From Mentoring to Developmental Networks: An Examination of Developmental Relationships in Sport

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Abstract

For several decades, mentoring has been viewed by many sport and non-sport scholars as a powerful type of developmental relationship between two people. However, evidence suggests there are additional developmental relationships that play an important role in a person's personal growth and development. To this end, researchers have advocated for the developmental network perspective, which proposes that people acquire a wide and diversified network of concurrent developmental relationships, such as mentors, who assist in their personal and professional development. The overarching purpose of this dissertation was to advance the conceptual and empirical understanding of developmental relationships in sport by conducting a cohesive series of three original manuscripts. Given a limited understanding of mentoring in sport compared to other domains, the first study used citation network analysis to synthesize and evaluate the mentoring literature across disciplines to inform mentoring in sport. Accordingly, the citation network analysis identified the major mentoring disciplines, uncovered the most influential mentoring texts, situated the sport mentoring discipline, and exposed gaps in the sport mentoring research. Taken together, the findings from study one served to advance our understanding of developmental relationships in sport, including advocating for the developmental network perspective. Therefore, the next two studies examined the developmental network perspective in two different contexts. Specifically, the second study qualitatively examined the developmental networks of experienced elite sport coaches, including the outcomes and types of assistance resulting from these developmental relationships. The findings indicated that coaches had a vast network of developmental relationships (e.g., coaches, athletes, family) that collectively contributed to their development on a personal and professional level. Furthermore, members of the developmental networks facilitated the acquisition of

developmental outcomes by providing intentional and unintentional forms of assistance, such as feedback, guidance, advice, and role modelling. Next, the third study used a mixed-methods case study design to examine the developmental networks of wheelchair rugby athletes with the purpose of providing insight into the collective developmental impact of their personal relationships, along with the quality and contribution of these relationships. Using a combination of social network analysis and thematic analysis, the findings indicated that wheelchair rugby athletes had small networks that included a diversified set of developmental relationships, such as peers, coaches, parents, romantic partners, and rehabilitation specialists. Furthermore, the quality of relationships varied as a function of the type of developmental relationship, which led to distinct developmental contributions, such as athlete's integration into the wheelchair rugby community, continued participation in this sport, and athletic development. In conclusion, this program of study adds to the growing body of literature on mentoring and developmental networks in sport by suggesting that people learn and develop with the assistance of multiple developmental relationships.

Résumé

Depuis plusieurs décennies, le mentorat a été considéré par de nombreux spécialistes, tant du domaine du sport que ceux non-sportif, comme une forme puissant de relation de développement entre deux personnes. Néanmoins, les preuves suggèrent qu'il existe d'autres relations de développement qui jouent un rôle important dans la croissance et le développement personnel d'une personne. Par conséquent, les chercheurs ont plaidé pour la perspective du réseau de développement qui propose que les gens acquièrent un réseau large et diversifié de relations de développement coexistantes, comme des mentors, qui aident à leur développement personnel et professionnel. L'objectif primordial de cette thèse était de faire progresser la compréhension conceptuelle et empirique des relations développementales dans le sport en menant une série cohérente de trois manuscrits originaux. Étant donné une compréhension limitée du mentorat dans le sport par rapport à d'autres domaines, la première étude a utilisé l'analyse des réseaux de citations afin de synthétiser et évaluer la documentation sur le mentorat dans toutes les disciplines afin d'éclairer le mentorat dans le sport. En conséquence, l'analyse du réseau de citations a identifié les principales disciplines de mentorat, découvert les textes de mentorat les plus influents, situé la discipline de mentorat sportif et mis en évidence les lacunes de la recherche sur le mentorat sportif. Ensemble, les résultats de la première étude ont servi à faire progresser notre compréhension des relations de développement dans le sport, y compris la promotion de la perspective du réseau de développement. Ainsi, les deux études suivantes ont examiné la perspective du réseau de développement dans deux contextes différents. Plus précisément, la deuxième étude a examiné qualitativement les réseaux de développement d'entraîneurs de sports d'élites expérimentés, y compris les résultats et les types d'aide résultant de ces relations de développement. Les résultats ont indiqué que les entraîneurs avaient un vaste

réseau de relations de développement (ex. entraîneurs, athlètes, famille) qui contribuaient collectivement à leur développement au niveau personnel et professionnel. Par ailleurs, les membres des réseaux de développement ont facilité l'acquisition de résultats de développement en fournissant des formes d'assistance intentionnelles et non intentionnelles, telles que des commentaires, de l'orientation, des conseils, et des modèles de rôle. Ensuite, la troisième étude a utilisé une conception d'étude de cas à méthodes mixtes pour examiner les réseaux de développement des athlètes de rugby en fauteuil roulant afin de donner un aperçu de l'impact développemental collectif de leurs relations personnelles ainsi que de la qualité et de la contribution de ces relations. En utilisant une combinaison d'analyse des réseaux sociaux et d'analyse thématique, les résultats ont indiqué que les athlètes de rugby en fauteuil roulant avaient de petits réseaux qui comprenaient un ensemble diversifié de relations de développement, comme des pairs, des entraîneurs, des parents, des partenaires romantiques, et des spécialistes de la réadaptation. En outre, la qualité des relations variait en fonction du type de relations de développement; ce qui a conduit à des contributions de développement distinctes, telles que l'intégration de l'athlète dans la communauté du rugby en fauteuil roulant, la participation continuée à ce sport, et le développement athlétique. En conclusion, ce programme d'étude s'ajoute au corpus croissant de littérature sur le mentorat et les réseaux de développement dans le sport en suggérant que les gens apprennent et se développent à l'aide de multiples relations de développement.

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[1] Bloom, G. A. (1996). *Characteristics, knowledge, and strategies of expert team sport coaches* (Doctoral dissertation). University of Ottawa.

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Chapter Two: A Citation Network Analysis of Career Mentoring Across Disciplines: A Roadmap for Mentoring Research in Sport

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- Contributions: The conceptualization, systematic multidisciplinary literature search, citation network analyses, and preliminary writing stages were completed autonomously during my comprehensive examination. Following this, I also took the lead in manuscript writing, as well as the journal submission and revisions.

Co-author: Gordon A. Bloom

- Contributions: Dr. Bloom created the comprehensive examination question that inspired the conceptualization of the study. Subsequent to the completion of the comprehensive examination, he provided support during the writing of the manuscript, journal submission, and revisions.

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- Contributions: Dr. Loughead provided support with the social network analyses, and throughout the writing and review of the manuscript.

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Chapter Three: A Qualitative Examination of the Developmental Networks of Elite Sport Coaches

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Chapter Four: A Mixed-Methods Case Study Examining the Developmental Networks of Athletes in a Wheelchair Rugby Team

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Co-author: Gordon A. Bloom

- Contributions: Dr. Bloom provided access to the para sport community, and also oversaw all stages of the study, including the conceptualization, ethics, data collection, data analysis, manuscript writing, and the journal submission.

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Preface

The dissertation is organized in manuscript format and includes five chapters. The first chapter is a general introduction that includes a review of the relevant literature, along with the rationale and objectives of the dissertation. Chapter two is an original manuscript that is published in *Psychology of Sport and Exercise* (Lefebvre, Bloom, & Loughead, 2020). Chapter three is an original manuscript that is accepted for publication in *Sport, Exercise, and Performance Psychology* (Lefebvre, Bloom, & Duncan, 2021). Chapter four is an original manuscript that has been submitted for review to a peer-reviewed journal. The fifth chapter is a general discussion, which includes a summary of the findings and a scholarly discussion of the implications of the results.

Chapter 1

General Introduction

There is growing recognition that the personal growth and development of a person is shaped by the people they encounter in their environments. For instance, in sport, there is increasing evidence to suggest that individual success is achieved with the support of a long list of personal relationships (e.g., Din et al., 2015; Lefebvre et al., 2019; Warmenhoven et al., 2021). As an example, Din et al.'s (2015) qualitative study found that "it took a village to win an [Olympic] medal" (p. 597), which included head coaches, assistant coaches, sport psychologists, physiologists, statisticians, nutritionists, physiotherapists, and parents, to name a few. To further exemplify this phenomenon, after winning the National Basketball Association (NBA) Most Valuable Player Award in 2014, Kevin Durant's acceptance speech served as a stark reminder of how one achieves greatness with the support of others:

> I just never thought that I could make it to college, NBA, or stand up here today in front of you guys and be an NBA Most Valuable Player. It's just a surreal feeling, and I had so much help. So many people believed in me when I didn't believe in myself. So many people doubted me and motivated me every single day to be who I am…When you got people behind you, you can do whatever. I wish I had a sharpie so I could write all your names on [trophy], because you had a hand in this. (Durant, 2014)

More specifically, Durant also referred to countless veteran teammates and coaches who provided developmental support akin to mentoring:

> Nick [veteran teammate] was the first guy I met when I got to Seattle as an 18-year-old. You took me in. You believed in me from the beginning. You knew that I had potential, and every single day I knew that I could look to you and know that you respect me as a

> man and as a player…Through the tough times, you guys [coaches] never left my side. Always wanted to help me get better. Always pushed me to new limits…And not just on the basketball court, but giving me talks about growing as a man first, and a basketball player next. (Durant, 2014)

Mentoring is undoubtedly an important type of developmental relationship. However, there is evidence to suggest that not everyone has the opportunity to be mentored in their careers (e.g., Bloom, 2013). Furthermore, scholars have advocated that there are other developmental relationships that play an important role in a person's personal growth and development (e.g., Higgins & Kram, 2001; Yip & Kram, 2017), indicating that mentoring is part of a larger developmental picture. To this end, researchers across a variety of disciplines have called for the examination of the developmental network perspective (e.g., Kram & Ragins, 2007; Leeder & Sawiuk, 2020), given that this perspective is an all-encompassing approach that incorporates all types of developmental relationships, including mentoring (Higgins & Kram, 2001).

The overarching purpose of the dissertation is to advance the conceptual and empirical understanding of developmental relationships in sport, within the context of mentoring and developmental networks. To contextualize the purpose, the ensuing review of the literature provides an overview of (a) mentoring theory and concepts, (b) mentoring research in sport, (c) contemporary approaches to mentoring, and (d) the developmental network perspective. Additionally, the rationale and research objectives of this dissertation are provided.

Literature Review

Learning is at the foundation of human development. In sport, *formal learning* occurs when individuals, such as coaches, partake in large-scale curriculum-based education, typically resulting in grades or certification. *Non-formal learning* occurs when individuals are involved in

workshops or conferences, often led by researchers or independent organizations. *Informal learning* consists of learning opportunities that can occur at any moment, intentionally or incidentally, independent from any formal educational system (Nelson et al., 2006; Trudel et al., 2009). All three of these forms of learning can be mediated or unmediated (Werthner & Trudel, 2006). *Mediated learning* is directed by an external individual, such as a teacher or an instructor (i.e., formal and nonformal learning). Alternatively, *unmediated learning* occurs when the learner takes initiative and chooses what is being learned (i.e., informal learning). Of particular relevance to this dissertation, mentoring is typically considered to be an informal, unmediated learning structure (e.g., Bloom et al., 1998; Hoffmann et al., 2019; Wilson et al., 2010).

Mentoring Theory and Concepts

Mentoring is defined as a type of developmental relationship between two individuals: a person who is perceived to have more experience and knowledge and a person who is perceived to have less (Bozeman & Feeney, 2007). Specifically, mentoring is "a process for the informal transmission of knowledge, social capital, and psychosocial support perceived by the recipient as relevant to work, career, or professional development" (Bozeman & Feeney, 2007, p. 731). The concept of mentoring dates back over 3,000 years, with origins emerging in ancient Greek mythology. Specifically, Mentor was a figure in Homer's epic poem "The Odyssey", whereby Athena, the goddess of wisdom, disguised herself as Mentor to provide guidance, teach, and protect Odysseus's son Telemachus while Odysseus sailed against troy (see Clutterbuck et al., 2017). Over time, a number of notable figures, such as scientists, writers, politicians, artists, actors, athletes, and coaches are reported to have been guided by mentors who played a key role in shaping their growth and development (Eby et al., 2007). The emerging recognition for mentoring inspired countless books (e.g., Levinson et al., 1978) along with an exponential

growth of research across a number of academic disciplines (Ragins & Kram, 2007). This surge resulted in a global recognition for the value of the mentoring relationship, leading to the formalization and corporatization of mentoring (Clutterbuck et al., 2017). Indeed, mentoring "has become a major social phenomenon" (Garvey, 2017, p. 16).

Mentor Role Theory

The academic development of mentoring was greatly enhanced by Dr. Kathy E. Kram's (1985) book, "Mentoring at work". Dr. Kram's (1985) seminal work provided the theoretical foundation of mentoring and has shaped what we know about mentoring today. Specifically, Kram's (1985) *mentor role theory* stipulates that mentors facilitate the professional development and personal growth of a mentee by providing career and psychosocial mentor functions. Accordingly, mentors contribute to the mentee's career development by providing the mentee with sponsorship, coaching, protection from adversity, challenging assignments, and increased professional exposure. Additionally, mentors contribute to the personal growth of mentees by assisting the mentee in developing a professional identity, acting as a sounding board, being respectful and supportive, and acting as a role model. Since its conception, decades of research has substantiated mentor role theory (Ragins & Kram, 2007), which has resulted in numerous measurement tools (e.g., Hoffmann et al., 2019; Noe, 1988; Scandura & Ragins, 1993), and has been tested across a diverse array of populations (e.g., Allen & Eby, 2004; Hoffmann & Loughead, 2016; Narcotta et al., 2009; Ragins & Cotton, 1999). In sum, mentor role theory has become an important pillar in developing a comprehensive understanding of mentoring.

Mentoring Structure

An important distinction in the concept of mentoring lies in the structure of the relationship, which can be either informal or formal. *Informal* mentoring refers to a mentor-

mentee relationship that emerges organically and is known to last anywhere between three and six years (Kram, 1985; Ragins & Cotton, 1999; Tourigny & Pulich, 2005). Traditionally, this structure of mentoring is considered to be popular, and very effective (e.g., Allen et al., 2004; Sambunjak et al., 2006). However, a number of scholars have reported that informal mentoring relationships are relatively unavailable to many keen individuals (Bloom, 2013; Kram, 1985). For this reason, many companies, organizations, and researchers aim to provide all individuals with the opportunity for formal mentoring relationships by developing and implementing mentoring programs (e.g., Buddeberg-Fischer & Herta, 2006; Grant et al., 2020; Koh et al., 2014; Noe, 1988). To this end, *formal mentoring* is characterized as a contractual mentoring relationship that is facilitated by a third party, such as a company or organization, who is responsible for matching the mentor and the mentee, and typically lasts between six months and one year (Kram, 1985; Tourigny & Pulich, 2005).

Mentoring Research in Sport

Although mentoring has a rich history in various disciplines, such as business (e.g., Kram, 1983), nursing (e.g., Andrews & Wallis, 1999), academics (e.g., Jacobi, 1991) and education (e.g., Wang & Odell, 2002), there has only recently been a surge in awareness for the value of mentoring in the sport literature (e.g., Bloom, 2013; Fairhurst et al., 2017; Fraina & Hodge, 2020; Leeder & Sawiuk, 2020). The majority of research in this context has examined the mentoring relationship between coaches (i.e., coach-coach dyads), and to a lesser extent between athletes (i.e., athlete-athlete dyads). In addition, a small body of research has also examined mentoring in para sport. Accordingly, the following section provides a brief overview of the sport literature that examines (a) coach-coach mentoring, (b) athlete-athlete mentoring, and (c) mentoring in para sport.

Coach-coach Mentoring

In sport coaching, mentoring has been cited as a vital source of professional development that can benefit both the mentor and mentee (Bloom, 2013; Bloom et al., 1998; Jones et al., 2009; Leeder & Sawiuk, 2020). The majority of coach mentoring research has examined the role of mentoring in the acquisition of knowledge, the outcomes related to mentoring, and the impact of formalized mentoring. First, the majority of sport coach mentoring research has examined mentoring within the broader context of coach learning, which has identified mentoring as an optimal source of knowledge acquisition (Bertz & Purdy, 2011; Cushion et al., 2003; Erickson et al., 2008; Gould et al., 1990; He et al., 2018; Irwin et al., 2004; Jones et al., 2003; Rathwell et al., 2014; Vallée & Bloom, 2016; Wilson et al., 2010; Wright et al., 2007). For instance, Erickson et al. (2008) examined the actual and preferred sources of coaching knowledge in 44 coaches and found that 48.5% of coaches identified mentoring as an ideal source of knowledge acquisition. As another example, Rathwell et al. (2014) examined the involvement of the head coach in the development and advancement of their assistant coaches. Among their findings, head coaches described the importance and value of mentoring their assistant coaches by exposing them to external sources of knowledge, such as coaching clinics, and by offering performance feedback as a way to maximize their development.

Second, several studies have directly investigated the mentoring process and found a range of beneficial outcomes for mentees and mentors within both informal and formal contexts (Bloom et al., 1998; Bloom et al., 2018; Grant et al., 2020; Koh et al., 2014; Narcotta et al., 2009; Schempp et al., 2016). Indeed, evidence indicated that mentor sport coaches provided career and psychosocial functions to help mentee coaches improve their coaching knowledge, professional identity (e.g., coaching style and philosophy), competence levels, self-efficacy,

interpersonal communication skills, and expand their networks (Bloom et al., 1998; Narcotta et al., 2009; Schempp et al., 2016). For instance, Bloom et al. (1998) qualitatively examined the mentoring experiences of 21 elite team sport coaches. Their findings highlighted that coaches were mentored by more experienced coaches early in their careers, which helped them develop their coaching philosophies and improve their performance. Eventually, these coaches started mentoring younger coaches, resulting in a cyclical process of mentoring (Bloom et al., 1998).

Finally, as a result of the positive benefits for mentors and mentees, many sport scholars have called for further research that explores the formalized mentoring process (e.g., Bloom, 2013; Bloom et al., 1998; Jones et al., 2009). Albeit limited, research that has examined the outcomes of mentoring programs indicated that mentees gained knowledge, innovation, and time management skills, and they developed personalized coaching styles (Grant et al., 2020; Koh et al., 2014). For instance, Grant et al. (2020) implemented and evaluated a pilot e-mentoring program for novice lacrosse coaches. Semi-structured interviews with both mentors and mentees revealed that mentees acquired important coaching knowledge, which ultimately led to an increase in confidence. Furthermore, the mentors reported feeling a sense of fulfillment during the mentoring process, which served as an opportunity to engage in meaningful self-reflection and refine their coaching knowledge.

In sum, the aforementioned coach mentoring research indicated that mentoring has the potential to serve as an important tool for the personal and professional development of sport coaches. Despite the expressed desire for mentoring, the coach education and career development literature in sport has been inclined to focus on other aspects of coach development (e.g., large-scale coach education curriculum; Lefebvre et al., 2016). Perhaps for this reason, the

available coach mentoring literature remains limited, which has hampered both conceptual advancements and indisputable support for the validity of mentoring for sport coaches.

Athlete-athlete Mentoring

Recently, a growing body of research has sought to examine the mentoring relationship between athletes (e.g., Cope et al., 2011; Hoffmann & Loughead, 2016; Hoffmann & Loughead, 2019; Hoffmann et al., 2017; Hoffmann et al., 2019; Perna et al., 1996; Sandardos & Chambers, 2019). For instance, Hoffmann and Loughead (2016) examined the mentoring experiences of 272 intercollegiate athletes and found that psychosocial mentoring functions were positively related to mentee satisfaction. That is, mentee athletes reported feeling greater levels of satisfaction with their performance and their personal dedication when perceiving higher levels of mentoring support from senior teammates. In addition, Hoffmann et al. (2017) qualitatively examined the mentoring experiences of 14 elite athletes. Their findings indicated that athlete mentors facilitated the development of athlete mentees (e.g., enhanced performance, confidence) by engaging in various career and psychosocial mentoring functions, such as providing guidance (e.g., mental skills, relationships with coaches), role modelling, and counseling. In sum, Hoffmann and colleagues' body of research provides preliminary evidence that athlete-athlete mentoring relationships have a positive impact on the sport experiences of athletes. However, more research is required to substantiate this contention and to further understand the implications of athlete-athlete mentoring relationships.

Mentoring in Para Sport

There has also been growing evidence for the utility of mentoring for the development of para sport coaches (e.g., Cregan et al., 2007; Douglas et al., 2018; Fairhurst et al., 2017; Lepage et al., 2020; Taylor et al., 2014) and athletes (Machida et al., 2013; Perrier et al., 2015). Given

that para sport coaches have often described their career progression as unplanned (Cregan et al., 2007), novice para sport coaches often turned to an experienced para sport coach for guidance, information, or advice (Fairhurst et al., 2017; Lepage et al., 2020). Thus, para sport coach-coach mentoring has been a prominent avenue for acquiring information related to effective coaching principles, such as communication, organization, training and competition, and information specific to athletes' impairments (Fairhurst et al., 2017; Lepage et al., 2020; Taylor et al., 2014), as well as providing coaches with the confidence to execute these skills in practice (Lepage et al., 2020). For instance, a qualitative examination of six highly successful Paralympic coaches found that these coaches sought out mentors to overcome challenges with acquiring coaching knowledge specific to para sport (Fairhurst et al., 2017). There has also been limited preliminary support to suggest athlete-athlete mentoring could also be an effective means of development in para sport (Machida et al., 2013; Perrier et al., 2015). For instance, Machida et al. (2013) interviewed 12 male wheelchair rugby players and found that athletes acted as peer mentors to help their teammates deal with adversity by providing belongingness, confidence, and motivation. Despite limited evidence for the role of mentoring between teammates (i.e., athlete-athlete dyads), there is emerging evidence to suggest that peer mentoring is vital for individuals with an impairment in non-sport contexts (see Chemtob et al., 2018; Gainforth et al., 2019; Hillier et al., 2019).

Taken together, it is apparent that there remains a need for more mentoring research in all sport contexts to better understanding the value of developmental relationships in sport. Furthermore, sport mentoring scholars have most-commonly examined the mentoring relationship within the traditional conceptualization of mentoring—a dyadic process involving two individuals of unequal power (e.g., age, seniority, experience; e.g., Bloom, 2013; Higgins &

Kram, 2001). Although the evidence for mentoring in sport suggests that this traditional approach to mentoring is effective (e.g., Bloom et al., 1998; Koh et al., 2014), this conceptualization fails to account for concurrent mentoring relationships, mentoring relationships characterized by alternative power dynamics (e.g., peer mentors, reverse mentors), and developmental relationships outside of the work environment (e.g., family, friends). This has led mentoring scholars in other disciplines to explore *contemporary conceptualizations of mentoring*, such as alternative forms of dyadic mentoring, triadic mentoring structures, and polyadic mentoring structures (e.g., Higgins & Kram, 2001; Moss et al., 2008; Mullen, 2016).

Contemporary Conceptualizations of Mentoring

Dyadic mentoring relationships can involve two individuals of unequal power (i.e., vertical mentoring, reverse mentoring), or two individuals of equal stature (i.e., lateral mentoring). Although vertical mentoring characterizes the aforementioned traditional conceptualization of mentoring, another type of vertical mentoring is *reverse mentoring,* where a novice shares new concepts, innovative strategies, and technological skills to their senior counterparts (Chen, 2013). To provide a sport example, a newly hired assistant coach could provide assistance to the senior head coach by introducing novel technological methods for watching game-tape. Furthermore, lateral mentoring, often referred to as *peer mentoring*, is characterized by two individuals of similar power (i.e., age, rank, and/or experience) involved in a mentoring relationship whereby learning is co-constructed and developmental impact is reciprocal (Kram & Isabella, 1985; Moss et al., 2008). As an example, this might include two first year student-athletes who help each other navigate the demands of academics and athletic performance by collectively sharing their knowledge and experience. Next, the most common triadic mentoring structure is *facilitated peer mentoring,* whereby peer cohorts are overseen by

senior mentors in a hierarchical manner (Files et al., 2008). According to Files et al. (2008), this type of mentoring allows for the advantages of lateral mentoring (e.g., mutual construction of knowledge), while maintaining the benefits of traditional hierarchical mentoring (e.g., experience and expertise). For instance, a coach mentoring program embedded within an advanced coaching diploma might provide pairs of developing coaches with a mentor coach, whereby all three are formally engaged in mentoring relationships with one another.

Furthermore, a number of polyadic mentoring structures are gaining research attention, within and outside of the sport discipline, such as group mentoring (e.g., Kroll et al., 2020), multiple mentoring (e.g., Sawiuk et al., 2017), information networks (e.g., Occhino et al., 2013), and developmental networks (e.g., Higgins et al., 2001). *Group mentoring* can include a group of peers who engage in mutual mentoring (i.e., peer group mentoring; Kaunisto et al., 2012; Kroll et al., 2020) or can involve group discussions facilitated by a mentor, whereby the mentors' experience is made available to multiple mentees concurrently (i.e., collaborative peer group mentoring; Alleyne et al., 2009). For instance, Kroll et al. (2020) used a peer group mentoring approach, whereby groups of four peer athletes engaged in bi-weekly meetings with the shared purpose of supporting each other's growth and development. Next, *multiple mentoring* is an extension of the traditional approach to mentoring and is characterized by the emergence of more than one senior mentor who each provide different types and amounts of support (Higgins & Kram, 2001; Sawiuk et al., 2017). As an example, a novice coach might reach out to multiple senior coaches across various sport organizations for developmental support. Furthermore, Occhino et al. (2013) described various forms of informal networks, such as communities of practice and dynamic social networks. A *community of practice* consists of a group of individuals who share a similar passion and meet or interact in a continuous manner as a means

of exchanging information, knowledge, and expertise about a specific topic or concern (Culver et al., 2009; Wenger, 1998). As an example, a group of athletes might establish a discussion group designed to brainstorm ideas to support diversity in sport. Alternatively, a *dynamic social network* consists of an evolving information network of trusted colleagues who share knowledge related to their profession (Occhino et al., 2013). For instance, a coach might engage with other coaches in their social circle as a means of acquiring coaching knowledge or to request advice regarding a specific issue. Lastly, the contemporary conceptualization of mentoring that has received much support across mentoring disciplines in the past two decades is the *developmental network perspective* (Higgin & Kram, 2001).

The Developmental Network Perspective

A developmental network consists of "the set of people a [mentee] names as taking an active interest in and action to advance the [mentee]'s career by providing developmental assistance" (Higgins & Kram, 2001, p. 268). Accordingly, this framework can simultaneously encompass the developmental impact of traditional mentors, peer mentors, reverse mentors, family, friends, romantic partners, and more. Therefore, developmental agents can range in power dynamics, such as superiors, colleagues, or subordinates, as well as structure, such as dyadic (e.g., traditional mentoring), triadic (e.g., facilitated peer mentoring), and polyadic forms of mentoring (e.g., community of practice). Taken together, in sport, an assistant coach might include their head coach (i.e., superior; traditional mentoring), co-assistant (i.e., colleague; peer mentoring), an athlete (i.e., subordinate; reverse mentoring), a group of colleagues (i.e., information network), or individuals outside of their sport environment, such as a father, a romantic partner, and/or a friend. Furthermore, as an extension of mentoring, the developmental

network perspective assumes that developmental agents provide varying levels and types of Kram's (1985) mentor functions (Higgins & Kram, 2001).

A unique feature of the developmental network perspective is that it is grounded in social network theory (Higgins & Kram, 2001; see also Borgatti et al., 2009; Burt, 1992; Granovetter, 1973). At the center of social network theory is the premise that individuals are embedded in thick webs of social interactions and relationships, which combine to form networks. In sport, this might include leadership networks (e.g., Fransen et al., 2015), cohesion networks (Loughead et al., 2016), or, in theory, developmental networks. Notably, social network theory is embedded within graph theory, which is an approach that provides mathematical language to describe and understand the structural properties and patterns within networks (Barnes & Harary, 1983; Scott, 2017; Wasserman & Faust, 1994). Accordingly, networks are visually represented via sociograms, which are composed of a set of actors (i.e., nodes) and relational ties (i.e., edges; Borgatti & Foster, 2003; Scott, 2017). For instance, team sports are closed networks that consist of actors (e.g., players, coaches), which have varying interconnections represented by relational ties (e.g., leadership, cohesion, development). Relational ties can vary in directionality and can be either undirected or directed. An *undirected* network is one where relational ties merely represent shared connections and are assumed to be reciprocal. Alternatively, a *directed* network is one where relational ties can be one-directional or bidirectional. Relational ties can also vary in numeration and can be binary or valued. Within *binary* networks, relational ties between actors are either present or absent. Alternatively, within *valued* networks, relational ties are measured on a scale and therefore account for the strength of a tie beyond its sheer presence. Lastly, networks can be sociocentric or egocentric. A *sociocentric* network is composed of relations between people within a defined group, such as a sport team. An *egocentric* network is

composed of relations surrounding a focal individual, as opposed to closed group (see Borgatti & Foster, 2003; Scott, 2017).

Aligned with social network principles, a developmental network consists of nodes (i.e., developmental agents) and edges (i.e., developmental relationships). The structure of developmental networks can vary along five dimensions: (1) network size, (2) strength of ties, (3) network diversity, (4) multiplexity, and (5) network reachability (Higgins & Kram, 2001; Murphy & Kram, 2010; Yip & Kram, 2017). First, *network size* refers to the overall number of developmental agents in a person's network. Second, *strength of ties* corresponds to the quality of the developmental relationships (i.e., ties) between a person and their developmental agents. Quality is commonly measured as perceived psychological closeness, or quantity of developmental support (Cummings & Higgins, 2006; Murphy & Kram, 2010). Third, *network diversity* corresponds to the range of developmental agents in one's developmental network. Range can be determined by one or more factors, such as type of relationship (e.g., colleague vs. family member), race, gender, age, etc. Fourth, *multiplexity* corresponds to the extent that a developmental agent is connected to a mentee through more than one type of relationship. For instance, an athlete's developmental agent could be both a teammate and a sibling. Lastly, *reachability* refers to the status of the developmental agents within a developmental network, which is typically determined by rank and/or social capital and is theorized to be associated with advancement and access to privileged knowledge (Higgins & Kram, 2001; Murphy & Kram, 2010; Yip & Kram, 2017).

Over the past two decades, there has been growing support for the developmental network perspective in many disciplines, such as business (e.g., Chanland & Murphy, 2018), nursing (e.g., MacLaren, 2018), medicine, (e.g., DeCastro et al., 2013), higher education (e.g.,

Baker & Lattuca, 2010), and academia (e.g., Griffin et al., 2018). Notably, due to the holistic nature of this approach—concurrently taking into account multiple developmental relationships—the developmental network perspective has been found to be a stronger predictor of developmental outcomes than the traditional dyadic approach to mentoring (Dobrow et al., 2012; Higgins & Thomas, 2001). Specifically, the developmental network literature provided evidence that network size, strength of ties, and network diversity were positively associated with a number of beneficial outcomes, such as promotions, confidence to overcome obstacles, access to novel perspectives, work satisfaction, retention, and performance (Dobrow et al., 2012; Higgins & Thomas, 2001; Kirchmeyer, 2005; van Emmerik, 2004). For instance, van Emmerik (2004) employed questionnaires to examine the developmental networks of 1,010 academics. Their findings indicated that the structural characteristics of the developmental networks, such as the size and range of participants' networks, were positively associated with intrinsic career success. As another example, Griffin et al. (2018) conducted a case study to examine the developmental networks of 16 underrepresented graduate students. Qualitative interviews revealed that minority graduate students drew support from a diverse network of developmental agents that included people from both within and outside of their academic community, such as supervisors, faculty, administrators, peers, and friends.

In sum, following the words of Yip and Kram (2017), "a developmental network perspective opens up new approaches to further the science and practice of mentoring" (p. 100). Importantly, despite the wealth of knowledge that provides support for the developmental network perspective as a promising avenue to understanding developmental relationships, it has yet to be directly examined in the sport context. Recently, sport mentoring scholars have been calling for increased attention to the developmental network perspective (e.g., Leeder & Sawiuk,

2020; Sawiuk et al., 2017). For instance, Leeder and Sawiuk's (2020) review of contemporary trends in the sport coach mentoring literature concluded that "the concept of developmental networks might help researchers to understand how coaches learn or advance their career in the dynamic and chaotic environment of sports coaching" (p. 10–11).

Rationale

Despite the popularity of mentoring in non-sport domains, there remains a limited knowledge base exemplifying the viability, efficacy, and understanding of mentoring in sport. Fortunately, there is a wealth of knowledge available in other mentoring disciplines (e.g., management, academic medicine, education) that can inform future research endeavours in sport. In addition, given the acknowledgement that there are other types of personal relationships that can serve in a developmental capacity, there have been growing calls to examine developmental relationships, including mentoring, within the developmental network perspective (Higgins & Kram, 2001; Yip & Kram, 2017). Indeed, according to Kram and Ragins (2007), "this paradigm shift [from mentoring] allows us to more accurately describe multiple sources of developmental support and detail the cumulative impact of developmental networks" (p. 660). Supporting this contention, the developmental network perspective has also been advocated as a favourable avenue for examining developmental relationships in sport (e.g., Leeder & Sawiuk, 2020; Sawiuk et al., 2017).

Research Objectives

The overarching purpose of the dissertation is to advance the conceptual, empirical, and methodological understanding of developmental relationships in sport, within the context of mentoring and developmental networks. To accomplish this purpose, the dissertation sought to address two specific research objectives:

1. Given the paucity of mentoring research in sport, the first objective is to a review the mentoring literature. To address this objective, chapter two presents a multidisciplinary synthesis of the mentoring literature, with the purpose of informing future sport mentoring research.
2. To further our understanding of the impact of developmental relationships in sport, the second objective is to examine the developmental network perspective in various sport populations. To address this objective, chapter three presents a qualitative examination of the developmental networks of elite sport coaches, and chapter four presents a mixed-methods case study examining the developmental networks of wheelchair rugby athletes.

References

Allen, T. D., & Eby, L. T. (2004). Factors related to mentor reports of mentoring functions provided: Gender and relational characteristics. *Sex Roles, 50*(1–2), 129–139.

Allen, T. D., Eby, L. T., Poteet, M. L., Lentz, E., & Lima, L. (2004). Career benefits associated with mentoring for protégés: A meta-analysis. *Journal of Applied Psychology, 89*(1), 127–136.

Alleyne, S. D., Horner, M. S., Walter, G., Fleisher, S. H., Arzubi, E., & Martin, A. (2009). Mentors' perspectives on group mentorship: A descriptive study of two programs in child and adolescent psychiatry. *Academic Psychiatry, 33*(5), 377–382.

Andrews, M., & Wallis, M. (1999). Mentorship in nursing: A literature review. *Journal of Advanced Nursing, 29*(1), 201–207.

Baker, V. L., & Lattuca, L. R. (2010). Developmental networks and learning: Toward an interdisciplinary perspective on identity development during doctoral study. *Studies in Higher Education, 35*(7), 807–827.

Barnes, J. A. & Harary, F. (1983). Graph theory in network analysis. *Social Networks, 5*(2), 235–244.

Bertz, S., & Purdy, L. (2011). Coach education in Ireland: Observations and considerations for high performance. *Journal of Coaching Education, 4*(3), 29–43.

Bloom, G. A. (2013). Mentoring for sports coaches. In P. Potrac, W. Gilbert, & J. Denison (Eds.), *The routledge handbook of sports coaching* (pp. 476–485). Routledge.

Bloom, G. A., Durand-Bush, N., Schinke, R. J., & Salmela, J. H. (1998). The importance of mentoring in the development of coaches and athletes. *International Journal of Sport Psychology, 29*(3), 267–281.

Bloom, G. A., Lefebvre, J. S., & Smith, P. (2018). Canadian case study conversation: Mentorship in elite women's ice hockey. In F. C. Chambers (Ed.), *Learning to mentor in sports coaching: A design thinking approach* (pp. 169–184). Routledge.

Borgatti, S. P., & Foster, P. C. (2003). The network paradigm in organizational research: A review and typology. *Journal of Management, 29*(6), 991–1013.

Borgatti, S. P., Mehra, A., Brass, D. J., & Labianca, G. (2009). Network analysis in the social sciences. *Science, 323*(5916), 892–895.

Bozeman, B., & Feeney, M. K. (2007). Toward a useful theory of mentoring: A conceptual analysis and critique. *Administration & Society*, *39*(6), 719–739.

Buddeberg-Fischer, B., & Herta, K. D. (2006). Formal mentoring programmes for medical students and doctors—a review of the Medline literature. *Medical Teacher*, *28*(3), 248–257.

Burt, R. S. (1992). *Structural holes: The social structure of competition*. Cambridge University Press.

Chanland, D. E., & Murphy, W. M. (2018). Propelling diverse leaders to the top: A developmental network approach. *Human Resource Management, 57*(1), 111–126.

Chemtob, K., Caron, J. G., Fortier, M. S., Latimer-Cheung, A. E., Zelaya, W., & Sweet, S. N. (2018). Exploring the peer mentorship experiences of adults with spinal cord injury. *Rehabilitation Psychology*, *63*(4), 542–552.

Chen, Y. C. (2013). Effect of reverse mentoring on traditional mentoring functions. *Leadership and Management in Engineering, 13*(3), 199–208.

Clutterbuck, D. A., Kochan, F., Lunsford, L. G., Dominguez, N. & Haddock-Millar. (2017). Introduction. In D. A. Clutterbuck, F. K. Kochan, L. G. Lunsford, N. Dominguez, & J. Haddock-Millar (Eds.), *Sage handbook of mentoring* (pp. 1–10). Sage.

Cope, C. J., Eys, M. A., Beauchamp, M. R., Schinke, R. J., & Bosselut, G. (2011). Informal roles on sport teams. *International Journal of Sport and Exercise Psychology, 9*(1), 19–30.

Cregan, K., Bloom, G. A., & Reid, G. (2007). Career evolution and knowledge of elite coaches of swimmers with a physical disability. *Research Quarterly for Exercise and Sport, 78*(4), 339–350.

Culver, D. M., Trudel, P., & Werthner, P. (2009). A sport leader's attempt to foster a coaches' community of practice. *International Journal of Sports Science & Coaching, 4*(3), 365–383.

Cummings, J. N., & Higgins, M. C. (2006). Relational instability at the network core: Support dynamics in developmental networks. *Social Networks*, *28*(1), 38–55.

Cushion, C. J., Armour, K. M., & Jones, R. L. (2003). Coach education and continuing professional development: Experience and learning to coach. *Quest*, *55*(3), 215–230.

DeCastro, R., Sambuco, D., Ubel, P. A., Stewart, A., & Jagsi, R. (2013). Mentor networks in academic medicine: Moving beyond a dyadic conception of mentoring for junior faculty researchers. *Academic Medicine*, *88*(4), 488–496.

Din, C., Paskevich, D., Gabriele, T., & Werthner, P. (2015). Olympic medal-winning leadership. *International Journal of Sports Science & Coaching*, *10*(4), 589–604.

Dobrow, S. R., Chandler, D. E., Murphy, W. M., & Kram, K. E. (2012). A review of developmental networks: Incorporating a mutuality perspective. *Journal of Management*, *38*(1), 210–242.

Douglas, S., Falcão, W. R., & Bloom, G. A. (2018). Career development and learning pathways of Paralympic coaches with a disability. *Adapted Physical Activity Quarterly*, *35*(1), 93–110.

Durant, K. (Speaker) (2014). *Kevin Durant wins MVP.* Retrieved from https://www.youtube.com/ watch?v=LFMh5GOCdpY&t=1186s

Eby, L. T., Rhodes, J. E. & Allen, T. D. (2007). Definition and evolution of mentoring. In T. D. Allen & L. T. Eby (Eds.), *The Blackwell handbook of mentoring: A multiple perspectives approach* (pp. 7–20). John Wiley & Sons.

Erickson, K., Bruner, M. W., MacDonald, D. J., & Côté, J. (2008). Gaining insight into actual and preferred sources of coaching knowledge. *International Journal of Sports Science & Coaching*, *3*(4), 527–538.

Fairhurst, K. E., Bloom, G. A., & Harvey, W. J. (2017). The learning and mentoring experiences of Paralympic coaches. *Disability and Health Journal*, *10*(2), 240–246.

Files, J. A., Blair, J. E., Mayer, A. P., & Ko, M. G. (2008). Facilitated peer mentorship: A pilot program for academic advancement of female medical faculty. *Journal of Women's Health*, *17*(6), 1009–1015.

Fraina, M., & Hodge, S. R. (2020). Mentoring relationships among athletes, coaches, and athletic administrators: A literature review. *Journal for the Study of Sports and Athletes in Education*, *14*(2), 140–164.

Fransen, K., Van Puyenbroeck, S., Loughead, T. M., Vanbeselaere, N., De Cuyper, B., Vande Broek, G., & Boen, F. (2015). Who takes the lead? Social network analysis as a pioneering tool to investigate shared leadership within sports teams. *Social Networks*, *43*, 28–38.

Gainforth, H. L., Giroux, E. E., Shaw, R. B., Casemore, S., Clarke, T. Y., McBride, C. B., Garnett, C. V., & Sweet, S. N. (2019). Investigating characteristics of quality peer mentors with spinal cord injury. *Archives of Physical Medicine and Rehabilitation, 100*(1), 1916–1923.

Garvey, B. (2017). Philosophical origins of mentoring: The critical narrative analysis. In D. A. Clutterbuck, F. K. Kochan, L. G. Lunsford, N. Dominguez, & J. Haddock-Millar (Eds.), *Sage handbook of mentoring* (pp. 15–33). Sage.

Gould, D., Giannini, J., Krane, V., & Hodge, K. (1990). Educational needs of elite US national team, Pan American, and Olympic coaches. *Journal of Teaching in Physical Education, 9*(4), 332–334.

Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology, 78*(6), 1360–1380.

Grant, M. A., Bloom, G. A., & Lefebvre, J. S. (2020). Lesson's learned: Coaches' perceptions of a pilot e-mentoring programme. *International Sport Coaching Journal, 7*(1), 22–30.

Griffin, K., Baker, V., O'Meara, K., Nyunt, G., Robinson, T., & Staples, C. L. (2018). Supporting scientists from underrepresented minority backgrounds. *Studies in Graduate and Postdoctoral Education, 9*(1), 19–37.

He, C., Trudel, P., & Culver, D. M. (2018). Actual and ideal sources of coaching knowledge of elite Chines coaches. *International Journal of Sports Science & Coaching, 13*(4), 496–507.

Higgins, M. C., & Kram, K. E. (2001). Reconceptualizing mentoring at work: A developmental network perspective. *Academy of Management Review, 26*(2), 264–288.

Higgins, M. C., & Thomas, D. A. (2001). Constellations and careers: Toward understanding the effects of multiple developmental relationships. *Journal of Organizational Behavior, 22*(3), 223–247.

Hillier, A., Goldstein, J., Tornatore, L., Byrne, E., & Johnson, H. M. (2019). Outcomes of a peer mentoring program for university students with disabilities. *Mentoring & Tutoring: Partnership in Learning*, *27*(5), 487–508.

Hoffmann, M. D., & Loughead, T. M. (2016). Investigating athlete mentoring functions and their association with leadership behaviours and protégé satisfaction. *International Journal of Sport and Exercise Psychology, 14*(1), 85–102.

Hoffmann, M. D., & Loughead, T. M. (2019). Preliminary development of a questionnaire to assess peer athlete mentoring functions: The Athlete Mentoring Questionnaire (AMQ). *Measurement in Physical Education and Exercise Science, 23*(1), 10–25.

Hoffmann, M. D., Loughead, T. M., & Bloom, G. A. (2017). Examining the experiences of peer mentored athletes competing in elite sport. *The Sport Psychologist, 31*(2), 134–136.

Hoffmann, M. D, Loughead, T. M., & Caron, J. G. (2019). Mentoring identity and the motivation to mentor: A case study of an exemplary peer athlete mentor. *The Sport Psychologist, 33*(1), 52–63.

Irwin, G., Hanton, S., & Kerwin, D. (2004). Reflective practice and the origins of elite coaching knowledge. *Reflective Practice*, *5*(3), 425–442.

Jacobi, M. (1991). Mentoring and undergraduate academic success: A literature review. *Review of Educational Research, 61*(4), 505–532.

Jones, R. L., Armour, K. M., & Potrac, P. (2003). Constructing expert knowledge: A case study of a top-level professional soccer coach. *Sport, Education and Society, 8*(2), 213–229.

Jones, R. L., Harris, R., & Miles, A. (2009). Mentoring in sports coaching: A review of the literature. *Physical Education and Sport Pedagogy, 14*(3), 267–284.

Kaunisto, S.-L., Estola, K., & Niemisto, R. (2012). The group as a context for peer-group mentoring. In H. Heikkinen, H. Jokinen, & P. Tynjala (Eds.), *Peer-group mentoring for teacher development* (pp. 112–120). Routledge.

Kirchmeyer, C. (2005). The effects of mentoring on academic careers over time: Testing performance and political perspectives. *Human Relations*, *58*(5), 637–660.

Koh, K. T., Bloom, G. A., Fairhurst, K. E., Paiement, D. M., & Kee, Y. H. (2014). An investigation of a formalized mentoring program for novice basketball coaches. *International Journal of Sport Psychology, 45*(1), 11–32.

Kram, K. E. (1983). Phases of the mentor relationship. *Academy of Management Journal, 26*(4), 608–625.

Kram, K. E. (1985). *Mentoring at work: Developmental relationships in organizational life.* Scott Foresman.

Kram, K. E., & Isabella, L. A. (1985). Mentoring alternatives: The role of peer relationships in career development. *Academy of Management Journal*, *28*(1), 110–132.

Kram, K. E., & Ragins, B. R. (2007). The landscape of mentoring in the 21st century. In B. R. Ragins & K. E. Kram (Eds.), *The handbook of mentoring at work: Theory, research, and practice* (pp. 659–692). Sage.

Kroll, J., Blake-Beard, S., & McMillian-Roberts, K. (2020). An exploration of the peer group mentoring experiences of university female basketball athletes. *Mentoring & Tutoring: Partnership in Learning, 28*(2), 229–252.

Leeder, T. M., & Sawiuk, R. (2020). Reviewing the sports coach mentoring literature: A look back to take a step forward. *Sports Coaching Review*. Advance online publication. https://doi.org.10.1080/21640629.2020.1804170

Lefebvre, J. S., Evans, M. B., Turnnidge, J., Gainforth, H. L., & Côté, J. (2016). Describing and classifying coach development programmes: A synthesis of empirical research and applied practice. *International Journal of Sports Science & Coaching*, *11*(6), 887–899.

Lefebvre, J. S., Martin, L. J., Côté, J., & Cowburn, I. (2019). Investigating the process through which national hockey league player development coaches 'develop' athletes: An exploratory qualitative analysis. *Journal of Applied Sport Psychology*. Advance online publication. https://doi.org/10.1080/10413200.2019.1688893

Lepage, P., Bloom, G. A., & Falcão, W. R. (2020). Development and acquisition of knowledge of youth parasport coaches. *Adapted Physical Activity Quarterly*, *37*(1), 72–89.

Levinson, D. J., Darrow, C. N., Klein, E. B., Levinson, M. H., & McKee, B. (1978). *The seasons of a man's life*. Random House.

Loughead, T. M., Fransen, K., Van Puyenbroeck, S., Hoffmann, M., De Cuyper, B., Vanbeselaere, N., & Boen, F. (2016). An examination of the relationship between athlete leadership and cohesion using social network analysis. *Journal of Sports Sciences, 34*(21), 2063–2073.

Machida, M., Irwin, B., & Feltz, D. (2013). Resilience in competitive athletes with spinal cord injury: The role of sport participation. *Qualitative Health Research*, *23*(8), 1054–1065.

MacLaren, J. A. (2018). Supporting nurse mentor development: An exploration of developmental constellations in nursing mentorship practice. *Nurse Education in Practice*, *28*, 66–75.

Moss, J., Teshima, J., & Leszcz, M. (2008). Peer group mentoring of junior faculty. *Academic Psychiatry*, *32*(3), 230–235.

Mullen, C. A. (2016). Alternative mentoring types. *Kappa Delta Pi Record*, *52*(3), 132–136.

Murphy, W. M., & Kram, K. E. (2010). Understanding non-work relationships in developmental networks. *Career Development International*, *15*(7), 637–663.

Narcotta, E. M., Petersen, J., & Johnson, S. R. (2009). Mentor functions in NCAA women's soccer coaching dyads. *Team Performance Management*, *15*(3–4), 100–116.

Noe, R. A. (1988). An investigation of the determinants of successful assigned mentoring relationships. *Personnel Psychology*, *41*(3), 457–479.

Nelson, L. J., Cushion, C. J., & Potrac, P. (2006). Formal, nonformal and informal coach learning: A holistic conceptualisation. *International Journal of Sports Science & Coaching*, *1*(3), 247–259.

Occhino, J., Mallett, C., & Rynne, S. (2013). Dynamic social networks in high performance football coaching. *Physical Education and Sport Pedagogy*, *18*(1), 90–102.

Perna, F. M., Zaichkowsky, L., & Bocknek, G. (1996). The association of mentoring with psychosocial development among male athletes at termination of college career. *Journal of Applied Sport Psychology*, *8*(1), 76–88.

Perrier, M., Smith, B. M., & Latimer-Cheung, A. E. (2015). Stories that move? Peer athlete mentors' responses to mentee disability and sport narratives. *Psychology of Sport and Exercise*, *18*, 60–67.

Ragins, B. R., & Cotton, J. L. (1999). Mentor functions and outcomes: A comparison of men and women in formal and informal mentoring relationships. *Journal of Applied Psychology*, *84*(4), 529–550.

Ragins, B. R., & Kram, K. E. (2007). The roots and meaning of mentoring. In B. R. Ragins & K. E. Kram (Eds.), *The handbook of mentoring at work: Theory, research, and practice* (pp. 3–15). Sage.

Rathwell, S., Bloom, G. A., & Loughead, T. M. (2014). Head coaches' perceptions on the roles, selection, and development of the assistant coach. *International Sport Coaching Journal, 1*(1), 5–16.

Sandardos, S. S., & Chambers, T. P. (2019). "It's not about sport, it's about you": An interpretative phenomenological analysis of mentoring elite athletes. *Psychology of Sport and Exercise, 43*, 144–154.

Sambunjak, D., Straus, S. E., & Marušić, A. (2006). Mentoring in academic medicine: A systematic review. *Journal of American Medical Association, 296*(9), 1103–1115.

Sawiuk, R., Taylor, W. G., & Groom, R. (2017). An analysis of the value of multiple mentors in formalised elite coach mentoring programmes. *Physical Education and Sport Pedagogy, 22*(4), 403–413.

Scandura, T. A., & Ragins, B. R. (1993). The effects of sex and gender role orientation on mentorship in male-dominated occupations. *Journal of Vocational Behavior, 43*(3), 251–265.

Schempp, P. G., Elliott, J., McCullick, B. A., Laplaca, D., & Berger, B. (2016). Mentors' roles in basketball coaching. *International Journal of Sport Psychology, 47*(6), 508–522.

Scott, J. (2017). *Social network analysis.* Sage.

Taylor, S. L., Werthner, P., & Culver, D. (2014). A case study of a parasport coach and a life of learning. *International Sport Coaching Journal, 1*(3), 127–138.

Tourigny, L., & Pulich, M. (2005). A critical examination of formal and informal mentoring among nurses. *The Health Care Manager, 24*(1), 68–76.

Trudel, P., Gilbert, W., & Werthner, P. (2009). Coach education effectiveness. In J. Lyle, & C. Cushion (Eds.), *Sport coaching: Professionalisation and practice* (pp. 135–152). Elsevier.

Vallée, C. N., & Bloom, G. A. (2016). Four keys to building a championship culture. *International Sport Coaching Journal, 3*(2), 170–177.

van Emmerik, I. J. H. (2004). The more you can get the better: Mentoring constellations and intrinsic career success. *Career Development International*, *9*(6), 578–594.

Wang, J., & Odell, S. J. (2002). Mentored learning to teach according to standards-based reform: A critical review. *Review of Educational Research*, *72*(3), 481–546.

Warmenhoven, J., Weissensteiner, J. R., & MacMahon, C. (2021). "It takes a village": the sources and types of support in development of male cricket players. *Journal of Science and Medicine in Sport, 24*(2), 164–170.

Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications*. Cambridge University Press.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.

Werthner, P., & Trudel., P. (2006). A new theoretical perspective for understanding how coaches learn to coach. *The Sport Psychologist, 20*(2), 198–212.

Wilson, L. M., Bloom, G. A., & Harvey, W. J. (2010). Sources of knowledge acquisition: Perspectives of the high school teacher/coach. *Physical Education and Sport Pedagogy, 15*(4), 383–399.

Wright, T., Trudel, P., & Culver, D. (2007). Learning how to coach: The different learning situations reported by youth ice hockey coaches. *Physical Education and Sport Pedagogy*, *12*(2), 127–144.

Yip, J., & Kram, K. E. (2017). Developmental networks: Enhancing the science and practice of mentoring. In D. A. Clutterbuck, F. K. Kochan, L. G. Lunsford, N. Dominguez, & J. Haddock-Millar (Eds.), *Sage handbook of mentoring* (pp. 88–104). Sage.

Chapter 2

A Citation Network Analysis of Career Mentoring Across Disciplines: A Roadmap for Mentoring Research in Sport

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Abstract

Objective: Given our limited understanding of mentoring in sport, reviewing research from other disciplines has the potential to advance knowledge in this context. Therefore, the purpose of this study was to synthesize and evaluate the mentoring literature across disciplines in order to bridge existing knowledge and to situate the mentoring in sport literature.

Design: A citation network analysis.

Method: A comprehensive literature search was conducted to locate influential career mentoring articles, books, and book chapters across all disciplines. Subsequently, this body of literature was evaluated using citation network to (a) identify the major career mentoring disciplines, (b) locate the most influential career mentoring texts, (c) evaluate the transfer of knowledge across disciplines, and (d) situate and evaluate the mentoring in sport literature.

Results: The literature search resulted in a mentoring network of 1,819 texts and 10,951 citation links. Five major mentoring disciplines emerged: academic medicine, industrial and organizational psychology, education, nursing, and psychology. The industrial and organizational psychology and academic medicine disciplines were the most substantial mentoring disciplines. Further, the findings suggest the literature is relatively disconnected within and across disciplines. In regard to sport, the mentoring research represented 1.47% of the full-network (29 texts and 50 citation relations) and is interwoven into the industrial and organizational psychology literature.

Conclusion: Given the limited sport texts uncovered in the citation network analysis, sport scholars can stand to benefit from the wealth of existing career mentoring literature in other disciplines. Accordingly, the identification of seminal career mentoring disciplines and texts

serves to provide sport mentoring scholars with a roadmap to further promote the advancement and dissemination of mentoring knowledge and research.

Keywords: professional development, knowledge transfer, sport coaching, industrial/organizational psychology, academic medicine

A Citation Network Analysis of Career Mentoring Across Disciplines: A Roadmap for Mentoring Research in Sport

Historically, many notable athletes (e.g., Michael Jordan), sport coaches (e.g., Bill Belichick), scientists (e.g., Carl Jung), and musicians (e.g., Ludwig van Beethoven) reported being guided by mentors who played a key role in shaping their careers (Eby et al., 2007). For instance, basketball hall of famer Michael Jordan reported his former University coach Dean Smith played a significant role in his personal and professional development:

> Other than my parents, no one had a bigger influence on my life than Coach Smith. He was more than a coach—he was my mentor, my teacher, my second father. Coach was always there for me whenever I needed him, and I loved him for it. In teaching me the game of basketball, he taught me about life. (Boren, 2015, para. 2)

Although there is intuitive appeal for mentoring in sport, empirical research is limited and has primarily explored the value and impact of mentoring relationships on the development of sport coaches (e.g., Fairhurst et al., 2017; Koh et al., 2014). For instance, evidence indicates that coach mentors have helped coach mentees improve their knowledge, competence, self-efficacy, networks, and interpersonal communication skills (Bloom et al., 1998; Fairhurst et al., 2017; Koh et al., 2014). To a lesser extent, sport mentoring research has also found that mentored athletes (by coaches and/or peers) have higher levels of satisfaction, dedication, confidence, individual performance, and willingness to mentor others (Hoffmann & Loughead, 2016; Hoffmann et al., 2017; Perna et al., 1996). The scarcity of sport mentoring research is disappointing since mentoring can be a particularly beneficial way for coaches and athletes to advance their knowledge, skills, and performance (Bloom, 2013; Bloom et al., 1998; Hoffmann et al., 2017).

Despite the limited empirical research in sport, mentoring has a rich history in a number of other disciplines. In fact, in the last few decades, the volume and scope of mentoring has grown exponentially, resulting in what Ragins and Kram (2007) described as "a literal explosion of research" (p. 4). Eby et al. (2007) categorized mentoring research into three main areas of scholarship: (a) youth mentoring, (b) academic mentoring, and (c) career mentoring. *Youth mentoring* involves a relationship between a more experienced adult and a younger mentee where the mentor "provides ongoing guidance, instruction, and encouragement aimed at developing the competence and character of the [mentee]" (Eby et al., 2017, p. 14). *Academic mentoring* involves a relationship between a student and a faculty member where the faculty member imparts knowledge and provides support and guidance on both academic and non-academic issues (Jacobi, 1991). Lastly, and of particular relevance to this paper, *career mentoring* involves the impact of mentoring on the professional and personal development of mentees in the "workplace" (Eby et al., 2007). Within the career context, Bozeman and Feeney (2007) defined mentoring as:

> a process for the informal transmission of knowledge, social capital, and psychosocial support perceived by the recipient as relevant to work, career, or professional development; mentoring entails informal communication, usually face-to-face and during a sustained period of time, between a person who is perceived to have greater relevant knowledge, wisdom, or experience (the mentor) and a person who is perceived to have less (the [mentee]). (p. 731)

Moreover, according to mentor role theory (Kram, 1985), mentors facilitate the professional development and personal growth of a mentee by providing a range of mentor functions. First, mentors contribute to the mentee's career advancement (i.e., instrumental support) by providing

the mentee with (a) sponsorship, (b) coaching, (c) protection from adversity, (d) challenging assignments, and (e) increased professional exposure. Additionally, mentors contribute to the personal growth (i.e., psychosocial support) of mentees by assisting the mentee in developing a professional identity, acting as a sounding board, being respectful and supportive, and acting as a role model.

The sheer growth of career mentoring research in the last couple of decades has undoubtedly encouraged a number of literature/scoping reviews, systematic reviews, and meta-analyses, which have revealed many career benefits spanning professions such as teaching, management, and nursing (e.g., Allen et al., 2004; Andrews & Wallis, 1999; Eby et al., 2013; Sambunjak et al., 2006; Underhill, 2006). For example, Allen et al.'s (2004) meta-analysis of 43 studies examined the career benefits for mentees in industrial and organizational settings. Among their findings, mentoring was positively associated with objective and subjective mentee outcomes, such as career success, satisfaction, and relationship quality. In the same manner, Sambunjak et al.'s (2006) systematic review of 42 mentoring texts in academic medicine (e.g., medical students, fellows, and staff physicians) found that mentoring was an important factor in the career and personal development of mentees. Underhill's (2006) meta-analysis of 106 studies spanning law enforcement, nursing, education, business, and psychology found that formal mentoring programs had a positive impact on mentee career outcomes, such as income, promotions, satisfaction, and reduced stress. Notably, the importance of systematically assimilating knowledge has been well-recognized for over two centuries (Chalmers et al., 2002), indicating that Cochrane-type reviews designed to aggregate findings from a collection of studies are integral to the advancement of a field. Nonetheless, they are limited in their ability to lend insight into the breadth, structure, and development of the literature.

Citation network analysis is an alternative approach to literature synthesis that provides mathematical language to describe networks (Barnes & Harary, 1983; Scott, 2017). Generally, a network structure is a function of the interactions between actors, whom are represented by nodes and relational ties. Citation networks consist of individual publications (i.e., nodes) and citation relations between publications (i.e., edges). Citation relations start at a *citing* publication (i.e., source) and end at a *cited* publication (i.e., target). By visualizing and analyzing citation patterns within a given literature, this analytical technique provides indications to the breadth and structure of a discipline, and can provide a temporal map of knowledge dissemination (Chen, 2006).

Citation network analysis has been implemented in diverse disciplines such as biology, public health, human resource development, medicine, management, economics (e.g., Burgess & Shaw, 2010; Moore et al., 2005), and more recently in sport psychology (e.g., Bruner et al., 2010; Bruner et al., 2013; Gustafsson et al., 2014). For instance, Bruner et al.'s (2013) citation network analysis created a visual network of the team building literature in sport and identified the most prominent texts in this literature. Similarly, Gustafsson et al. (2014) used citation network analysis to evaluate the sport burnout literature by identifying the prominent texts and the level of interconnectivity of the research in that discipline. Importantly, "this type of information can assist scholars and practitioners alike by allowing them to quickly identify publications and authors of prominence to facilitate literature searches" (Rangeon et al., 2012, p. 85). Therefore, for a field like mentoring that contains a wealth of literature, a citation network analysis can inform and facilitate the creation of knowledge for smaller disciplines where mentoring is beginning to emerge, such as sport coaching.

Given our limited understanding of mentoring in sport, reviewing the knowledge from other disciplines has the potential to expedite the advancement of knowledge in this context. To this end, the purpose of this study was to synthesize and evaluate the mentoring literature across disciplines in order to bridge existing knowledge and to situate the mentoring in sport literature. To address this purpose, a comprehensive literature search was employed to identify mentoring texts (i.e., articles, books, and book chapters) across disciplines. This body of literature was then evaluated using citation network analysis to address the following four research objectives:

R1. Identify the major career mentoring disciplines

R2. Locate the most influential career mentoring texts

R3. Evaluate the transfer of knowledge across disciplines

R4. Situate and evaluate the career mentoring in sport literature

Method

A two-phase search of the literature was utilized following the protocol previously adopted by researchers in sport psychology (see Bruner et al., 2010, 2013).

Specification of the Article Population

Phase I

In this phase, searches were performed using the Web of Science Core Collection (WSCC) database, which includes research from the disciplines of science, social science, arts, and humanities. The search query combined three groups of terms to ensure that retrieved citations involved mentoring (Group 1: mentor*), targets the development of mentees (Group 2: development, advancement, training, growth), and occurred in a career setting (Group 3: workplace, career, professional). The database search identified 3,777 relevant citations between 1969 and 2017. Prior to the next phase, retrieved citations underwent an exclusion process,

which involved applying the following criteria: (a) refereed articles, and (b) English language. Accordingly, 431 texts were excluded resulting in an updated list of 3,346 citations.

Phase II

Although the WSCC database is multidisciplinary and can access over 22,000 journals (approximately 1.4 billion cited references), extra precaution was taken to ensure that the full breadth of career mentoring literature would be identified. Consequently, phase II involved a search of the reference lists of the citations identified in phase I. To do so, the full record and cited references of citations were exported from the WSCC database and imported into CitNetExplorer (Van Eck & Waltman, 2014), a WSCC compatible software program that can process citations and their bibliographic data exported from the WSCC database. Most importantly, CitNetExplorer was used to sift through the full list of references within the 3,346 citations identified in Phase I to locate relevant books, book chapters, and articles that were not identified in the initial electronic database search. Applying a criterion of 10+ occurrences (see Bruner et al., 2013), CitNetExplorer located an additional 545 citations, resulting in a final list 3,891 retrieved citations to be assessed against exclusion criteria.

Content-based Article Exclusion

Full-text records were examined to exclude records where career mentoring was not substantially included within the text. For instance, if mentoring was a minor finding in the text and passively outlined in the discussion, the record was excluded (e.g., Epstein & Hundert, 2002). Additionally, the record was excluded if it did not pertain to *career* mentoring. For example, items focusing on youth mentoring or mentoring for academic achievement were excluded despite covering a substantial portion of mentoring. Accordingly, 531 articles, 80

books, and 2 book chapters were excluded. This resulted in a list 3,278 records, hereby referred to as texts.

Procedure

The texts were entered into network analytical and visualization software to create a directed and unweighted co-occurrences citation network consisting of 3,278 nodes and 11,156 edges (i.e., Gephi 0.9.2; Bastian et al., 2009). Specifically, in order to generate the citation network, two coinciding CSV documents (i.e., dataset) were entered into Gephi software: (1) a nodes file (node identifier, author(s), and year), and (2) an edges file (source node and target node), which served to identify the relationship between nodes (i.e., directed citations). Following this, the network was visually displayed using Gephi's "ForceAtlas2" layout, a force-directed layout designed to spatialize large scale-free networks (see Jacomy et al., 2014).

Network-based Article Exclusion

A secondary exclusion process was implemented to the final selection of texts in order to create the final full-network (see Figure 2.1). First, applying degree centrality principles (see analysis of citation networks section), all nodes with zero citation relations (formally termed isolate nodes; Verspagen, 2007) were excluded from the network (i.e., degree centrality = 0). Accordingly, 1,306 isolate nodes (zero collective edges) were excluded from the network. Second, applying modulation principles (see analysis of citation networks section), all nodes that were not associated with a subnetwork that was 2% or greater size were also excluded from the final network. Accordingly, 153 nodes and 205 edges were excluded.

Analysis of Citation Networks

Three measures were conducted throughout the analysis: (a) modulation optimization, (b) degree centrality, and (c) density. The software program Gephi (0.9.2; Bastian et al., 2009) was

used to conduct all measures of analyses. First, groups of mutually connected publications (i.e., communities), hereby referred to as subnetworks, were identified using a modularity optimization algorithm. This algorithm is designed for identification of subnetworks within large networks (Blondel et al., 2008). This measure was used to identify the major career mentoring networks (R1) and locate the sport mentoring network (R4). Second, degree centrality—also termed local centrality—refers to the average strength of edges connecting individual nodes (i.e., the prominence of a text; Barabási & Bonabeau, 2003). There are three measures of centrality: indegree centrality, outdegree centrality, and degree centrality. Indegree corresponds to the number of incoming ties (i.e., the number of source texts within the network citing a single target text). Conversely, outdegree centrality corresponds to the strength of outgoing ties (i.e., the number of target texts within the network being cited by a single source text; Moore et al., 2005). Degree centrality is simply the sum of indegree and outdegree scores. Indegree centrality was used to locate seminal career mentoring research across disciplines (R2, R4), and all the measures of centrality contributed to the transfer of knowledge within the career mentoring literature (R3, R4). Third, density—a group level construct—represents the overall connectedness of a network. More specifically, it is the number of connections within a network in relation to the maximum number of possible connections and ranges between 0 (i.e., no connections) and 1 (i.e., complete network; Scott, 2017). This measure was used to evaluate the interconnectedness within and across disciplines, lending insight into the transfer of knowledge (R3, R4).

Results

The final full-network consisted of 1,819 nodes and 10,951 edges. All nodes and edges are displayed in Figure 2.2. In accordance with the aims of this study, the first section presents

the major career mentoring subnetworks/disciplines (R1). The second section presents the most influential career mentoring texts (R2). Within this section, Table 2.1 features the most influential texts within each individual subnetwork. The third section examines the interconnectedness within and across career mentoring disciplines (R3). Within this section, Table 2.2 features citation network measures for each network. The final section locates the sport career mentoring network consisting of mentoring for the advancement of coaches' and athletes' careers and situates it within the mentoring literature (R4). The sport subnetwork and its career mentoring texts is visually depicted in Figure 2.3. To complement our findings, two supplemental documents are available online. Supplemental document 1 contains the final list of career mentoring texts, which includes: ID Number, Author(s), Year, Title, Source (e.g., journal name), Type (e.g., article), DOI (when applicable), indegree, outdegree, and degree scores, and modularity class (i.e., subnetwork qualification). Supplemental document 2 contains the figures of individual subnetworks complete with identifier labels (ID Number).

Identification of the Major Career Mentoring Disciplines (R1)

The modulation optimization algorithm identified 42 naturally emerging subnetworks. However, only six subnetworks met the 2% threshold and are hereby referred to as the *major career mentoring subnetworks* (collectively representing 92.24% of texts). The remaining 36 subnetworks (M_{size} = 0.22%; i.e., 4 texts) were excluded due to a lack of substance and discernable features (see exclusion criteria). The content of the titles and journals for the collection of texts within each major subnetwork were examined to assign a discipline-based typology and description for all emerging subnetworks. Accordingly, the six subnetworks were represented by five career mentoring disciplines. All six subnetworks are color coded and can be seen in Figure 2.2. First, the most substantial subnetwork, as determined by percentage quantity

of texts, was termed *academic medicine* (purple; 29.21% of texts). Texts within this subnetwork were found to target students (e.g., medical students, residents, graduate students), academic scholars (e.g., research fellows, junior faculty, senior faculty), practitioners, and researcher/practitioners in medicine. There was also a considerable amount of texts investigating marginalized students, faculty, and practitioners, such as gender and racial minorities. Further, academic medicine was found to represent a wide scope of vocations, such as family medicine, internal medicine, pediatrics, gerontology, geriatrics, and psychiatry.

Next, two subnetworks were merged to generate the second most substantial subnetwork termed *industrial and organizational* (*I/O*) *psychology* (green and orange; 28.7%). This joint subnetwork is split between I/O psychology *general* (green) and I/O psychology *distinctive* (orange). Texts in the I/O psychology general subnetwork involves mentoring for employees in corporate and organizational settings, such as management, accounting, entrepreneurship, human resources, and economics. A pocket of texts also investigates mentoring for graduate students and faculty in the academic setting. Alternatively, texts in the I/O psychology distinctive subnetwork distinguishes themselves through their emphasis on distinct populations, such as marginalized populations in the workplace, particularly with women and racial minorities. Further, this subnetwork also sets itself apart in that it also incorporates literature from a number of other professions, such as sport (see situating and evaluating career mentoring in sport section below), military, pharmacology, and forestry. The third largest subnetwork was termed *education* (blue; 15.72%). The target population for texts from the education subnetwork was student-teachers in training (e.g., student-teachers, preservice teachers, practicum teachers) and early career teachers (e.g., beginning teachers, novice teachers). Generally, the titles did not indicate any specifics regarding the teaching specializations, however, at times the titles

referenced the primary, secondary, or special education contexts, as well as the subjects of science, math, and physical education.

The fourth subnetwork, termed *nursing* (black; 9.89%), primarily targeted clinical nursing—student nurses in a clinical placement (i.e., pre-registered nurses), newly qualified nurses, and registered nurses. There were also a number of texts involving nursing scholars/faculty in academia, and a few texts targeting marginalized populations in both clinical and academic nursing settings. Texts representing other professions also emerged within this subnetwork, such as athletic training, physical therapy, occupational therapy, and dentistry. The smallest subnetwork meeting our criteria was termed *psychology* (pink; 8.72%). Similar to the academic medicine subnetwork, a large scope of the literature targeted academics, primarily graduate students pursuing professional and/or experimental degrees in psychology, and to a lesser extent faculty. Further, a considerable amount of the literature also targeted mental health practitioners (e.g., clinical and counselling psychologists, pediatric psychology). Notably, comparable to the I/O psychology distinctive subnetwork, there was a strong emphasis on marginalized populations, such as women, persons with impairments, racial minorities, and sexual minorities. Finally, some notable disciplines that were not interwoven into an existing subnetwork and did not meet our network inclusion criteria include: early childhood care and education, school principalship, academic geography, physical education, music, and prosthetic dentistry.

Identification of Influential Career Mentoring Texts (R2)

The most prominent texts within each discipline, as measured by indegree centrality, are identified in Table 2.1. To this end, the 10 most prominent texts were all clustered into the I/O psychology subnetwork with the exception of Sambunjak et al. (2006), which clustered into the

academic medicine subnetwork (see Table 2.1). Further, 55 texts qualified as top 10 across the collection of subnetworks with varying degrees of influence: academic medicine (*indegree range*: 35–176; i.e., number of times cited), I/O psychology (*indegree range*: 84–253), education (*indegree range*: 18–48), nursing (*indegree range*: 12–27), and psychology (*indegree range*: 16–37). Of the 55 prominent texts, there were 20 review articles, 14 quantitative studies, 10 qualitative studies, four mixed-methods studies, four books, two book chapters, and one methodology paper. Of the 20 review articles, six were generic literature review/overviews, six position papers, five systematic/systematized reviews, one meta-analysis, and one critical review. Notably, the size of nodes in Figure 2.2 corresponds to indegree centrality (i.e., text influence).

Evaluating the Transfer of Knowledge Across Disciplines (R3)

Inspecting the measures of density, indegree, and outdegree, the interconnectivity *within* networks appear to be characterized by low levels (see Table 2.2 for numeric values of the aforementioned measures). Specifically, our findings indicate that the full-network is characterized as low in density (.003). Even with density levels as low as .015, the I/O psychology and psychology subnetworks emerged as the highest in density. Further, a text within the full-network averaged six incoming citations (i.e., indegree centrality) and referenced six other texts (i.e., outdegree centrality). Across the subnetworks, the average number of incoming citations per text ranged between 2.57 and 9.72, and the average number of referenced/outgoing citations ranged between 2.96 and 8.93. Overall, it appears as though the full-network and subnetworks are relatively disconnected in itself (low number of citations, and low density measures).

Levels of interconnectedness *between* networks are apparent through visual inspection of citation relations in Figure 2.2—more citation relations correspond to higher levels of

interconnectedness. That is, according to Figure 2.2, it appears that certain subnetworks are more connected than others. For instance, I/O psychology and psychology appear to have more crossing citation relations and are more embedded within one another compared to all other subnetworks, thus representing the most interconnected subnetworks. Next, although the academic medicine subnetwork and the I/O psychology subnetwork appear to be moderately interconnected, there are no outgoing edges from the I/O psychology subnetworks indicating a unidirectional flow of knowledge transfer. Finally, the education and nursing subnetworks appear to be disconnected from all other major disciplines, indicating that these subnetworks are likely working in silos.

Situating and Evaluating Career Mentoring in Sport (R4)

The final research objective was to situate the sport mentoring literature. Given that career mentoring in sport did not emerge as a major subnetwork within the full-network, a manual search was conducted to locate the sport mentoring nodes. The findings indicate that this body of research is interwoven into the I/O psychology distinctive literature. To substantiate the manual search, the modulation optimization algorithm was applied to the I/O psychology distinctive subnetwork to identify the naturally occurring groups of mutually connected publications within this subnetwork. Accordingly, the sport nodes emerged as one of the four clusters of nodes falling within the I/O distinctive subnetwork: hereby referred to as “sport subnetwork” and can be identified in Figure 2.3 using turquoise colored nodes and edges. The sport subnetwork represents 15.18% of the I/O psychology distinctive subnetwork (1.47% of the full-network). This resulted in a subnetwork of 29 texts and 50 citation relations. Importantly however, 10 of the 29 texts were not considered because they did not originate from the sport mentoring literature.

Of the 19 sport-specific texts within the sport mentoring subnetwork, 12 texts explored career mentoring for sport coaches (e.g., Bloom et al., 1998), five texts explored career mentoring for strength and conditioning coaches (e.g., Magnusen & Peterson, 2012), and two texts explored career mentoring for elite athletes (e.g., Hoffmann et al., 2017). Of these texts, there were 10 qualitative studies, four quantitative studies, and five literature reviews. The most prominent text, with an indegree centrality score of 10 was a qualitative review—the first empirical study on mentoring for sport coaches—conducted by Bloom et al. (1998). Inspection of the remaining top 5 most prominent texts (authors, year [indegree centrality]) include: Cushion et al. (2003[10]), Perna et al. (1996[4]), Magnusen and Peterson (2012[4]), and Koh et al. (2014[3]) (see Table 2.1 for full details). Finally, despite the density of the sport subnetwork emerging as noticeably greater than any other discipline, the findings indicate low levels of interconnectedness: density = 0.062, average incoming citations = 2.97, and average outgoing citations = 4.07 (see Table 2.2 for numeric values).

Discussion

The popularity of career mentoring—the impact of mentors on the professional and personal development of mentees in the workplace—has stimulated a wealth of empirical literature and practical recommendations across a number of different fields and professions (Eby et al., 2007; Ragins & Kram, 2007). The present study extends the career mentoring literature by uncovering the breadth and structure of the career mentoring literature across disciplines. Accordingly, this section will discuss implications relating to (a) the seminal career mentoring literature, (b) the current lack of interdisciplinary communication, and (c) implications for scholars in sport mentoring.

Seminal Career Mentoring Literature

An important tenet of citation network analysis is impact measurement, which contends that the importance of a text can be measured by the extent to which it has been cited by subsequent texts (Narin et al., 1994). Moreover, Narin et al. (1994) noted that "distinguishing between important and unimportant articles, is usually addressed through citation analysis…if a sufficiently large number of articles are being considered, then the articles that are highly cited are of much greater impact" (p. 69). In line with this contention, the current study identified a collection of texts that have made a substantive contribution to the career mentoring literature. Consequently, this study directs scholars to the most impactful career mentoring texts in the I/O psychology, academic medicine, education, nursing, and psychology disciplines. Notably, previous studies have indicated that the top 10% is a robust indicator of scientific excellence (e.g., Van Raan, 2005), which in the current study corresponds to the top 182 career mentoring texts (approximately the number of texts that have a 17 or greater indegree value). A number of these texts can be located in Table 2.1 (see Supplemental Document 1 for the full list) and would be useful for scholars who are conducting research in mentoring to help conceptualize their research designs in accordance with their research goals.

Further analysis of the most prominent texts revealed that nine out of the 10 most highly impactful texts belonged to the I/O psychology discipline, indicating that texts within the industrial and organizational context has played a key role in shaping the career mentoring literature. This comes as no surprise given the rich history of mentoring in this discipline. For instance, according to Eby et al. (2007):

> Kram's (1985) pioneering qualitative study…was the first in-depth study of mentoring in the workplace in which Kram delineated several key aspects of mentoring relationships such as the functions of mentoring, phases of a mentoring relationship, and complexities

> of cross-gender relationships. Kram's study created a flurry of research on mentoring in the fields of education, psychology, and management. (p. 8)

Despite the clear impact of the I/O psychology discipline, our findings also indicate that academic medicine has emerged as a particularly substantial discipline for career mentoring research and warrants further investigation by mentoring scholars.

Lack of Interdisciplinary Communication

A second foundational bibliometric tenet is that citations between articles represent indicators of intelligence/knowledge linkages between subject areas (Narin et al., 1994). Therefore, by indexing and counting citations between articles, citation networks enable researchers to uncover the structure and interconnectedness within and across given disciplines (Barabási & Bonabeau, 2003; Moore et al., 2005). Grounded in this premise, our findings reveal that there is a shortage of interdisciplinary communication (i.e., low interconnectedness), which suggests that for the most part, career mentoring disciplines appear to be working in silos. This is concerning given that "there is a growing realization among scientists from all disciplines that multidisciplinary work is critical to answering the major research questions of the day" (Allen & Eby, 2007, p. 3). As an example, mentoring has become a vital process in the professional development of students in internships and placements, such as pre-service teachers and/or pre-registered nurses (e.g., Gray & Smith, 2000). With the objective of developing the most effective practices of mentoring for student-interns, it may be advantageous for education and nursing researchers to work together and build off the knowledge being constructed in their respective disciplines. Likewise, adopting knowledge across the breadth of mentoring disciplines could potentially expedite the advancement of knowledge in career mentoring as a whole. As Allen and Eby (2007) noted, interdisciplinary research provides a medium for connections to generate new

knowledge as it stimulates new ways of thinking and solutions to problems. The practical implication for sport mentoring scholars is to use different theoretical frameworks beyond Kram's (1983) mentoring functions. For instance, this can include Vygotsky's (1978) Theory of Social Development, Miller's (1976) Relational Cultural Theory, Rusbult's (1980) Investment Model, and Higgins and Kram's (2001) Developmental Network Perspective. Consequently, using different theoretical perspectives would allow the field of career mentoring in sport to broaden its perspective in generating new knowledge and insight.

Implications for Sport Mentoring Scholars

Despite the growth in career mentoring research, the results from the current study revealed that the majority of career mentoring knowledge has been gained through studies completed in settings outside of the sport context (i.e., 98.4% of texts). Further, our findings indicated that the career mentoring texts in sport were clustered within the I/O psychology distinctive subnetwork, which denotes that sport mentoring researchers are transferring knowledge gained from texts within this discipline (e.g., Levinson et al., 1978; Ragins, 1989). This may be partially explained by the fact that career mentoring research in sport is inherently conducted by researchers falling within the field of *sport psychology*, where researchers have relied on Kram's (1983, 1985) mentor theory as the underlying theoretical framework guiding their mentoring research, which originated from the I/O psychology literature (e.g., Bloom et al., 1998; Koh et al., 2014; Perna et al., 1996). However, there is an opportunity for sport researchers to move beyond the I/O psychology paradigm. In particular, the production of interdisciplinary knowledge from different fields can help generate breakthrough research results (Gibbons et al., 1994). Further, different disciplines may have different ideas of what constitutes knowledge

(e.g., What is mentoring?), how it is produced (e.g., How does mentoring occur?), and how should it be applied (e.g., What are the best approaches to mentoring?) (Rescher, 2003).

Due to the limited quantity of sport texts uncovered in the citation network analysis (i.e., 19 career mentoring in sport texts), sport scholars can stand to benefit from the wealth of existing mentoring literature in other disciplines, such as (1) education, (2) psychology, (3) nursing, and (4) academic medicine. First, the pedagogical requirements of coaching is often described as synonymous with the education (teaching) profession (310 mentoring texts). This is exemplified by several quotes from expert coaches, such as basketball coach John Wooden, "The coach is first of all a teacher" and soccer coach Anson Dorrance, "Coaching is obviously synonymous with teaching because I think great coaching *is* effective teaching" (see Barber, 2014, p. xv–xvi). Moreover, Camiré et al. (2016) noted that a number of teachers in Canada, especially physical educators, serve the dual-role of teacher-coach. In fact, there is emerging evidence in the physical education teacher education literature to demonstrate the impact of mentoring on their professional development; findings which can undoubtedly inform and assist sport coach career mentoring research (e.g., Chambers et al., 2012; McEvoy et al., 2019). As an example, many physical educators noted the importance of developing key mentoring relationships to help with entry to teaching, development within the profession, and career decisions, all of which were vital to these individuals becoming effective physical educators (McEvoy et al., 2019). Second, the clinical requirements of sport psychology practitioners are akin to those of counselling psychologists (172 mentoring texts). In fact, it is not uncommon for sport psychology practitioners to utilize counselling principles when working with athletes and coaches (e.g., Longstaff & Gervis, 2016).

Third, nursing (195 mentoring texts) is a high-pressure environment, which relies on high levels of collaboration and teamwork (Barton et al., 2018), perhaps in the same manner that athletic teams do (see Beauchamp & Eys, 2014). In fact, Judge (2017) noted that "Nurses working together can change everything" (p. 90). Furthermore, our findings revealed a direct overlap between the nursing literature and the sport context such that the nursing subnetwork incorporates career mentoring for physiotherapists and athletics trainers. For instance, the treatment of injuries can be a very emotional time for athletes wherein they often develop trusting relationships with their athletic therapists who can serve as mentors/confidants through the rehabilitation process. Finally, the discipline of academic medicine (i.e., 576 career mentoring texts) parallels the training and performance requirements of elite athletes, particularly with respect to surgeons:

> Both professional athletics and surgery attract talent. Both make decisions in the heat of the moment. Both must be able to focus attention and eliminate distraction. Both must communicate with teammates to execute a proper game plan. Both work within broad performance systems or operational philosophies, but still often need spontaneous, creative thinking skills. Both work under the limelight of transparency and exposure. Both need to be able to deal with loss. Both need passion and perseverance for sustainability. (Verrier, 2017, p. 225)

Thus, given that academic medicine has become the leading career mentoring discipline in terms of quantity of texts, sport mentoring scholars interested in learning about the implications of mentoring for high-performance athletes should utilize the wealth of existing knowledge in this context.

Given the many parallels between the sport context and the aforementioned disciplines, sport mentoring scholars should look to other disciplines, including but not limited to the four highlighted above, to enhance the creation of knowledge and practice. This process can help sport mentoring scholars subsequently advance the field by addressing important research gaps in the career mentoring in sport literature. To help sport scholars in their interdisciplinary efforts, this citation network analysis can be used as a tool to locate prominent articles across other career mentoring disciplines (see Table 2.1; Supplemental Document 1), with the intent of the adoption of knowledge from other disciplines. In fact, three examples are provided below, which (a) identify a research gap in the sport mentoring literature, (b) provide examples of other disciplines that have addressed a similar gap, and (c) include examples of literature identified in Supplemental Document 1:

1. Coach mentoring scholars tend to rely on traditional approaches to mentoring, which has conceptualized mentoring as a dyadic process involving two individuals of unequal power (e.g., Bloom, 2013). Some alternative mentoring models have been proposed in other disciplines, such as peer mentoring (e.g., Kram & Isabella, 1985 [I/O Psychology]), facilitated peer mentoring (e.g., Files et al., 2008 [Academic Medicine]), and developmental networks (e.g., Higgins & Kram, 2001[I/O Psychology]), which have served to improve understanding of the mentoring process across disciplines.
2. Despite being well documented in other disciplines, career mentoring research endeavours directed towards marginalized groups (e.g., Fairhurst et al., 2017) are limited in the sport discipline. Sport mentoring scholars can look to other disciplines to inform research endeavours targeting gender (e.g., Levinson et al., 1991 [Academic Medicine]),

race (e.g., Dingus, 2008 [Education]), sexual diversity (e.g., Lark & Croteau, 1998 [Psychology]), and/or impairments (e.g., Jones, 1997 [I/O Psychology]).

3. There is currently only one text that explores formal career mentoring in sport (i.e., Koh et al., 2014). This is somewhat surprising given that sport researchers have been calling for the design, implementation, and evaluation of formal mentoring programs for coaches/athletes for many years (e.g., Bloom, 2013; Jones et al., 2009). Notably, researchers in other disciplines such as education (e.g., Hobson, 2002), nursing (e.g., Chen & Lou, 2014), and academic medicine (e.g., Buddeberg-Fischer, & Herta, 2006) have a rich history of using formal mentoring, often in the form of student-training initiatives.

In sum, there is a wealth of existing knowledge in other career mentoring disciplines that can inform these research gaps in the sport discipline, therefore sport researchers are encouraged to look to other domains for guidance empirically, methodologically, and practically. Indeed, by identifying the prominent career mentoring texts/disciplines and bridging this existing knowledge with the evolving field of sport mentoring, this study can serve to expedite the advancement of the sport mentoring discipline.

Limitations

As with all studies, certain analytical limitations should be highlighted: (a) text seniority, (b) preferential attachment, (c) self-citations, (d) citation characteristics, and (e) inter-disciplinary norms (Barabási & Albert, 1999; Bruner et al., 2013; Narin et al., 1994). First, citation network research necessarily favors texts that have a longer duration in the literature. That is, older texts are more likely to be considered prominent within a network, and newer potentially more influential texts can be overlooked or deemed less important. Second, authors

are likely to cite established and/or prominent texts as a means to legitimize their own work, known as preferential attachment. Third, the emergence of citation metrics for career decisions have pressured academics to engage in self-citations (Seeber et al., 2019), which can skew measurements of impact. Fourth, the citation measures do not consider contextually relevant citation information that might reveal important characteristics of the cited text. As an example, flawed, unpopular, and/or provocative texts may receive a high number of negative citations due to their apparent limitations, and within a citation network can be misconceived as prominent or influential (Barabási & Albert, 1999). Lastly, the normative citation patterns likely differ across disciplines. That is, a discipline like academic medicine may have higher citation rates than a discipline like education. This indicates that measure of impact is not standardized, suggesting the impact of an article should be considered in light of its discipline. Furthermore, it is also important to note that the literature search was not exhaustive given the wide scope of the search (i.e., mentoring across all disciplines).

Conclusion

In conclusion, citation network analysis is a valuable methodological tool for shedding light on key texts and scholars that have shaped the (mentoring) literature. Moreover, the current study is advantageous for helping researchers to situate work within the broader career mentoring literature and for providing them with a mentoring roadmap to promote the advancement of mentoring knowledge and research in sport. It is hoped that this study will serve as a catalyst for the dissemination and transfer of knowledge that can inform future research efforts in this important domain.

References

Allen, T. D. & Eby, L. T. (2007) *The Blackwell handbook of mentoring: A multiple perspectives approach*. John Wiley & Sons.

Allen, T. D., Eby, L. T., Poteet, M. L., & Lentz, E., & Lima, L. (2004). Career benefits associated with mentoring for protégés: A meta-analysis. *Journal of Applied Psychology, 89*(1), 127–136.

Andrews, M., & Wallis, M. (1999). Mentorship in nursing: A literature review. *Journal of Advanced Nursing, 29*(1), 201–207.

Barabási, A. L., & Albert, R. (1999). Emergence of scaling in random networks. *Science, 286*(5439), 509–512.

Barabási, A. L., & Bonabeau, E. (2003). Scale-free networks. *Scientific American, 288*(5), 50–59.

Barber, N. (2014). *What teachers can learn from sports coaches: A playbook of instructional strategies*. Routledge.

Barnes, J. A. & Harary, F. (1983). Graph theory in network analysis. *Social Networks, 5*(2), 235–244.

Barton, G., Bruce, A., & Schreiber, R. (2018). Teaching nurses teamwork: Integrative review of competency-based team training in nursing education. *Nurse Education in Practice, 32*, 129–137.

Bastian, M., Heymann, S., & Jacomy, M. (2009). Gephi: An open source software for exploring and manipulating networks. *International AAAI Conference on Weblogs and Social Media* [online].

Beauchamp, M. R., & Eys, M. A. (2014). *Group dynamics in exercise and sport psychology*. Routledge.

Blondel, V. D., Guillaume, J. L., Lambiotte, R., & Lefebvre, E. (2008). Fast unfolding of communities in large networks. *Journal of Statistical Mechanics: Theory and Experiment*, *2008*(10), P10008.

Bloom, G. A. (2013). Mentoring for sports coaches. In P. Potrac, W. Gilbert, & J. Denison (Eds.), *Routledge handbook of sports coaching* (pp. 476–485). Routledge.

Bloom, G. A., Durand-Bush, N., Schinke, R. J., & Salmela, J. H. (1998). The importance of mentoring in the development of coaches and athletes. *International Journal of Sport Psychology*, *29*(3), 267–281.

Boren, C. (2015, February 8). Michael Jordan on Dean Smith: 'My mentor, my teacher, second father'. *The Washington Post.* Retrieved from https://www.washingtonpost.com/news/early-lead/wp/2015/02/08/michael-jordan-on-dean-smith-my-mentor-my-teacher-my-second-father/?utm_term=.230a1e424602

Bozeman, B., & Feeney, M. K. (2007). Toward a useful theory of mentoring: A conceptual analysis and critique. *Administration & Society*, *39*(6), 719–739.

Bruner, M. W., Erickson, K., Wilson, B., & Côté, J. (2010). An appraisal of athlete development models through citation network analysis. *Psychology of Sport and Exercise*, *11*(2), 133–139.

Bruner, M. W., Eys, M. A., Beauchamp, M. R., & Côté, J. (2013). Examining the origins of team building in sport: A citation network and genealogical approach. *Group Dynamics: Theory, Research, and Practice, 17*(1), 30–42.

Buddeberg-Fischer, B., & Herta, K. D. (2006). Formal mentoring programmes for medical students and doctors—a review of the Medline literature. *Medical Teacher*, *28*(3), 248–257.

Burgess, T. F., & Shaw, N. E. (2010). Editorial board membership of management and business journals: A social network analysis study of the Financial Times 40. *British Journal of Management*, *21*(3), 627–648.

Camiré, M., Rocchi, M., & Kendellen, K. (2016). Profiling the Canadian high school teacher-coach: A national survey. *International Sport Coaching Journal*, *3*(2), 145–155.

Chalmers, I., Hedges, L. V., & Cooper, H. (2002). A brief history of research synthesis. *Evaluation & The Health Professions*, *25*(1), 12–37.

Chambers, F. C., Armour, K., Luttrell, S., Bleakley, W., Brennan, D., & Herold, F. (2012). Mentoring as a profession-building process in physical education teacher education. *Irish Educational Studies*, *31*(3), 345–362.

Chen, C. (2006). CiteSpace II: Detecting and visualizing emerging trends and transient patterns in scientific literature. *Journal of the Association for Information Science and Technology*, *57*(3), 359–377.

Chen, C. M., & Lou, M. F. (2014). The effectiveness and application of mentorship programmes for recently registered nurses: A systematic review. *Journal of Nursing Management*, *22*(4), 433–442.

Cushion, C. J., Armour, K. M., & Jones, R. L. (2003). Coach education and continuing professional development: Experience and learning to coach. *Quest*, *55*(3), 215–230.

Dingus, J. E. (2008). “I'm learning the trade” mentoring networks of black women teachers. *Urban Education*, *43*(3), 361–377.

Eby, L. T. D. T., Allen, T. D., Hoffman, B. J., Baranik, L. E., Sauer, J. B., Baldwin, S., Morrison, M. A., Kinkade, K. M., Maher, C. P., Curtis, S., & Evans, S. C. (2013). An interdisciplinary meta-analysis of the potential antecedents, correlates, and consequences of protégé perceptions of mentoring. *Psychological Bulletin, 139*(2), 441–476.

Eby, L. T., Rhodes, J. E. & Allen, T. D. (2007). Definition and evolution of mentoring. In T. D. Allen & L. T. Eby (Eds.), *The Blackwell handbook of mentoring: A multiple perspectives approach* (pp. 7–20). John Wiley & Sons.

Epstein, R. M., & Hundert, E. M. (2002). Defining and assessing professional competence. *Journal of American Medical Association*, *287*(2), 226–235.

Fairhurst, K. E., Bloom, G. A., & Harvey, W. J. (2017). The learning and mentoring experiences of Paralympic coaches. *Disability and Health Journal*, *10*(2), 240–246.

Files, J. A., Blair, J. E., Mayer, A. P., & Ko, M. G. (2008). Facilitated peer mentorship: A pilot program for academic advancement of female medical faculty. *Journal of Women's Health*, *17*(6), 1009–1015.

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (1994). *The new production of knowledge.* Sage.

Gray, M. A., & Smith, L. N. (2000). The qualities of an effective mentor from the student nurse's perspective: Findings from a longitudinal qualitative study. *Journal of Advanced Nursing*, *32*(6), 1542–1549.

Gustafsson, H., Hancock, D. J., & Côté, J. (2014). Describing citation structures in sport burnout literature: A citation network analysis. *Psychology of Sport and Exercise*, *15*(6), 620–626.

Higgins, M. C., & Kram, K. E. (2001). Reconceptualizing mentoring at work: A developmental network perspective. *Academy of Management Review*, *26*(2), 264–288.

Hobson, A. J. (2002). Student teachers' perceptions of school-based mentoring in initial teacher training (ITT). *Mentoring and Tutoring*, *10*(1), 5–20.

Hoffmann, M. D., & Loughead, T. M. (2016). A comparison of well-peer mentored and non-peer mentored athletes' perceptions of satisfaction. *Journal of Sports Sciences*, *34*(5), 450–458.

Hoffmann, M. D., Loughead, T. M., & Bloom, G. A. (2017). Examining the experiences of peer mentored athletes competing in elite sport. *The Sport Psychologist*, *31*(2), 134–136.

Jacobi, M. (1991). Mentoring and undergraduate academic success: A literature review. *Review of Educational Research*, *61*(4), 505–532.

Jacomy, M., Venturini, T., Heymann, S., & Bastian, M. (2014). ForceAtlas2, a continuous graph layout algorithm for handy network visualization designed for the Gephi software. *PloS One*, *9*(6), e98679.

Jones, G. E. (1997). Advancement opportunity issues for persons with disabilities. *Human Resource Management Review*, *7*(1), 55–76.

Jones, R. L., Harris, R., & Miles, A. (2009). Mentoring in sports coaching: A review of the literature. *Physical Education and Sport Pedagogy*, *14*(3), 267–284.

Judge, K. (2017). Teamwork can change everything. *Journal of Infusion Nursing*, *40*(2), 90.

Koh, K. T., Bloom, G. A., Fairhurst, K. E., Paiement, D. M., & Kee, Y. H. (2014). An investigation of a formalized mentoring program for novice basketball coaches. *International Journal of Sport Psychology*, *45*(1), 11–32.

Kram, K. E. (1983). Phases of the mentor relationship. *Academy of Management Journal, 26*(4), 608–625.

Kram, K. E. (1985). *Mentoring at work: Developmental relationships in organizational life.* Scott Foresman.

Kram, K. E., & Isabella, L. A. (1985). Mentoring alternatives: The role of peer relationships in career development. *Academy of Management Journal, 28*(1), 110–132.

Lark, J. S., & Croteau, J. M. (1998). Lesbian, gay, and bisexual doctoral students' mentoring relationships with faculty in counseling psychology: A qualitative study. *The Counseling Psychologist, 26*(5), 754–776.

Levinson, D. J., Darrow, C. N., Klein, E. B., Levinson, M. H., & McKee, B. (1978). *The seasons of a man's life*. Random House.

Levinson, W., Kaufman, K., Clark, B., & Tolle, S. W. (1991). Mentors and role models for women in academic medicine. *Western Journal of Medicine, 154*(4), 423–426.

Longstaff, F., & Gervis, M. (2016). The use of counseling principles and skills to develop practitioner-athlete relationships by practitioners who provide sport psychology support. *The Sport Psychologist, 30*(3), 276–289.

Magnusen, M. J., & Petersen, J. (2012). Apprenticeship and mentoring relationships in strength and conditioning: The importance of physical and cognitive skill development. *Strength & Conditioning Journal, 34*(4), 67–72.

McEvoy, E., Heikinaro-Johansson, P., & MacPhail, A. (2019). An exploration of the influence of professional relationships on the career pathways of physical education teacher educators. *European Physical Education Review, 25*(4), 913–928.

Miller, J. B. (1976). *Toward a new psychology of women.* Beacon Press.

Moore, S., Shiell, A., Hawe, P., & Haines, V. A. (2005). The privileging of communitarian ideas: Citation practices and the translation of social capital into public health research. *American Journal of Public Health, 95*(8), 1330–1337.

Narin, F., Olivastro, D., & Stevens, K. A. (1994). Bibliometrics/theory, practice and problems. *Evaluation Review, 18*(1), 65–76.

Perna, F. M., Zaichowsky, L., & Bocknek, G. (1996). The association of mentoring with psychosocial development among male athletes at termination of college career. *Journal of Applied Sport Psychology, 8*(1), 76–88.

Ragins, B. R. (1989). Barriers to mentoring: The female manager's dilemma. *Human Relations, 42*(1), 1–22.

Ragins, B. R., & Kram, K. E. (2007). The roots and meaning of mentoring. In B. R. Ragins & K. E. Kram (Eds.), *The handbook of mentoring at work: Theory, research, and practice* (pp. 3–15). Sage.

Rangeon, S., Gilbert, W., & Bruner, M. (2012). Mapping the world of coaching science: A citation network analysis. *Journal of Coaching Education, 5*(1), 83–108.

Rescher, N. (2003). *Epistemology: An introduction to the theory of knowledge.* State University of New York Press.

Rusbult, C. E. (1980) Commitment and satisfaction in romantic associations: A test of the Investment Model. *Journal of Experimental Social Psychology, 16*(2), 172–186.

Sambunjak, D., Straus, S. E., & Marušić, A. (2006). Mentoring in academic medicine: A systematic review. *Journal of American Medical Association, 296*(9), 1103–1115.

Scott, J. (2017). *Social network analysis.* Sage.

Seeber, M., Cattaneo, M., Meoli, M., & Malighetti, P. (2019). Self-citations as strategic response to the use of metrics for career decisions. *Research Policy, 48*(2), 478–491.

Underhill, C. M. (2006). The effectiveness of mentoring programs in corporate settings: A meta-analytical review of the literature. *Journal of Vocational Behavior*, *68*(2), 292–307.

Van Eck, N. J., & Waltman, L. (2014). CitNetExplorer: A new software tool for analyzing and visualizing citation networks. *Journal of Informetrics*, *8*(4), 802–823.

Van Raan, A. F. J. (2005). Measurement of central aspect of scientific research: Performance, interdisciplinarity, structure. *Measurement: Interdisciplinary Research and Perspectives, 3*(1), 1–19.

Verrier, E. D. (2017). The elite athlete, the master surgeon. *Journal of the American College of Surgeons*, *224*(3), 225–235.

Verspagen, B. (2007). Mapping technological trajectories as patent citation networks: A study on the history of fuel cell research. *Advances in Complex Systems, 10*(1), 93–115.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Harvard University Press.

Table 2.1

Influential Career Mentoring Texts Within Individual Mentoring Subnetworks

Sub-rank (Full-rank)	Author(s) (year)	Title [Text identifier]	Indegree Score
		A. Academic Medicine Subnetwork (29.21%)	
1 (2)	Sambunjak et al. (2006)	Mentoring in academic medicine – A systematic review [n1042]	176
2 (11)	Palepu et al. (1998)	Junior faculty members' mentoring relationships and their professional development in US medical schools [n388]	86
3 (T15)	Jackson et al. (2003)	Having the right chemistry: A qualitative study of mentoring in academic medicine [n720]	74
T4 (T23)	Pololi & Knight (2005)	Mentoring faculty in academic medicine – A new paradigm? [n933]	50
T4 (T23)	Berk et al. (2005)	Measuring the effectiveness of faculty mentoring relationships [n944]	50
T4 (T23)	Sambunjak et al. (2010)	A systematic review of qualitative research on the meaning and characteristic of mentoring in academic medicine [n1716]	50
7 (26)	Pololi et al. (2002)	Helping medical school faculty realize their dreams: An innovate, collaborative mentoring program [n653]	49
8 (T31)	Straus et al. (2009)	Issues in the mentor-mentee relationship in academic medicine: A qualitative study [n1500]	45
9 (T40)	Buddeberg-Fischer & Herta (2006)	Formal mentoring programmes for medical students and doctors – A review of the medicine literature [n1046]	39
T10 (T48)	Levinson et al. (1991)	Mentors and role models for women in academic medicine [n146]	35
T10 (T48)	Straus et al. (2013)	Characteristics of successful and failed mentoring relationships: A qualitative study across two academic health centers [n2167]	35
		B. Industrial and Organizational Psychology Subnetwork (28.7%)	
1 (1)	Kram (1985)	Mentoring at work 1st Edition [n70]	253
2 (3)	Kram (1983)	Phases of the mentor relationship [n55]	123
3 (4)	Levinson (1978)	The seasons of a man's life [n31]	117
4 (5)	Allen et al. (2004)	Career benefits associated with mentoring for protégés: A meta-analysis [n865]	109
5 (6)	Ragins & Cotton (1999)	Mentor functions and outcomes: A comparison of men and women in formal and informal mentoring relationships [n460]	108
6 (7)	Noe (1988)	An investigation of the determinants of successful assigned mentoring relationships [n104]	102
7 (8)	Higgins & Kram (2001)	Reconceptualizing mentoring at work: A developmental network perspective [n609]	97
8 (9)	Chao et al. (1992)	Formal and informal mentorships: A comparison on mentoring functions and contrast with nonmentored counterparts [n179]	92
9 (10)	Scandura (1992)	Mentorship and career mobility: An empirical investigation [n187]	87
10 (12)	Kram & Isabella (1985)	Mentoring alternatives – The role of peer relationships in career development [n71]	84

(Continued)

C. Education Subnetwork (15.72%)			
1 (T27)	Hobson et al. (2009)	Mentoring beginning teachers: What we know and what we don't [n1497]	48
2 (T43)	Feiman-Nemser (2001)	Helping novices learn to teach: Lessons from an exemplary support teacher [n604]	38
3 (T59)	Smith & Ingersoll (2004)	What are the effects of induction and mentoring on beginning teacher turnover [n888]	33
4 (T68)	Wang & Odell (2002)	Mentored learning to teach according to standards-based reform: A critical review [n651]	30
5 (T92)	Little (1990)	Chapter 6: The mentor phenomenon and the social organization of teaching [n127]	25
T6 (T97)	Anderson & Shannon (1988)	Toward a conceptualization of mentoring [n99]	24
T6 (T97)	Awaya et al. (2003)	Mentoring as a journey [n772]	24
8 (T120)	Clutterbuck (2004)	Everyone needs a mentor: Fostering talent in your organisations [n870]	20
9 (T131)	Harrison et al. (2006)	Mentoring beginning teachers in secondary school: An analysis of practice [n1055]	19
T10 (T150)	Gold (1996)	Beginning teacher support: Attrition, mentoring, and induction [n1085]	18
T10 (T150)	Hall et al. (2008)	More than a place to teach: Exploring the perceptions of the roles and responsibilities of mentor teachers [1364]	18
D. Nursing Subnetwork (9.89%)			
1 (T80)	Andrews & Wallis (1999)	Mentorship in nursing: A literature review [n449]	27
2 (T132)	Thomas (2001)	The truth about mentoring minorities. Race matters. [n619]	19
3 (T160)	Bray & Nettleton (2007)	Assessor or mentor? Role confusion in professional education [n1178]	17
T4 (T196)	Byrne & Keefe (2002)	Building research competence in nursing through mentoring [n680]	15
T4 (T196)	Greene & Puetzer (2002)	The value of mentoring: A strategic approach to retention and recruitment [n686]	15
T6 (T225)	Gray & Smith (2000)	The qualities of an effective mentor from the student nurse's perspective: Findings from a longitudinal perspective [n526]	14
T6 (T225)	Driscoll et al. (2009)	Navigating the lonely see: Peer mentoring and collaboration among aspiring women scholars [n1553]	14
T8 (T246)	Morrison-Beedy et al. (2001)	Mentoring students and junior faculty in faculty research: A win-win scenario [n612]	13
T8 (T246)	Myall et al. (2008)	Mentorship in contemporary practice: The experiences of nursing students and practice mentors [n1368]	13
T10 (T273)	Yoder (1990)	Mentoring: A concept analysis [n139]	12
T10 (T273)	Neary (2000)	Supporting students' learning and professional development through the process of continuous assessment and mentorship [n504]	12
T10 (T273)	Beecroft et al. (2006)	New graduate nurses' perceptions of mentoring: Six-year programme evaluation [n1049]	12
T10 (T273)	Sorcinelli & Yun (2007)	From mentor to mentoring networks: Mentoring in the new academy [n1225]	12

(Continued)

		E. Psychology Subnetwork (8.72%)	
1 (45)	Johnson (2002)	The intentional mentor: Strategies and guidelines for the practice of mentoring [n654]	37
T2 (T52)	Ragins & Scandura (1994)	Gender differences in expected outcomes of mentoring relationships [n240]	34
T2 (T52)	Clark et al. (2000)	Mentor relationships in clinical psychology doctoral training: Results of a national survey [n514]	34
4 (T70)	Green & Bauer (1995)	Supervisory mentoring by advisers: Relationships with doctoral student potential, productivity, and commitment [n271]	29
5 (T74)	Ehrich et al. (2004)	Formal mentoring programs in education and other professions: A review of the literature [n877]	28
6 (T97)	Tenenbaum et al. (2001)	Mentoring relationships in graduate school [n617]	24
7 (T115)	Cronan-hillix et al. (1986)	Students' views of mentors in psychology graduate training [n87]	21
8 (T131)	Thomas (1993)	Racial dynamics in cross-race developmental relationships [n211]	19
T9 (T179)	Hollingsworth & Fassinger (2002)	The role of faculty mentors in the research training of counseling psychology doctoral students [n656]	16
T9 (T179)	Johnson (2007)	On being a mentor: A guide for higher education faculty [n1214]	16
		F. Sport Subnetwork (1.47%)	
1 (T274)	Bloom et al. (1998)	The importance of mentoring in the development of coaches and athletes [n391]	12
2 (T348)	Cushion et al. (2003)	Coach education and continuing professional development: Experience and learning to coach [n743]	10
T3 (T548)	Perna et al. (1996)	The association of mentoring with psychosocial development among male athletes at termination of college career [n282]	4
T3 (T548)	Magnusen & Peterson (2012)	Apprenticeship and mentoring relationships in strength and conditioning: The importance of physical and cognitive skill development [n2067]	4
5 (T611)	Koh et al., 2014	An investigation of a formalized mentoring program for novice basketball coaches [n2537]	3

Note: T = Tied

Table 2.2

Citation Network Measures by Network

Network	Citation Network Measures				
	Nodes	Edges	Density	Indegree	Outdegree
Full-Network	1,819	10,951	.003	6.04	6.03
Academic Medicine	576	2,875	.009	5.39	5.73
I/O Psychology	566	4,699	.015	9.72	8.93
Education	310	1,078	.011	3.81	4.01
Nursing	195	374	.010	2.57	2.96
Psychology	172	452	.015	4.10	4.67
Sport	29	50	.062	2.97	4.07

Note: Nodes = texts; Edges = citation relations; Density = interconnectivity of texts within the network; Indegree = average incoming citations per text; Outdegree = average outgoing citations per text.

Figure 2.1

Citation Flow Diagram of Career Mentoring Across Disciplines

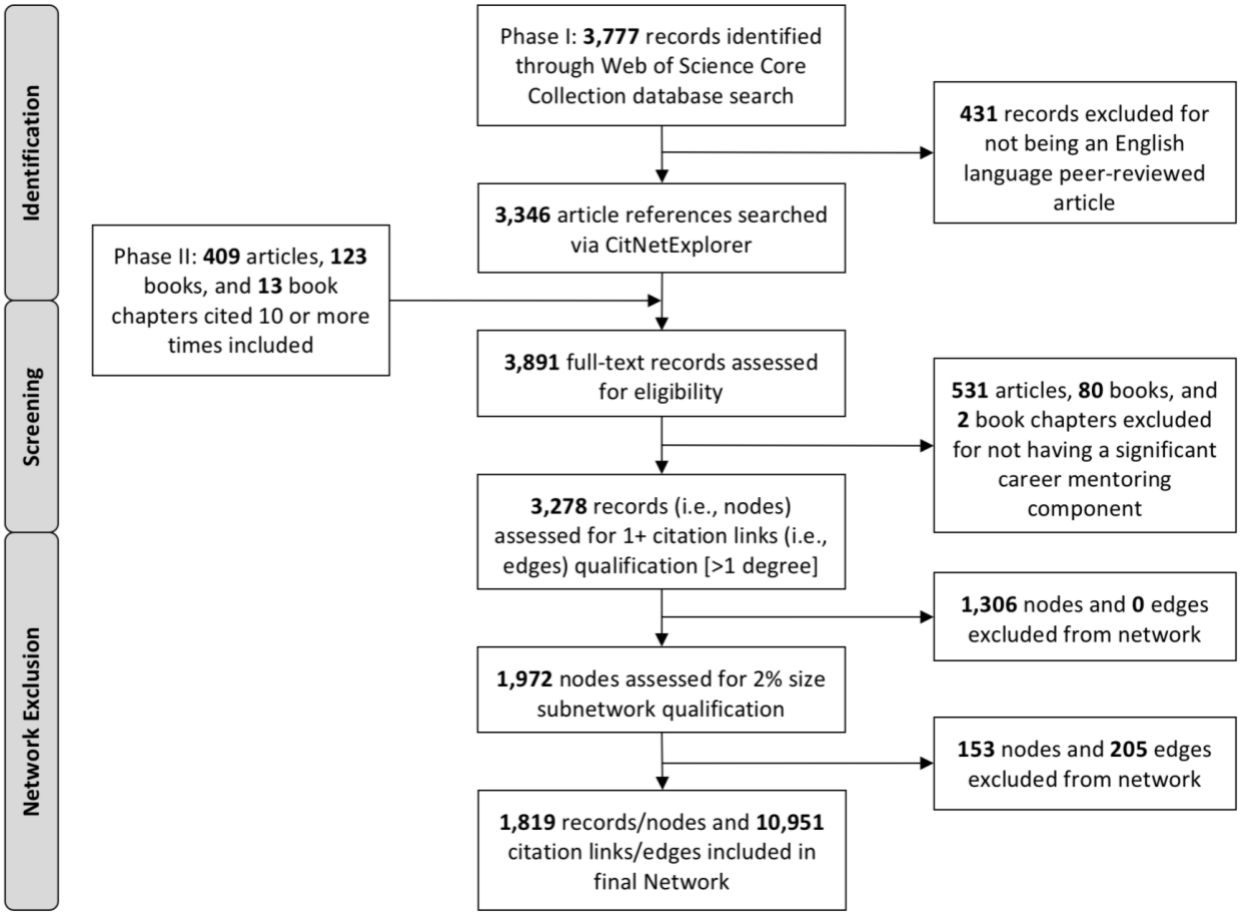
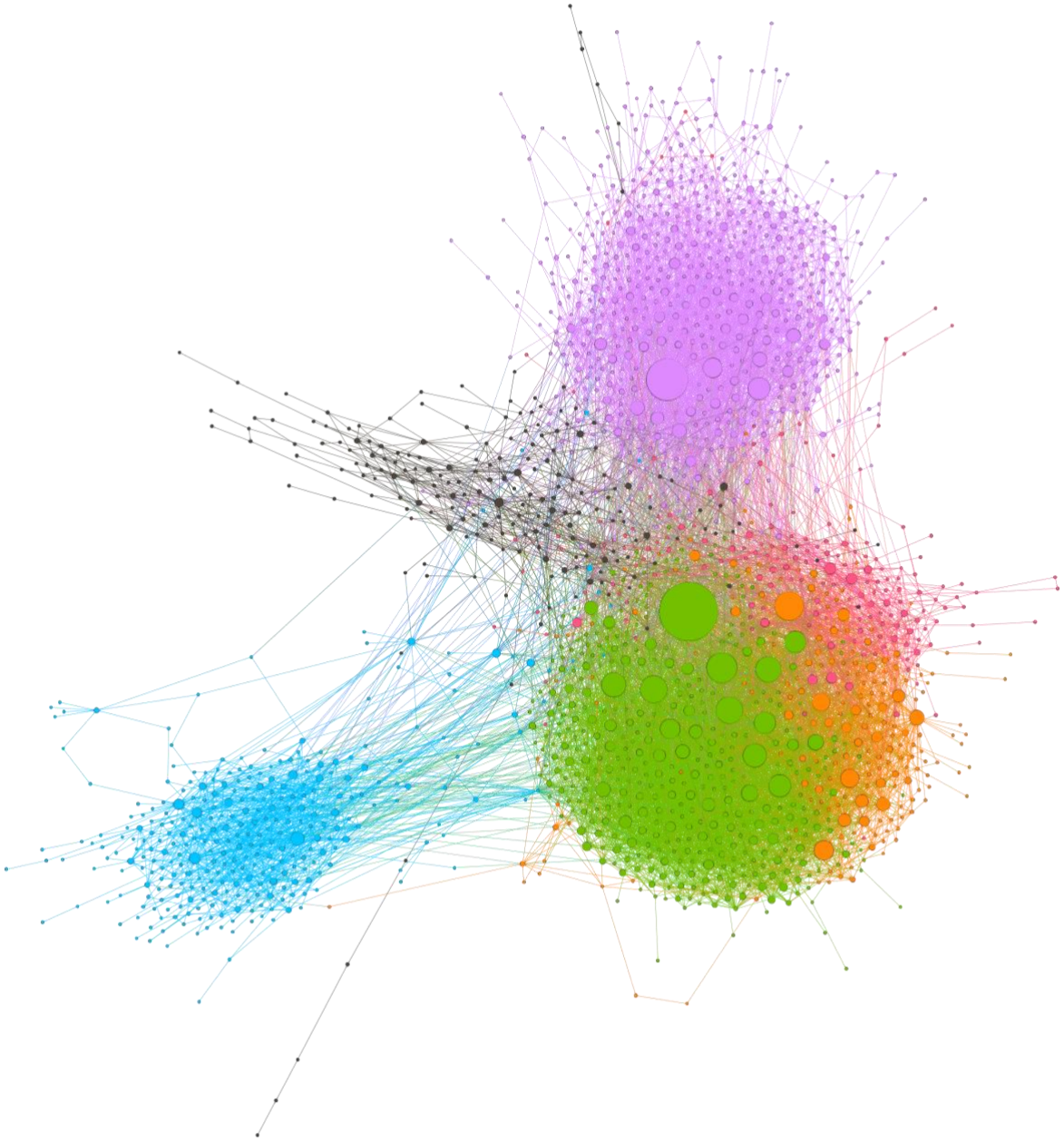


Figure 2.2

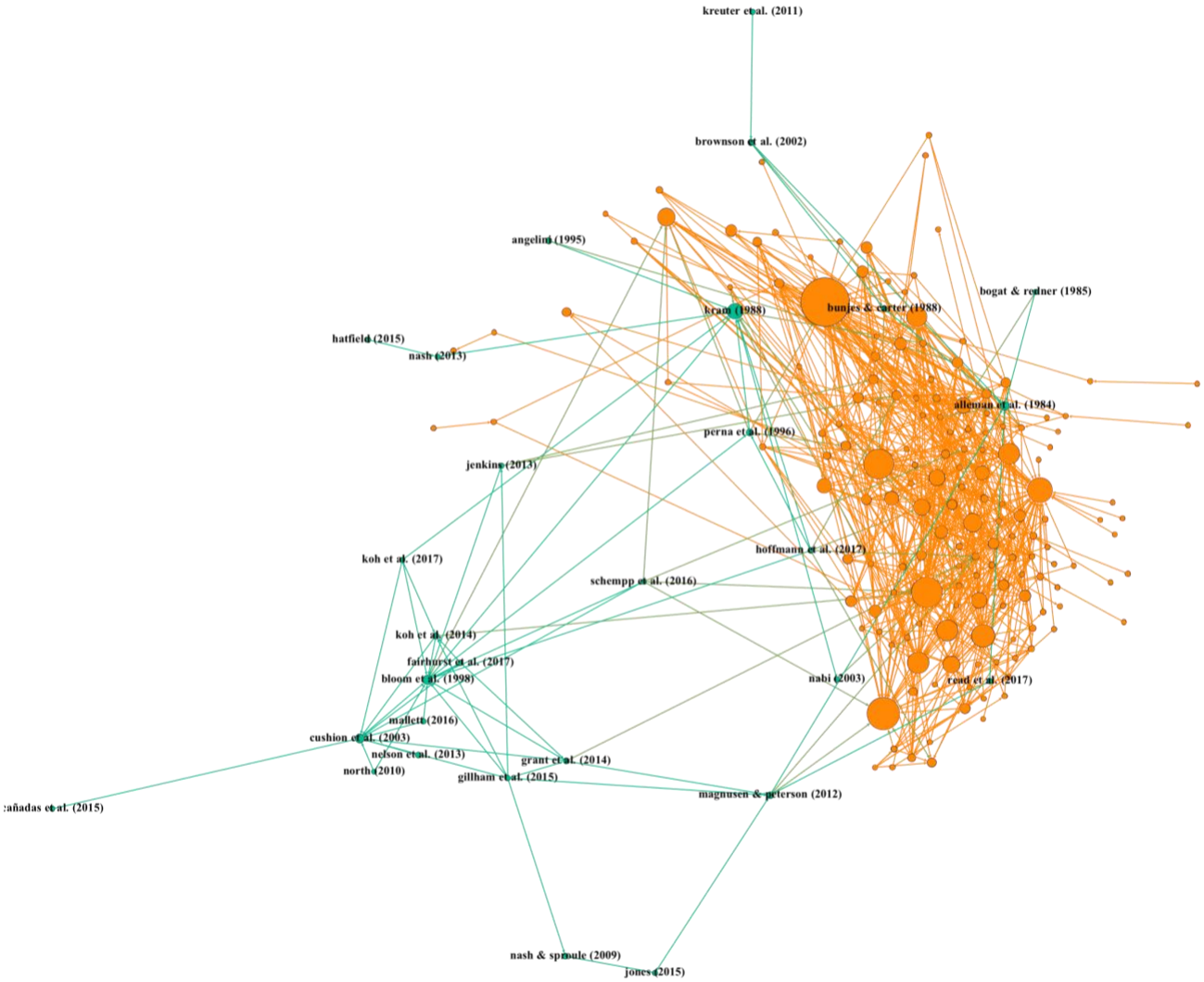
Interdisciplinary Full-network of the Career Mentoring Literature



Note: Interdisciplinary full-network of the career mentoring literature, consisting of 1,819 mentoring texts and 10,951 citation relations. The size of each node corresponds to the text's indegree centrality score as an indication of text prominence. 1. Purple = Academic Medicine subnetwork; 2. Green and Orange = I/O Psychology General and Distinctive subnetworks; 3. Blue = Education subnetwork; 4. Black = Nursing subnetwork; 5. Pink = Psychology subnetwork.

Figure 2.3

Sport Subnetwork



Note: Sport subnetwork (turquoise) consisting of 29 mentoring texts and 50 citation relations, which emerged within the I/O psychology distinctive subnetwork (orange). Authors (year) is provided as an identifier for each node within the sport network.

Bridging Text

Chapter two was an original manuscript that systematically reviewed 1,819 mentoring texts across various disciplines. Using citation network analysis to evaluate this body of literature, results indicated a lack of interdisciplinary communication across mentoring disciplines. Moreover, results identified the most influential texts across mentoring disciplines, thus serving as a road map for sport mentoring researchers. With this in mind, the review highlighted research gaps within the sport mentoring discipline, suggesting that sport mentoring scholars could fill these gaps by adopting knowledge from other disciplines, including Higgins and Kram's (2001) reconceptualization of mentoring using the developmental network perspective. Therefore, chapter three adopted the developmental network perspective within the most established sport mentoring population—sport coaches.

Chapter 3

A Qualitative Examination of the Developmental Networks of Elite Sport Coaches

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Abstract

The developmental network perspective proposes that people acquire a wide and diversified network of concurrent developmental relationships, such as mentors, who assist their personal and professional development. The overarching purpose of this study is to qualitatively examine the developmental networks of experienced elite sport coaches to identify their developmental agents, the outcomes resulting from these developmental relationships, and the type of developmental assistance provided by the developmental agents. Participants were nine experienced elite coaches (*M*age = 50.22, *SD* = 10.56) with an average of 21.44 years of coaching experience at the university, professional, and/or national levels. Data were acquired during a single interview with each participant via a two-step process: the construction of visual representations of participants' developmental networks, which were subsequently used to guide semi-structured interviews. The data were analyzed using thematic analysis. The findings indicated that coaches had a vast network of developmental relationships (e.g., coaches, athletes, family) that collectively contributed to their development on a personal (e.g., core values) and professional (e.g., coaching knowledge, employment opportunities) level. Furthermore, members of the developmental networks facilitated the acquisition of developmental outcomes by providing intentional and unintentional forms of assistance, such as feedback, guidance, advice, and role modelling. This study adds to the growing body of literature that suggests people learn and develop with the assistance of multiple developmental relationships. Thus, developing coaches should be encouraged to surround themselves with a variety of developmental agents, both inside and outside of sport, to enhance their growth and development.

Keywords: coach learning, development, mentoring, sport coaching

A Qualitative Examination of the Developmental Networks of Elite Sport Coaches

Over the past two decades, mentoring scholars across a variety of disciplines have been advocating for the developmental network perspective as an alternative conceptual approach to understanding the impact of mentoring (Higgins & Kram, 2001). The *developmental network perspective* is an all-encompassing mentoring model that proposes that people acquire a wide and diversified network of concurrent *developmental agents* who take "an active interest in and action to advance the [mentee]'s career by providing developmental assistance" (Higgins & Kram, 2001, p. 268). Notably, the developmental network perspective integrates principles of social network theory (e.g., Granovetter, 1973), and suggests that mentoring relationships can vary in diversity (i.e., relationship type) and strength (i.e., relationship quality; Higgins & Kram, 2001; Yip & Kram, 2017).

There has been growing evidence from a variety of disciplines, including industrial and organizational psychology (e.g., Murphy & Kram, 2010), medicine (e.g., DeCastro et al., 2013), nursing (e.g., MacLaren, 2018), and higher education/academia (e.g., Kirchmeyer, 2005) that support the value and importance of the developmental network perspective (Chandler et al., 2011; Dobrow et al., 2012). By taking into account multiple developmental relationships, researchers in the organizational psychology literature have found the developmental network approach to be a stronger predictor of development than traditional dyadic approaches to mentoring (Higgins & Thomas, 2001). Additionally, some of these studies have used qualitative methods to examine the developmental network perspective (e.g., Janssen et al., 2013; Shen & Kram, 2011; Sweitzer, 2009). For instance, Janssen et al. (2013) used both relational maps and semi-structured interviews to examine the current and past developmental networks of 18 employees across various white-collar professions. Their findings identified that participants

averaged 5.28 developmental agents who supported them by providing various developmental support functions (e.g., role modelling, demonstrating interest and care), which resulted in a number of beneficial outcomes (e.g., feelings of autonomy, competence, and relatedness).

Although the developmental network perspective has yet to be explored in the sport context, research conducted within sport settings has identified mentoring as an important part of coach development (Bloom et al., 1998; Donoso-Morales et al., 2017; Narcotta et al., 2009; Rathwell et al., 2014; Vallée & Bloom, 2016), suggesting that mentors are critically important developmental agents. Traditionally, mentoring for sport coach development has been conceptualized within mentor role theory (Kram, 1985), which describes mentoring as a dyadic process that involves two individuals of unequal power (Bloom, 2013; Higgins & Kram, 2001; Lefebvre et al., 2020). According to mentor role theory, mentors facilitate the personal growth and development of their mentee by providing a range of mentor functions (Kram, 1985). Specifically, mentors provide the mentee with sponsorship, protection from adversity, challenging assignments, and increased professional exposure. Additionally, mentors contribute to the personal growth of mentees by assisting them in developing a professional identity, acting as a sounding board, being respectful and supportive, and acting as a role model.

To date, quantitative studies have confirmed that mentor sport coaches provided career and psychosocial functions to mentee coaches, such as challenging assignments and sponsorship (Narcotta et al., 2009). Further, qualitative evidence has demonstrated that mentors helped mentees improve their competence, self-efficacy, interpersonal communication skills, and expand their networks (Bloom et al., 1998; Koh et al., 2014; Taylor et al., 2014). For instance, in her path to coaching her university team to five consecutive national championships, Chantal Vallée indicated that mentoring helped her become a better coach and leader, and inspired her to

become a life-long learner (Vallée & Bloom, 2016). In another study, Rathwell et al. (2014) interviewed six accomplished university head coaches and found that they mentored their assistant coaches by exposing them to various developmental opportunities such as coaching clinics (i.e., professional exposure), by offering performance feedback, and by increasing the number and difficulty of leadership opportunities (i.e., challenging assignments). Accordingly, head coaches contributed to the development of their assistant coaches, and in doing so, ensured their assistants were well prepared for future career opportunities. Furthermore, Bloom et al. (1998) interviewed 21 expert team sport coaches and found that these coaches were mentored by more experienced coaches during both their athletic and coaching careers, during which they gained valuable knowledge that shaped their coaching careers. Notably, research has also shown that mentoring has beneficial outcomes for mentors, such as refining their coaching knowledge, engaging in meaningful self-reflection, and feeling a sense of fulfillment (Grant et al., 2020; Koh et al., 2014). Although there is evidence to suggest that mentoring is a critically important developmental relationship (e.g., Bloom et al., 1998; Koh et al., 2014), examining coach development solely through this traditional lens fails to account for concurrent developmental relationships and assumes a hierarchical structure (Higgins & Kram, 2001). Thus, sport and non-sport scholars have examined other developmental relationships and structures such as peers, multiple mentors, and information networks.

Peer mentoring is characterized by two individuals of similar age, rank, and/or experience/power involved in reciprocal mentoring (Hoffmann et al., 2017; Kram & Isabella, 1985; Moss et al., 2008). In sport, for instance, this could include two newly hired assistant coaches of equal status acquiring knowledge and experience together. Next, *multiple mentoring* consists of the emergence of more than one hierarchical mentor (i.e., unequal power) who

provides different amounts and varying types of support (Higgins & Kram, 2001; Sawiuk et al., 2017). For instance, an inexperienced coach might consider a veteran coach to be an informal mentor, while at the same time acquiring a formal mentor to help progress up the coaching ranks. Furthermore, a *dynamic social network* is an evolving informal information network consisting of trusted colleagues who share knowledge (Occhino et al., 2013). For instance, a coach might reach out to other coaches in their social circles for coaching knowledge and/or advice. Lastly, a *community of practice* is another more specific type of information network which consists of groups of individuals who share a concern, set of problems, or a passion regarding a specific topic and interact on an ongoing basis with the intent of developing their knowledge and expertise (Wenger, 1998). As an example, a group of coaches might organize biweekly virtual meetings to brainstorm various topics, such as diversity and inclusion in their sport. Analogous to peer mentoring, learning within information networks is a collaborative process involving the co-construction and sharing of knowledge (Stoszkowski & Collins, 2014; Palincsar, 1998).

Notably, the developmental network perspective is an inclusive framework that incorporates various developmental relationships and structures, such as traditional mentors, peer mentors, information networks, family, friends, and community members. In sport, the developmental network of an assistant coach might include: another assistant coach (i.e., peer mentor), various head coaches (i.e., multiple mentors), an information network of colleagues (i.e., dynamic social networks), along with individuals outside of the immediate sport context, such a parents (i.e., family), and a former teammate (i.e., a friend). By simultaneously taking into account the constellation of developmental relationships of sport coaches, this approach offers a more complete picture of how multiple individuals can impact the personal and professional development of a coach. Furthermore, given that this perspective offers information beyond

traditional mentoring structures, such as the implications of network size, diversity, and strength (Yip & Kram, 2017), the developmental network perspective offers a promising avenue for understanding the impact of developmental relationships (e.g., mentoring) in greater depth. However, the developmental network perspective has yet to be directly explored in the sport context where previous research has suggested multiple developmental relationships may be active in the development of effective/elite coaches (Lefebvre et al., 2020; Sawiuk et al., 2017). Therefore, the purpose of the study is to retrospectively examine the developmental networks involved in the personal and professional development of experienced elite sport coaches. The study is guided by the following research questions:

1. *Who* are the developmental agents within elite sport coaches' developmental networks?
2. *What* are the outcomes/consequences associated with their developmental network?
3. *How* do developmental agents impact the development of elite sport coaches?

Method

Our study was situated within an interpretivist philosophical paradigm, which was underpinned by a relativist ontology (i.e., the existence of multiple, changing, and mind-depending realities) and social constructivist epistemology (i.e., knowledge is co-constructed and embedded within social experiences; Daly, 2007). A generic qualitative methodology was employed (see Bradbury-Jones et al., 2017), and our data were generated through a mapping of coaches' developmental networks followed by semi-structured interviews (Sparkes & Smith, 2014). With the purpose of identifying patterns of meaning across our data, the data were analyzed following thematic analysis guidelines (Braun et al., 2016). Thematic analysis was selected given that it does not contain methodological stipulations nor is it tied to a specific theoretical framework or approach, thus allowing researcher flexibility to analyze the data

(Braun et al., 2016). In alignment with the philosophical underpinnings of this study, the authorship team included combined research-based expertise and personal experiences with elite coaching and with mentoring. For instance, one author has seven years experience coaching at the university level and another author has 20 years of youth sport coaching experience. These experiences enabled us to reflect on our own developmental networks, which also facilitated the interpretation of data by enabling the research team to engage in stimulating discussions during the analytical process.

Participants

Nine current elite sport coaches (M_{age} = 50.22, *SD* = 10.56) were purposefully selected. To garner in-depth retrospective discussions, all the participants had at least 10 years of coaching experience at the elite level (i.e., high-performance athletes; ICCE, 2013). Accordingly, participants combined for 193 years of coaching experience (M_{years} = 21.44, *SD* = 9.44) at the university, professional, and/or national levels. Two of the nine participants were female, which was representative of the current landscape of elite coaching (Culver et al., 2019). The participants coached male teams (*n* = 2), female teams (*n* = 4), or mixed-gender teams (*n* = 3), across a range of sports. They collectively achieved a number of coaching accomplishments, such as national championships, world championships, coach of the year awards—to name a few—and some had guided athletes/teams to Olympic and Paralympic medals. Perhaps contributing to their impressive backgrounds, the participants demonstrated a values-based athlete-centred coaching approach (Falcão et al., 2020). More specifically, despite their numerous winning records, the participants emphasized the importance of fostering the development of their athletes both within and outside of their sport (e.g., life skills, balance). Furthermore, they highlighted the value of creating a sport environment that fostered an

autonomous desire for continued participation and a pursuit of success by emphasizing fun, growth, and positive social interactions. To protect anonymity, participants were given pseudonyms.

Data Collection

After obtaining approval by the authors' institutional Research Ethics Board, the primary investigator contacted potential participants through telephone, email, and snowball sampling referrals (Sparkes & Smith, 2014). Prior to participation, all nine coaches provided written informed consent (see Appendix A). Data were acquired during a single interview with each participant via a two-step process (see Appendix B).

In step one, the researcher and participants co-constructed a visual representation of their developmental network. Specifically, Bagnoli's recommendations for graphically eliciting relational maps (i.e., developmental networks) were followed whereby participants were provided with a template of a relational map consisting of a center point, representing the participant, and a number of circles (Bagnoli, 2009). These circles represented career influence, with inner circles representing greater influence. Participants were asked to "Name the individual(s) whom you believe (currently or in the past) takes/took an active interest in and concerted action to advance your career". The researcher allowed the participants to interpret this question themselves by avoiding prompting them towards specific individuals. However, the researcher would ask questions such as: "do you feel this person had an impact on you personally or professionally?", and "there is no wrong answer, I'm interested in what *you* think". Participants assigned pseudonyms for each developmental agent and placed them onto the relational map. Once the participants exhausted their list of developmental agents, the ensuing relational map was deemed to be a representation of their developmental network (see Figure

3.1), although participants could add, remove, or change their network at any time. These graphic displays of developmental networks were then used to guide the remainder of the interview.

In step two, participants were asked a series of open-ended semi-structured interview questions that were informed by literature from coaching science (e.g., Côté & Gilbert, 2009; Lefebvre et al., 2020) and the developmental network perspective (Higgins & Kram, 2001; Yip & Kram, 2017). Following opening questions about athletic and coaching career transitions, core interview questions examined the participant's developmental networks (i.e., step one). Participants described (a) each developmental agent in detail along with the nature of their relationship (i.e., who), (b) the developmental outcomes associated with the developmental agent (i.e., what), and (c) the method in which the developmental agent facilitated the achievement of such outcomes (i.e., how). Interviews concluded with questions that provided an opportunity for each participant to address any gaps that may have been overlooked by the researchers. The interviews were conducted in person by the primary investigator and ranged from 72 to 158 minutes. Sessions were audio recorded and transcribed verbatim.

Data Analysis

Using a deductive-inductive approach, Braun et al.'s (2016) guidelines for thematic analysis helped identify patterns in the dataset whereby themes were identified (i.e., inductively) within a broader set of overarching themes that aligned with the research questions and the developmental networks literature (i.e., deductively). Importantly, the thematic analysis was conducted reflexively and recursively, meaning that the analytical process began with the first interview and continued throughout the collection of data. First, the primary investigator engaged in the process of familiarization, which started during the collection of data, and continued by

immersing himself in the data by recursively reading the transcripts and/or listening to the audio recordings. This concurrently involved engaging in analytical readings of the data, reflexive note taking, and identifying and labelling extracts of interest within the dataset (i.e., codes). These codes were subsequently organized and clustered into higher-level patterns (i.e., generation of themes), which were continuously refined and named throughout the analytical process. As an example, the transcript extract "[Athletic director] was a woman, so to have a direct report and leader who is a female kind of role model I think is something that resonated with me" was coded as *role modelling*, which was combined with other codes to generate the theme "indirect mechanisms". Lastly, following the generation of the final set of overarching themes, themes, and subthemes, the primary investigator engaged in the writing of data extracts and descriptive/analytic commentary. Accordingly, the analysis deductively generated three overarching themes, which were inductively comprised of nine themes.

Quality Standards

In line with our philosophical underpinnings, we do not subscribe to a criteriological approach (i.e., notion of universal criteria) to justify the trustworthiness of our work (Smith & McGannon, 2018). Thus, we selected the following list of socially-constructed characteristics: (a) meaningful coherence, (b) transparency, (c) resonance, (d) credibility, and (f) rich rigor (e.g., Smith & McGannon, 2018; Sparkes & Smith, 2014). First, *meaningful coherence* was established by ensuring all aspects of the study, such as philosophical assumptions, purpose, methods, and results were aligned. Second, *transparency* was sought by means of an audit trail and the use of critical friends. Throughout the study the first author engaged in reflexive notes and extensive documentation, such as providing rationales for research decisions and reflexive interpretations of the data. Furthermore, at various occasions, all members of the research team

engaged in a critical dialogue with the first author with the intent of challenging him and fostering reflexivity at all phases of the study. Third, *resonance* was achieved by providing rich participant quotations, with the intent of portraying evocative representations of participants experiences. Lastly, *rich rigor* was achieved through a sound theoretical framework (i.e., development networks grounded in social network theory; see Higgins & Kram, 2001), appropriate sampling, the generation of meaningful data, and breadth/depth of analysis.

Results

Three overarching themes comprised of nine themes were generated from the data (see Table 3.1). The results revealed that the coaches acquired a vast developmental network that encompassed a large number *of developmental agents* (e.g., coaches, family). These developmental agents collectively contributed to their *developmental outcomes* on a personal and professional level. Lastly, the participants described various *mechanisms of influence* through which developmental agents impacted their development.

Developmental Agents

All the participants described a large number of individuals within their developmental networks. More specifically, visual inspection of all nine relational maps identified a total of 197 developmental agents with participants' developmental networks ranging between 12 and 39 developmental agents (M = 22; see Figure 3.1 for a sample network). Although each developmental agent brought something unique and important to their development, the participants emphasized the importance of all their developmental agents as a collective. For instance, William, a university swimming coach, explained: "I'm sure that I needed them all to develop that well-roundedness". To this end, the developmental agents that will be discussed in

the current study were grouped into the following themes: (1) *coaches*, (2) *athletes*, (3) *management*, and (4) *family*.

Coaches

The participants identified a wide range of coaches as developmental agents, such as former coaches during their athletic careers, head coaches early in their coaching careers, assistant coaches, coaches from opposing teams, retired coaches, coaches from other sports, etc. As Derek, a professional ice hockey coach, noted: “I learned from pretty much every coach”. As the most expansive group of developmental agents, the coach data were further divided into the following subthemes: (a) mentors, (b) peers, (c) idols, and (d) mentees. First, participants identified their mentors, which can be characterized by close relationships with more experienced individuals, such as head coaches early in their coaching careers or highly-regarded retired coaches. As an example, Danielle, a university basketball coach, noted: “He became my personal mentor and he's still my mentor to this day. There's no question that we won a lot of championships because of what my mentor taught me as a coach”. Second, participants discussed a number of peer coaches and colleagues with whom they held close trusting relationships and who often provided advice and counsel on a variety of matters related to the profession. For instance, Becca, a university basketball coach noted: “He is the other assistant coach with our national team. He's also become one of my best friends. I work with him and we talk almost daily about different things. He's really helped me grow as a coach.” Third, most participants mentioned a developmental impact stemming from idols—most commonly internationally-renowned coaches, dead or alive, with whom they had no personal connections. This type of developmental relationship has become possible due to technological advancements that provided ease of access to some of the greatest coaches across the globe. Accordingly, Jeff,

a university ice hockey coach, described: “Lou Holtz would be another guy. Never met him. Watched all his videos, read his book, find him interesting. So, these are all people I’ve read, or watched, or gotten something out of in terms of their approach.” Furthermore, several participants emphasized the important role that reading about these coaches played in their development. For instance, Liam, a university volleyball coach, explained:

> A fundamental part of my life is reading books, which I think had a big impact in the developmental aspect of my coaching. You always have a mentor available in a book. We're always on the road, or on the plane, and I'm just always reading. I think books have been one of my greatest mentors.

Lastly, participants identified mentees as developmental agents, which typically consisted of their assistant coaches who often provided them with the opportunity to refine and expand their own coaching competencies:

> Figuring out how to mentor my current assistant coach has actually helped me grow more than anything. I've been trying to figure out how to prepare her to be a head coach by challenging her to grow. And then, she has taught me a lot in terms of approach with athletes. (Becca)

Athletes

The majority of participants included a number of athletes within their developmental networks. Similar to their relationship with their coach mentees, participants indicated the reciprocal nature of the developmental impact within coach-athlete relationships. For instance, William explained: "It was a symbiotic relationship…it's amazing right, like it was so cool to have an athlete that you were able to influence that much, who in turn influenced you so much". Many times, the athletes pushed the participants to improve their coaching. As Liam explained:

"I'd put all my players in [my developmental network]…I'm trying to help human beings and they're all different. I think they bring the best out of me to always be adaptable to their needs." Importantly, the participants described learning from both positive (e.g., quality leaders) and negative experiences with their players (e.g., difficult athletes).

Management

All the participants identified individuals in management positions, such as athletic directors, general managers, and lower level management (e.g., manager of sport performance), as developmental agents for their role in providing coaching opportunities and ongoing professional support. For example, Danielle explained: "I'm going to add my boss. [General manager] was a huge influencer for me because he offered me the job then mentored me. That's been a great experience for me in terms of evaluating, dialoguing, emailing, making decisions together." Generally, the participants described these individuals as largely responsible for their coaching opportunities, followed by ongoing professional support. For instance, Aaron, a university volleyball coach, described: "He was the athletic director and he gave me my first shot. He taught me what professionalism was all about and he held me accountable." As another example, William added: "She's been the varsity manager since I got here. She has been my sounding board, the person who has kept me in check, and has guided me through these red tape issues."

Family

Interestingly, participants' developmental networks extended beyond the sport context to their family members. Specifically, participants discussed the developmental importance of their parents, grandparents, and siblings. For instance, Danielle explained: "Well 100% my parents. I mean the apple doesn't fall far from the tree. The way you are raised is the way you think and the

work ethic my dad taught me is unprecedented". Furthermore, the participants also emphasized the significance of their partners and children. As an example, Jeff explained:

> Both of my children had a huge impact on my coaching because I think coaching, teaching, parenting can be similar, to a certain extent. Being a parent has had as much or more of an impact in terms of my development as a coach.

Developmental Outcomes

During the interviews, participants discussed a number of developmental outcomes that contributed to both their *personal* and *professional growth.* As Danielle explained: "They [developmental agents] are the reason I am who I am today. I would be so different if I didn't have these experiences. These are the people that shaped who I am". Taken together, this theme identifies the personal and professional development that resulted from their developmental relationships.

Personal Growth

The participants identified their personal growth as a key piece of their development, rationalizing that who they are shapes how they coach. Accordingly, throughout their upbringing (e.g., family), during their athletic careers (e.g., former coaches), and early in their coaching careers (e.g., mentors), their developmental agents contributed to their personal growth by playing a role in their acquisition of (1) core values and (2) personal characteristics. The participants discussed how their developmental agents instilled core values, such as a deep sense of respect and care towards others, empathy, humility, and loyalty. The development of these core values helped them understand how they coached, such as their overall approach and philosophy of coaching. For instance, Aaron described:

> My Grandpa has shaped a lot of how I want to treat my family which carries over into coaching because these athletes are like my kids. I want to treat them the same way, and he taught me that. I care about [my athletes] probably to a fault. I take it personally when things go wrong, but at the same time I push them to be better on and off the court.

Furthermore, the participants emphasized the importance of the personal characteristics they acquired as a result of their relationships with developmental agents, such as confidence, professionalism, discipline, work ethic, competitiveness, and passion, which contributed to an unparalleled and relentless desire for success. Their drive and work ethic translated to their coaching and made them exceptionally demanding of themselves and others (e.g., assistant coaches and athletes):

> [Father] made me work really hard and made me understand that success is earned through effort and intelligence. He never gave me a cent in my life. He told me "if you want something then you have to work for it." In the same way, I give [my athletes] nothing and I push them very hard in the gym. (Liam)

Professional Growth

The collective impact of developmental agents was felt across all the major spheres of coaching, resulting in various (a) sport specific, (b) interpersonal, and (c) intrapersonal outcomes (e.g., knowledge acquisition) that ultimately served to advance their coaching careers.

First, the participants all described how their developmental agents helped develop their sport-specific knowledge and behaviours. This included learning coaching fundamentals (e.g., technical and tactical skills, organizational behaviours), managerial requirements (e.g., recruitment, fundraising), and navigating the sport culture (e.g., dealing with media, micro-politics). Furthermore, developmental agents contributed to the advancement of the participants'

coaching careers via job opportunities and promotions. More specifically, participants described learning about new job opportunities through coaching colleagues, who at times even advocated for them. For instance, Chris, a university Swimming coach, described: “[Colleague] was the one that told me about the job opening. If it hadn't been for him, I wouldn't be where I am today. I'm not sure I'd be coaching today.” As another example, Liam noted: “They didn't even open the job here, they just gave it to me. I think it was because of [head coach] and the way he sold me to the administration”.

Second, all of the participants emphasized that their developmental agents helped them recognize the importance of relationships (i.e., interpersonal outcomes): “Coaching [athlete] gave me such an insight into how important the coach-swimmer relationship can be. I think my impact on her and her impact on me was more than I got from any other athlete I ever coached” (William). According to the participants, their developmental agents helped them learn how to develop and foster relationships and *how to* use their relationships to get the most out of people. As an example:

> [Peer coach] is a brilliant communicator, very observant, and emotionally intelligent. I've really learned a lot from him and communicating with people that way. As a simplified example, “you're telling me that you're good but your face is telling me that you're not good. So what's really going on?” (Becca)

Furthermore, the participants discussed the benefits of cultivating relationships with their developmental agents. Developing and fostering relationships allowed participants to expand their networks and provided additional opportunities for engaging in networking. For instance, David, a professional ice hockey coach explained:

> Well, the [ice] hockey world is all about connections and networks. You can't have a job in hockey, in coaching, if you don't have relationships. We all know each other from somewhere…[colleague] was influential for me when I needed to find another job. He helped me grow my network and even talked to different coaches about me and for me without me asking.

Another benefit of fostering relationships with their developmental agents was the direct impact on their work environment: "You want to have a great working atmosphere because you're spending a lot of time there and [assistant coach] helps create that for me. I enjoy coming to coach and she's a large reason why that happens" (Chris).

Third, a few of the participants discussed acquiring intrapersonal knowledge from their developmental agents. For instance, several participants indicated learning the importance of self-monitoring of behaviours and/or engaging in reflective practice:

> I'm seeing now how important it is for self-reflection to be part of coaching and how it's become a big part of how I teach…[colleague] was the biggest influence for sure in getting me to take that step back and be able to self-reflect. (Aaron)

Furthermore, other participants discussed help with emotional regulation: "[Partner] has kept me grounded, if you will. I'm an emotional kind of guy, competitive, and she helped me funnel and channel that in an appropriate direction" (Jeff). Lastly, coaching can be an all-consuming profession and for this reason several participants discussed learning the importance of life balance. For example, David described:

> I learned from [head coach] that it's not the time that you spend at the office, but the quality time that you spend at the office. It's important to have balance in your life and not just think about work.

Mechanisms of Influence

The participants discussed how developmental agents contributed to their development by providing various forms of developmental assistance. That is, the participants referred to a number of *indirect* (e.g., observation) and *direct* (e.g., tangible support) mechanisms of influence. For instance, Liam explained that in order to improve as a coach: "You have to observe, talk with other coaches, and do all the specific direct and indirect things that will bring more knowledge to yourself. It's important for younger coaches to understand these ways of gaining knowledge." Importantly, the participants also emphasized their role as *active agents* in their own development, such as reflecting on and making sense of acquired knowledge. For instance, William explained: "Part of being a great coach is taking all the things that you have learned, observed, seen, been given, happen to catch, and putting it together to make the plan."

Indirect mechanisms

The participants described a range of mechanisms that indirectly influenced their development, such as (a) mere presence, (b) observation and role modelling, and (c) exposure to enriching experiences. First, some participants described unconsciously assimilating knowledge from the mere presence of influential figures (e.g., parents, former coaches). For instance, William explained: "I learned more from [senior coach] because of the way that he was…A lot of it was just osmosis, picking up skills, picking up traits, and picking up the way to do things". Second, whereas the mere presence of influential figures involved an unconscious process of acquiring knowledge and behaviours, the participants appeared to indicate a more conscious and intentional process of observing and learning from others. Specifically, participants described learning from certain developmental agents by observing and modelling the behaviours of more experienced coaches. For instance: "I was observing how [head coach] was working his

assistants, how he was talking to the players, the tone of voice he was using in different meetings and different times" (David). As another example, William described:

> He was my example as a professional when I was just starting out as a coach. From a professional standpoint, I think that [head coach] was the person I wanted to model myself after—more than any other person in [my developmental network].

This appeared to be particularly important for the female coaches and something they looked for in their developmental agents. For example, Becca explained: "[Athletic director] was a woman, so to have a direct report and leader who is a female kind of role model I think is something that resonated with me." Third, the participants also described that their association with certain developmental agents exposed them to a variety of enriching experiences that served to advance their coaching knowledge. For instance, Danielle described how she gained knowledge during informal experiences with her developmental agents: "one way that [developmental agents] influenced me is through experiences, such as meals and informal evenings out with them". The enriching experiences described by participants were, however, not all fundamentally positive. In fact, a number of coaches, athletes, and managers were identified as a developmental agent for their negative impactful contributions. As examples:

> [Former coach] was the biggest jackass I've ever met in my life and it made me realize that I don't want to be like him. It influenced me in the sense that I never want to be that person while coaching. (Aaron)

> Difficult players made me adjust the way I coach. They brought something to me that made me, at some point, unable to coach them. Like a problem that I had to go solve. These players influenced me incredibly by requiring me to grow and learn how to coach better. (Danielle)

Direct mechanisms

Developmental agents had a direct influence on the development of participants, such as (a) providing support, (b) engaging in enriching forms of communication, and (c) taking actionable developmental measures. First, there was a huge emphasis on support, which was manifested in various forms. For instance, early in their lives/career's developmental agents provided tangible support (e.g., finances, sport opportunities) that allowed them to engage in and develop a passion for their sport. Throughout their careers, developmental agents also provided moral and emotional support: "With coaching, there's not a lot of balance in your life and I'm just fortunate that [partner] is extremely supportive of what I do" (Jeff). Some developmental agents also provided professional support, whereby these developmental agents helped participants navigate the demands of coaching, provided support for the program and the participants' vision, and navigated professional adversity by protecting and/or advocating for them. For instance, several participants discussed threats to their job security and how developmental agents, ranging from management to colleagues, fought for them:

> [Athletic director] backs us 100%. I had a very awful incident, which was a really difficult period for me. It was unmerited and the athletic director backed me on that, and she continues to back us whenever there's an issue. It's always nice to know that you've got people behind you when you need to, and I think that's important for your work environment. (Chris)

Furthermore, the participants described engaging in various enriching forms of communication with the developmental agents. For instance, the participants gained immense knowledge simply through conversations where they exchanged information regarding their shared passion. For example, William explained that he would "go to his office and just sit in

with [head coach] and chat swimming over a drink or two (laughing) and I would learn so much". At times, when they had questions, needed help, or had concerns, they reached out to certain developmental agents who served as a sounding board, gave feedback, and provided guidance and advice. For instance, William, who also coached para sport swimmers, reflected on how his colleague helped him learn coaching knowledge specific to para sport:

> For the last three or four years [colleague] has been someone that I can bounce ideas off of. He's been in the sport for years and I was able to learn a lot about different impairments, different classes, different kinds of people that you're gonna run into and I think it helped me in my coaching.

Some developmental agents provided more tangible, actionable measures that served to expedite their growth, such as challenging them, providing resources, and sponsoring the participant. Specifically, some participants referred to how some colleagues challenged them to think more deeply about their decisions and actions. For instance, Danielle described: "[Mentor] would challenge me and say 'the statistics show *this*, so why did you do *that*?'. We had like hour-long conversations on a weekly basis where he would look at the team and challenge my decisions". Furthermore, as an example of sponsoring, Liam explained:

> From day one, [head coach] never treated me just as an assistant, he would present me to everybody, and he would always say that I was a coach. I was not an assistant coach. I was just somebody on the same playing field or level as he was.

The self as an active agent

The participants described themselves as being an active agent in in their developmental process by (1) intentionally seeking out sources of information, and (2) reflecting on the information disseminated from their developmental agents. The participants described how they

actively sought various developmental agents who served as sources of influence. For instance, Derek explained that “at the end of the day I like to sit and think, who did I meet today? What did I learn from them? What did I like? Or ‘this person is not a fit for me’.” Furthermore, the participants also communicated their involvement as an analytical filter in the dissemination of information and knowledge. That is, following the acquisition of knowledge, participants engaged in reflection to determine what information was most helpful to them:

> I think a lot of it comes down to self-reflection on my part after having interactions with them whether positive or negative; ‘Have I done this? Have I tried what they're talking about? Have I looked at the bigger picture?’ It comes down to taking what they've taught me and it's about how I self-reflect on it, and how I either use it or don't use it. I think that has a big piece to it. (Aaron)

As another example, Liam explained: “I take everything and then I think: ‘What does that mean for me? What does that mean in my environment? What does that mean in my specific context with my team?”

Discussion

The purpose of this study was to examine the developmental networks of experienced elite sport coaches to identify their developmental agents, the outcomes resulting from these developmental relationships, and the type of developmental assistance provided by the developmental agents. Accordingly, our findings indicated that elite coaches acquired a vast and varied developmental network that contributed to their personal and professional development by intentionally and unintentionally serving various developmental functions.

Network Structure: Vast and Varied

Examining the structure of elite sport coaches' developmental networks, which averaged 22 developmental agents per participant, indicated that their networks were vast and varied. Notably, the literature on developmental networks in non-sport disciplines has found that the size of a person's developmental network was positively associated with developmental outcomes, such as work satisfaction, retention, and promotions (Higgins, 2000; Higgins & Thomas, 2001; van Emmerik, 2004). In sport, emerging athlete development literature suggests that "it takes a village" to foster development in athletes (Din et al., 2015, p. 596). In the same manner that many people influenced the development of business professionals and athletes, perhaps coaches can also benefit from fostering multiple developmental relationships to maximize their development. Furthermore, the findings revealed that the coaches received developmental assistance from *various* sources, which corresponds to *network diversity* (Higgins & Kram, 2001; Yip & Kram, 2017), which has been associated with a number of beneficial outcomes in non-sport contexts, such as work performance, career and life satisfaction, and job offers (Kirchmeyer, 2005; Murphy & Kram, 2010). According to Yip and Kram (2017), acquiring a diverse network of developmental relationships "offers the possibility of new ideas and perspectives that can enhance the focal person's knowledge, understanding, skill development, and preparedness of future opportunities" (p. 93). With this in mind, these elite coaches have likely benefited from the variety in ideas and perspectives that they have received due to the diversity of their developmental relationships. Accordingly, prospective coaches should consider surrounding themselves with different types of developmental relationships from various social and professional circles.

Our findings also revealed that the two female coaches reported a particular emphasis on having female developmental agents as role models. Although our results did not explain why

our female coaches desired same-sex role models, perhaps it is because they can model and learn from many gender-specific issues, such as balancing coaching with motherhood (e.g., LaVoi & Dutove, 2012). Indeed, in their pursuit of career advancement, female coaches must navigate unique individual, interpersonal, organizational/structural, and sociocultural barriers (LaVoi & Dutove, 2012). Nonetheless, there is emerging evidence in sport (Banwell et al., 2019; Banwell et al., 2020) and non-sport (Chang et al., 2020) contexts that developmental agents, such as mentors, can promote the advancement of careers for women by providing support to help navigate these barriers. Therefore, sport psychology scholars should further examine the developmental impact of female role models and the potential advantage of fostering vast and varied developmental networks for the advancement of women in sport.

Outcome of Developmental Networks

The findings indicate that the developmental networks contributed to both the personal and professional growth of these coaches. In particular, it appears that the collection of relationships resulted in the acquisition of a particularly expansive range of knowledge, which supports the coach learning literature that has found coaches gained knowledge directly and indirectly from others in their environment (Erickson et al., 2008; Occhino et al., 2013). This finding is also consistent with research conducted outside the sport context which has shown that the content of exchanges between individuals and their developmental agents was broader and more exhaustive than traditional mentoring relationships (Cotton et al., 2011; Janssen et al., 2013; Murphy & Kram, 2010). Furthermore, the coaches in the current study acquired knowledge across multiple domains of effective coaching: professional knowledge (e.g., technical/tactical skills, managerial requirement), interpersonal knowledge (e.g., fostering relationships, networking), and intrapersonal knowledge (e.g., reflecting, finding balance), which

aligned with Côté & Gilbert's (2009) domains of coaching effectiveness. Of importance, the coach learning literature indicates it can be difficult for coaches to acquire interpersonal and intrapersonal knowledge within more structured coach development initiatives (see Lefebvre et al., 2016). Our findings suggest that developmental agents, such as coaches and family members, contributed to the participants' acquisition of interpersonal and intrapersonal knowledge, and may have served as a source of knowledge to develop them into more effective coaches. Future research should consider examining further the different types of knowledge that various developmental agents provide to these aspiring coaches.

"Mentor" Functions Beyond Mentoring

Some authors have suggested that career and psychosocial functions of mentorship can be provided within developmental relationships beyond traditional conceptualizations of mentoring (Dobrow et al., 2012). Our findings support this contention by identifying that developmental agents might collectively provide advice, feedback, and guidance (i.e., coaching and counselling), protect coaches from threats to their job security (i.e., protection from adversity), serve as role models, and contribute to their career advancement via employment opportunities—among others. Furthermore, whereas the original definition of a developmental agent implies an active role, whereby they "take an *active* interest in and *action* to advance the [mentee]'s career" (Higgins & Kram, 2001, p. 268), the findings in our study identified a number of unintentional forms of support. This included: (a) the mere presence of an influential figure, (b) observation and role modelling, and (c) exposure to enriching experiences. These alternative functions might be explained by the fact that coaches reported learning from individuals with whom they had no relationship (i.e., idols), as well as relationships that were grounded within negative experiences, such as toxic coaches during their athletic careers and difficult athletes (cf. Heelis et al., 2020).

Likewise, recent qualitative examinations of developmental networks have identified that developmental agents can be distant, unmet, and imaginary figures, such as heroes and idols, and can also be negative (Cotton et al., 2011; Murphy & Kram, 2010; Shen & Kram, 2011). For instance, Shen and Kram (2011) argued that some developmental agents assisted in an individual's development via anti-role modelling, where the developmental agent served as "a negative object of NOT doing or becoming" (p. 548). These findings have led scholars to suggest refining the definition of developmental agents to "a person or figure to whom a [mentee] attributes developmental assistance that enables his or her career success" (Cotton et al., 2011, p. 39). Our findings suggest that this alternative definition may be more suitable within the sport context and that further research into the implicit ways that a person can influence the development of a coach is warranted.

Practical Implications

Some non-sport scholars have suggested that a single mentor is not sufficient to meet a person's needs (Higgins & Kram, 2001). This raises important concerns for sport coaches because it can be difficult for coaches to acquire a "traditional" mentor (cf. Bloom, 2013). However, the important implication from this study is that developmental assistance can be provided by a range of developmental relationships—not just mentors. To this point, considering the finding that coaches play an active role in acquiring developmental relationships, early career coaches should understand the value of acquiring knowledge from various sources, such as peers, coaches within and outside of their organization, books about internationally-renowned coaches (i.e., idols), management, and should even strive to learn from their experiences with their athletes (positive or negative ones).

Educational and training opportunities (e.g., leadership training, mentoring programs) grounded within the developmental network perspective are beginning to emerge within various occupations, such as business, healthcare, and education (e.g., de Janasz & Sullivan, 2004; Yip & Kram, 2017). Similarly, coach education initiatives and mentoring programs grounded within this perspective may be a promising avenue for future endeavours. For instance, coach education initiatives could include activities that allow coaches to reflect on their developmental network, such as self-assessments (Who are my developmental agents?) and action planning (Who should I include in my network?), to maximize their developmental opportunities (see Murphy & Kram, 2014).

Limitations and Future Directions

Although this study provides insight on the size and diversity of the developmental networks of elite sport coaches, there are a number of other structural components of developmental networks that warrant attention. For instance, future studies can examine the strength of ties and network reachability (Yip & Kram, 2017). Strength of ties corresponds to the quality (i.e., strength) of developmental relationships (i.e., ties), which can be measured as psychological closeness or quantity of support (Cummings & Higgins, 2006). Network reachability corresponds to the extent to which an individual has access to high status developmental agents, which is proposed to result in access to greater opportunities and access to privileged knowledge (Higgins & Thomas, 2001; Yip & Kram, 2017). Second, this study examined the relationships between elite coaches and their developmental agents from the perspective of the coach. However, developmental relationships are characterized by a reciprocal process of influence and are mutually beneficial (Higgins & Kram, 2001), therefore, scholars have advocated for a mutuality approach that takes into account the viewpoints of all members

(Dobrow et al., 2012). By only including the elite coach's perspective we have limited our ability to gain a deeper understanding into the reciprocal nature of developmental networks; therefore, future studies should also consider including the perspectives of the developmental agents (Dobrow et al., 2012). Furthermore, this study uncovered unique developmental agents (athletes, management, idols, negative influences) which warrants further investigation. For instance, according to Lara-Bercial and Mallett (2016), "the interaction and reciprocal influence between [performance managers and directors] and the high performance coach needs to be better understood to maximize its contribution to coach and athlete learning and development" (p. 42). Third, the study was conducted retrospectively. Theoretical and empirical evidence suggests that social networks change over time (Wellman, 1998), therefore exploring how the developmental networks of elite coaches change over the course of their career stages would be an interesting avenue for future research. For instance, it would be interesting to explore how the improvement in the size, strength, diversity, and reachability of coaches' developmental network over time impacted their attainment of outcomes and opportunities. Lastly, sport psychology scholars could look beyond sport coaches by implementing the developmental network perspective to understand the theoretical and practical implications of multiple developmental relationships for the development of athletes, graduate students, and mental performance consultants—among others.

Conclusion

In conclusion, this study adds to the growing body of literature that suggests people learn and develop with the assistance of multiple people and in multiple ways. According to Yip and Kram (2017), "research on developmental networks can enhance the science and practice of mentoring beyond the traditional dyadic relationships" (p. 100). In doing so, the current study

provides conceptual and empirical support for the developmental network perspective and sheds light on how elite sport coaches can advance personal and professional development by fostering a diverse range of developmental relationships.

References

Bagnoli, A. (2009). Beyond the standard interview: The use of graphic elicitation and arts-based methods. *Qualitative Research*, *9*(5), 547–570.

Banwell, J., Kerr, G., & Stirling, A. (2019). Key considerations for advancing women in coaching. *Women in Sport and Physical Activity Journal*, *27*(2), 128–135.

Banwell, J., Kerr, G., & Stirling, A. (2020). Benefits of a female coach mentorship programme on women coaches' development: An ecological perspective. *Sports Coaching Review*. Advance online publication. https://doi.org/10.1080/21640629.2020.1764266

Bloom, G. A. (2013). Mentoring for sports coaches. In P. Potrac, W. Gilbert, & J. Denison (Eds.), *Routledge handbook of sports coaching* (pp. 476–485). Routledge.

Bloom, G. A., Durand-Bush, N., Schinke, R. J., & Salmela, J. H. (1998). The importance of mentoring in the development of coaches and athletes. *International Journal of Sport Psychology*, *29*(3), 267–281.

Bradbury-Jones, C., Breckenridge, J., Clark, M. T., Herber, O. R., Wagstaff, C., & Taylor, J. (2017). The state of qualitative research in health and social science literature: A focused mapping review and synthesis. *International Journal of Social Research Methodology*, *20*(6), 627–645.

Braun, V., Clarke, B., & Weate, P. (2016). Using thematic analysis in sport and exercise research. In B. Smith & A. C. Sparkes (Eds.), *Routledge handbook of qualitative research in sport and exercise* (pp. 191–205). Routledge.

Chandler, D. E., Kram, K. E., & Yip, J. (2011). An ecological systems perspective on mentoring at work: A review and future prospects. *The Academy of Management Annals*, *5*(1), 519–570.

Chang, J., Baek, P., & Kim, T. (2020). Women's developmental networks and career satisfaction: Developmental functions as a mediator. *Journal of Career Development.* Advance online publication. https://doi.org/10.1177/0894845319900005

Côté, J., & Gilbert, W. (2009). An integrative definition of coaching effectiveness and expertise. *International Journal of Sports Science & Coaching*, *4*(3), 307–323.

Cotton, R. D., Shen, Y., & Livne-Tarandach, R. (2011). On becoming extraordinary: The content and structure of the developmental networks of Major League Baseball Hall of Famers. *Academy of Management Journal*, *54*(1), 15–46.

Culver, D. M., Kraft, E., Din, C., & Cayer, I. (2019). The Alberta Women in Sport Leadership Project: A social learning intervention for gender equity and leadership development. *Women in Sport and Physical Activity Journal*, *27*(2), 110–117.

Cummings, J. N., & Higgins, M. C. (2006). Relational instability at the network core: Support dynamics in developmental networks. *Social Networks*, *28*(1), 38–55.

Daly, K. J. (2007). *Qualitative methods for family studies and human development.* Sage.

DeCastro, R., Sambuco, D., Ubel, P. A., Stewart, A., & Jagsi, R. (2013). Mentor networks in academic medicine: Moving beyond a dyadic conception of mentoring for junior faculty researchers. *Academic Medicine*, *88*(4), 488–496.

de Janasz, S. C., & Sullivan, S. E. (2004). Multiple mentoring in academe: Developing the professorial network. *Journal of Vocational Behavior*, *64*(2), 263–283.

Din, C., Paskevich, D., Gabriele, T., & Werthner, P. (2015). Olympic medal-winning leadership. *International Journal of Sports Science & Coaching*, *10*(4), 589–604.

Dobrow, S. R., Chandler, D. E., Murphy, W. M., & Kram, K. E. (2012). A review of developmental networks: Incorporating a mutuality perspective. *Journal of Management, 38*(1), 210–242.

Donoso-Morales, D., Bloom, G. A., & Caron, J. G. (2017). Creating and sustaining a culture of excellence: Insights from accomplished university team-sport coaches. *Research Quarterly for Exercise and Sport*, *88*(4), 503–512.

Erickson, K., Bruner, M. W., MacDonald, D. J., & Côté, J. (2008). Gaining insight into actual and preferred sources of coaching knowledge. *International Journal of Sports Science & Coaching*, *3*(4), 527–538.

Falcão, W. R., Bloom, G. A., & Sabiston, C. M. (2020). The impact of humanistic coach training on youth athletes' development through sport. *International Journal of Sports Science & Coaching, 15*(5–6), 610-620.

Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology, 78*(6), 1360–1380.

Grant, M. A., Bloom, G. A., & Lefebvre, J. S. (2020). Lesson's learned: Coaches' perceptions of a pilot e-mentoring programme. *International Sport Coaching Journal, 7*(1), 22–30.

Heelis, W. J., Caron, J. C., & Bloom, G. A. (2020). The experience of high-performance coaches in the management of difficult athletes. *Psychology of Sport and Exercise, 51,* 101751.

Higgins, M. C. (2000). The more, the merrier? Multiple developmental relationships and work satisfaction. *Journal of Management Development*, *19*(4), 277–296.

Higgins, M. C., & Kram, K. E. (2001). Reconceptualizing mentoring at work: A developmental network perspective. *Academy of Management Review*, *26*(2), 264–288.

Higgins, M. C., & Thomas, D. A. (2001). Constellations and careers: Toward understanding the effects of multiple developmental relationships. *Journal of Organizational Behavior, 22*(3), 223–247.

Hoffmann, M. D., Loughead, T. M., & Bloom, G. A. (2017). Examining the experiences of peer mentored athletes competing in elite sport. *The Sport Psychologist, 31*(2), 134–136.

ICCE, ASOIF, & LBU (2013). *The International Sport Coaching Framework v1.2.* Champaign: Human Kinetics.

Janssen, S., van Vuuren, M., & de Jong, M. D. T. (2013). Identifying support functions in developmental relationships: A self-determination perspective. *Journal of Vocational Behavior*, *82*(1), 20–29.

Kirchmeyer, C. (2005). The effects of mentoring on academic careers over time: Testing performance and political perspectives. *Human Relations*, *58*(5), 637–660.

Koh, K. T., Bloom, G. A., Fairhurst, K. E., Paiement, D. M., & Kee, Y. H. (2014). An investigation of a formalized mentoring program for novice basketball coaches. *International Journal of Sport Psychology, 45*(1), 11–32.

Kram, K. E. (1985). *Mentoring at work: Developmental relationships in organizational life.* Scott Foresman.

Kram, K. E., & Isabella, L. A. (1985). Mentoring alternatives: The role of peer relationships in career development. *Academy of Management Journal*, *28*(1), 110–132.

Lara-Bercial, S., & Mallett, C. J. (2016). The practices and developmental pathways of professional and Olympic serial winning coaches. *International Sport Coaching Journal*, *3*(3), 221–239.

LaVoi, N. M., & Dutove, J. K. (2012). Barriers and supports for female coaches: An ecological model. *Sports Coaching Review*, *1*(1), 17–37.

Lefebvre, J. S., Bloom, G. A., & Loughead, T. (2020). A citation network analysis of career mentoring across disciplines: A roadmap for mentoring research in sport. *Psychology of Sport and Exercise, 49,* 101676.

Lefebvre, J. S., Evans, M. B., Turnnidge, J., Gainforth, H. L., & Côté, J. (2016). Describing and classifying coach development programmes: A synthesis of empirical research and applied practice. *International Journal of Sports Science & Coaching*, *11*(6), 887–899.

MacLaren, J. A. (2018). Supporting nurse mentor development: An exploration of developmental constellations in nursing mentorship practice. *Nurse Education in Practice*, *28*, 66–75.

Moss, J., Teshima, J., & Leszcz, M. (2008). Peer group mentoring of junior faculty. *Academic Psychiatry*, *32*(3), 230–235.

Murphy, W. M., & Kram, K. E. (2010). Understanding non-work relationships in developmental networks. *Career Development International*, *15*(7), 637–663.

Murphy, W. M., & Kram, K. E. (2014). *Strategic relationships at work: Creating your circle of mentors, sponsors, and peers for success in business and life.* McGraw-Hill.

Narcotta, E. M., Petersen, J., & Johnson, S. R. (2009). Mentor functions in NCAA women's soccer coaching dyads. *Team Performance Management*, *15*, 100–116.

Occhino, J., Mallett, C., & Rynne, S. (2013). Dynamic social networks in high performance football coaching. *Physical Education and Sport Pedagogy*, *18*(1), 90–102.

Palincsar, A. S. (1998). Social constructivist perspectives on teaching and learning. *Annual Review of Psychology, 49*(1), 345–375.

Rathwell, S., Bloom, G. A., & Loughead, T. M. (2014). Head coaches' perceptions on the roles, selection, and development of the assistant coach. *International Sport Coaching Journal, 1*(1), 5–16.

Sawiuk, R., Taylor, W. G., & Groom, R. (2017). An analysis of the value of multiple mentors in formalised elite coach mentoring programmes. *Physical Education and Sport Pedagogy, 22*(4), 403–413.

Shen, Y., & Kram, K. E. (2011). Expatriates' developmental networks: Network diversity, base, and support functions. *Career Development International, 16*(6), 528–551.

Smith, B., & McGannon, K. R. (2018). Developing rigor in qualitative research: Problems and opportunities within sport and exercise psychology. *International Review of Sport and Exercise Psychology, 11*(1), 101–121.

Sparkes, A. C., & Smith B. (2014). *Qualitative research methods in sport, exercise & health: From process to product.* Routledge.

Stoszkowski, J., & Collins, D. (2014). Communities of practice, social learning and networks: Exploiting the social side of coach development. *Sport, Education and Society*, *19*(6), 773–788.

Sweitzer, V. (2009). Towards a theory of doctoral student professional identity development: A developmental networks approach. *The Journal of Higher Education, 80*(1), 1–33.

Taylor, S. L., Werthner, P., & Culver, D. (2014). A case study of a parasport coach and a life of learning. *International Sport Coaching Journal*, *1*(3), 127–138.

Vallée, C. N., & Bloom, G. A. (2016). Four keys to building a championship culture. *International Sport Coaching Journal, 3*(2), 170–177.

van Emmerik, I. J. H. (2004). The more you can get the better: Mentoring constellations and intrinsic career success. *Career Development International*, *9*(6), 578–594.

Wellman, B. (1988). Structural analysis: From method and metaphor to theory and substance. In B. Wellman & S. D. Berkowitz (Eds.), *Social structures: A network approach* (pp. 19–61). Cambridge University Press.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.

Yip, J., & Kram, K. E. (2017). Developmental networks: Enhancing the science and practice of mentoring. In D. A. Clutterbuck, F. K. Kochan, L. G. Lunsford, N. Dominguez, & J. Haddock-Millar (Eds.), *Sage handbook of mentoring* (pp. 88–104). Sage.

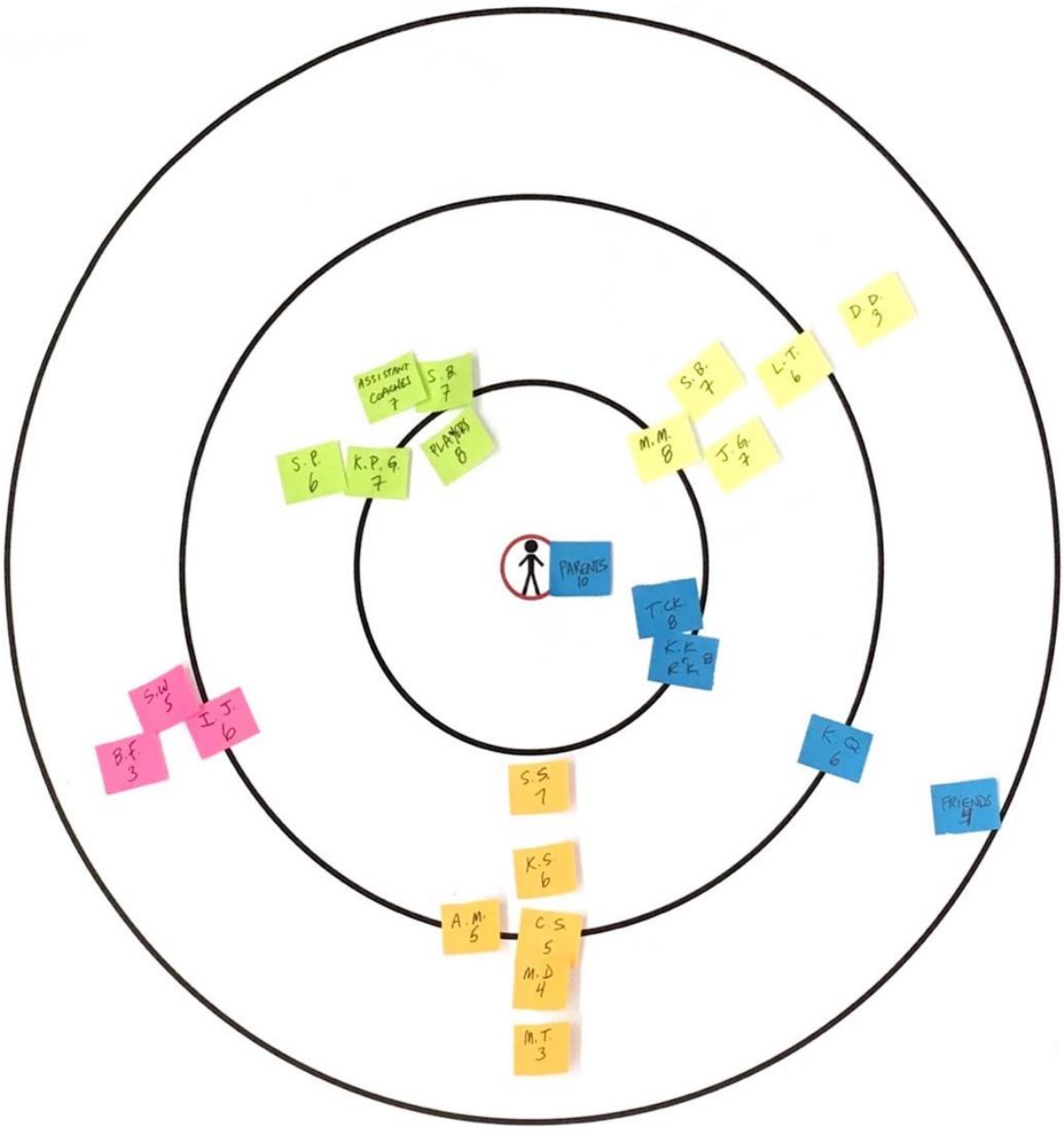
Table 3.1

Overview of the Thematic Structure

Developmental Agents		
Coaches	Mentors	Close relationships with more experienced coaches (e.g., head coaches, retired coaches)
	Peers	Colleagues of similar status with close trusting relationships
	Idols	Internationally-renowned coaches, no personal relationship
	Mentees	Typically consists of their assistant coaches
Athletes		Relationships with various players—positive (e.g., quality leaders) and negative (e.g., difficult athletes)
Management		Athletic directors, general managers, lower level management
Family		Parents, siblings, grandparents, partners, and children
Developmental Outcomes		
Personal Growth		Acquisition of core values and personal characteristics (e.g., caring, work ethic), which dictate their approach to coaching
Professional Growth	Sport specific	Acquisition of sport specific knowledge (e.g., fundamentals, managerial behaviours)
		Career advancement (e.g., employment opportunities and promotions)
	Interpersonal	Learning *how to* interact with others (e.g., communication)
		Outcomes of cultivating relationships (e.g., expansion of networks)
	Intrapersonal	Learning self-monitoring of behaviours, reflective practice, and finding balance
Mechanisms of Influence		
Indirect Mechanisms		Mere presence of influential figures resulting in unconscious assimilation of knowledge
		Role modeling and observation of behaviours and actions
		Exposure to enriching experiences (e.g., desirable difficulties)
Direct Mechanisms		Tangible support (e.g. financial support), moral support (e.g., emotional support) and professional support (e.g., protection)
		Enriching forms of communication (e.g., feedback, advice, guidance)
		Actionable developmental measures (e.g., challenging, providing resources)
The Self as an Active Agent		Intentionally seeking out sources of information (i.e., developmental agents)
		Engaging in reflection as an analytical filter of information

Figure 3.1

A Visual Representation of Becca's Developmental Network



Note: Becca, a university basketball coach, defined a network of 24 developmental relationships across five subnetworks. Becca described her network as follows: "The friends and family network (*blue*) were critical to having the support to pursue this crazy passion. The *orange* section is peers and/or coaching experts that I've had in every context of my life, as a player and a coach, that have impacted my coaching philosophy now. *Pink* included administrators here at [university] who created a space for excellence and pushed me to continue to be better. The *green* section includes some specific individuals during my time here at [university], such as players and coaches that I've learned something from. Finally, the *yellow* is the [national] program and includes, peers, mentors, my boss, and an assistant coach."

Bridging Text

Chapter three was an original manuscript that qualitatively examined the developmental networks of elite sport coaches. The findings identified the developmental agents of sport coaches, the outcomes associated with these developmental agents, and the mechanisms through which developmental agents facilitated these outcomes. In addition to providing conceptual and empirical support for the developmental network perspective, this study forwarded a number of conclusions that influenced chapter four. Among these, future research should gather data from both mentees and their developmental agents; examine other structural components of developmental networks, such as the strength of ties and network reachability; and examine the developmental network perspective in other sport populations. Therefore, in chapter four a mixed-methods case study was implemented to examine the developmental networks of para sport athletes by gathering data from both athletes and their developmental agents. Furthermore, the study seeks to examine the structural components of the developmental networks, such as networks size, strength of ties, network diversity, and network reachability.

Chapter 4

A Mixed-Methods Case Study Examining the Developmental Networks of Athletes in a Wheelchair Rugby Team

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(Under review)

Lefebvre, J. S., Alexander, D., Sweet, S. N., & Bloom, G. A. (under review). A mixed-methods case study examining the developmental networks of athletes in a wheelchair rugby team.

Abstract

The purpose of this study was to examine the developmental networks of wheelchair rugby athletes to provide insight into the collective developmental impact of their personal relationships, along with the quality and contribution of these relationships. The study was conducted using a convergent mixed-methods design embedded within an instrumental case study (i.e., wheelchair rugby team). Participants included seven wheelchair rugby athletes (five males; two females) and seven non-athletes linked to the team (four males; three females). Five athletes had a spinal cord injury and two athletes had a congenital impairment. Non-athletes included one current coach/romantic partner, three parents, one kinesiologist, and two administrators. The quantitative data were analyzed using social network analysis. The qualitative data were analyzed using thematic analysis. The findings indicate that wheelchair rugby athletes had small networks (M = 6) that included a diversified set of developmental relationships, such as peers, coaches, parents, romantic partners, and rehabilitation specialists. Furthermore, the quality of relationships varied as a function of the type of developmental relationships, which led to distinct developmental contributions, such as athletes integration into the wheelchair rugby community, continued participation in this sport, and athletic development. These results provide pertinent and useful information on the relationships of para sport athletes, including the development of collaborative learning environments for them.

Keywords: para sport, peer mentoring, social network analysis, athlete development

A Mixed-Methods Case Study Examining the Developmental Networks of Athletes in a Wheelchair Rugby Team

People with impairments are often exposed to a number of daily physical and psychosocial challenges, including increased risk of pain resulting from their impairment (Turner et al., 2001) as well as social isolation (Emerson et al., 2021). Fortunately, sport and physical activity can provide these individuals with a means of positive psychosocial interaction and facilitate community integration by increasing peer interaction and socialization (Allan et al., 2018; Evans et al., 2018; Tawse et al., 2012). For example, Allan et al. (2018) conducted life-history interviews with 21 current and former para sport athletes and found that para sport participation was associated with an enhanced sense of pride, empowerment, confidence, and acceptance in their lives. Despite these benefits, sport participation rates are consistently lower for people with impairments than their able-bodied counterparts (Evans et al., 2018).

To maximize their personal and athletic growth, athletes with an impairment rely on support from a number of individuals, such as peers, coaches, and parents (Allan et al., 2018; Gainforth et al., 2019; Tawse et al., 2012). For instance, a growing body of research in the disability literature is providing evidence for the value of *peers* (Chemtob et al., 2018; Gainforth et al., 2019; Machida et al., 2013). In the spinal cord injury literature, peer mentoring has been defined as “a peer interaction that aims to provide encouragement, counsel, and information to individuals who share similar lived experiences” (Gainforth et al., 2019, p. 1916). For example, adults with a spinal cord injury described their peer mentors as positive role models capable of enhancing their sense of autonomy (i.e., offering choice and flexibility), relatedness (i.e., empathy and trust in the relationship), and competence (i.e., completing tasks, such as transferring out of their chair; Chemtob et al., 2018). Additionally, Machida and colleagues

(2013) interviewed 12 male wheelchair rugby players and found that athletes acted as peer mentors to help their teammates deal with adversity by providing belonging, confidence, and motivation. These findings highlighted the important role of peer mentoring in enhancing well-being of people with a spinal cord injury, both within and outside of the para sport context. Other studies have demonstrated that there are a number of additional relationships that contribute to the development of para sport athletes (Allan et al., 2018; Tawse et al., 2012). For instance, Tawse et al. (2012) concluded that *coaches* played an important role in the development of their athletes, while Allan et al. (2018) found that *parents* played a key role in fostering participation in para sport. These separate studies suggest that a variety of individuals provide support to the development of para sport athletes, but there remains a need to examine the collective impact of all personal relationships on the development of para sport athletes.

There has been growing multidisciplinary support for better understanding the intricacies of personal relationships by using the developmental network perspective (Chanland & Murphy, 2018; Dobrow et al., 2012; Kulkarni, 2012). Specifically, the developmental network perspective stipulates that individuals acquire a network of *developmental agents* who take an active interest in the advancement of their career and take action by providing various forms of developmental assistance (Higgins & Kram, 2001). In addition, a person's combined set of developmental agents represents their *developmental network* (Higgins & Kram, 2001). A core tenet of this approach is that individuals acquire a wide range of concurrent developmental relationships that provide varying amounts and types of developmental assistance (Higgins & Kram, 2001). Furthermore, the developmental network perspective is grounded in principles of social network theory (e.g., Higgins & Kram, 2001; Scott, 2017). Accordingly, the structure of a person's developmental network can vary along five dimensions: (a) network size, (b) network diversity,

(c) strength of ties, (d) multiplexity, and (e) network reachability (Higgins & Kram, 2001; Yip & Kram, 2017). *Network size* corresponds to the number of developmental agents within a network. *Network diversity* corresponds to the range in the type of relationship that makes up a person's developmental network. *Strength of ties* corresponds to the quality or impact of the developmental relationships that make up these networks. *Multiplexity* corresponds to the extent that two individuals are connected via more than one type of relationship. Lastly, *network reachability* corresponds to the status of members within a developmental network (Higgins & Kram, 2001; Yip & Kram, 2017).

The structure of a person's developmental network, such as larger size, greater diversity, and stronger ties, is associated with more beneficial outcomes (see Dobrow et al., 2012). For instance, Chang et al. (2020) examined the developmental networks of 427 female workers across various occupations in the Republic of Korea and found that females with a greater number of developmental agents (i.e., network size) were more satisfied with their careers. Furthermore, females reported benefitting from the role modelling of developmental agents of higher status (i.e., reachability). Indeed, there is emerging evidence for the applicability and effectiveness of the developmental network perspective in marginalized populations, such as women and racial minorities in the workplace (e.g., Chang et al., 2020; Chanland & Murphy, 2018). Despite this, according to Kulkarni (2012), "missing in this stream of research are application and implications of social networks as they influence [the development] of people with [impairments]" (p. 138). Accordingly, an examination of developmental networks within the para sport context would provide a unique contribution to the developmental network literature.

Given its ability to simultaneously consider the developmental impact of multiple relationships, the developmental network perspective has recently been advocated as a promising avenue for examining developmental relationships in sport (e.g., Leeder & Sawiuk, 2020; Lefebvre et al., 2020, Lefebvre et al., 2021). To date, only one known study has directly explored this perspective in the sport context (Lefebvre et al., 2021). Using a qualitative approach, Lefebvre et al. (2021) examined the developmental networks of nine experienced North American elite sport coaches. These coaches had many development agents (i.e., average network size of 22), which included family, coaches, athletes, and management personnel. Furthermore, coaches' developmental networks were associated with outcomes spanning their personal (e.g., core values, personal characteristics) and professional (e.g., coaching knowledge, career advancement) development. Although the initial support for the applicability of the developmental network perspective to the sport context is promising, there is a need to continue exploring this approach in other sport populations, including para sport.

In sum, people with impairments have reported that relationships with peers, coaches, and family played an important role in their sport experience and athletic development (Allan et al., 2018; Machida et al., 2013; Tawse et al., 2012). Drawing from social network principles (see Higgins & Kram, 2001), the developmental network perspective can uniquely provide insight into the collective developmental impact of the relationships that characterize para sport athletes' developmental networks. In doing so, this approach can provide information about the differing quality and contribution of these relationships. Accordingly, the purpose of this study was to examine the developmental networks of para sport athletes on one wheelchair rugby team. This study was guided by the following research questions: (1) Who do para sport athletes consider to

be their developmental agents? (2) How much support is provided by developmental agents? (3) In what ways do developmental agents contribute to the development of para sport athletes?

Method

Design and Methodological Orientation

A mixed-methods case study approach was selected to help explore the developmental networks of athletes in a wheelchair rugby team, whereby "the quantitative and qualitative data collection, results, and integration are used to provide in-depth evidence for a case" (Creswell & Plano Clarke, 2017, p. 375). For this study, a convergent mixed-methods design was embedded within an instrumental case study (Gibson, 2016; Hodge & Sharp, 2016). A convergent design refers to the simultaneous collection of multiple types of data to obtain different but complementary data on the same topic (i.e., developmental networks of para sport athletes). The quantitative and qualitative data then served to inform and complement one another (Creswell & Plano Clarke, 2017). The sources of evidence include participant observations, a social network questionnaire, and qualitative interviews.

The study was situated within the critical realist perspective (see Pawson & Tilley, 1997; Ryba et al., in press). Specifically, the critical realist perspective is underpinned by a constructivist epistemology and a transcendental realist and stratified ontology (Ryba et al., in press; Shannon-Baker, 2016; Smith et al., 2012). Constructivism assumes that our understanding of a phenomenon is subjective (i.e., the world is constructed via our individual perceptions), and acknowledges that knowledge is co-constructed between the researcher and participant. Transcendental realism assumes there is a world that exists independently from our understanding of reality (i.e., reality can exist outside of our perception; Maxwell & Mittapalli, 2010). Moreover, a stratified ontology assumes that there are aspects of reality that are

observable, and aspects of reality that are unobservable (e.g., psychological and social objects and structures that govern events), and these unobservable events can only be partially inferred (North 2013; Ryba et al., in press). Taken together, Shannon-Baker (2016) noted that:

> Critical realists place high importance on perspectives—that is, taking new perspectives, understanding different viewpoints, and representing diverse voices…critical realism also offers mixed methods researchers a perspective that emphasizes perspective-taking and empowering the voices of others while still recognizing that these can only be partial representations of reality. (p. 303)

Participants

Participants were all associated with one regional wheelchair rugby team in a large metropolitan Canadian city. Seven athletes (five males; two females) and seven non-athletes (four males; three females) participated in this study. All seven athletes had neurological disorders: acquired acute spinal cord injury (n = 5) and congenital disorders (n = 2; muscular dystrophy and cerebral palsy). Three athletes competed at the highest level with the national team, two athletes competed at the provincial level, and two athletes participated recreationally. The athletes' ages ranged from 23 to 44 years (M = 32.71, SD = 8.20) and wheelchair rugby playing experience ranged between 1 and 23 years (M = 7.71, SD = 7.61). Of the non-athletes, one participant served the dual role of coach as well as romantic partner to one of the athletes. The other non-athletes included three parents, one kinesiologist, and two administrators.[2]

Procedure

After obtaining approval from our University ethics board, the provincial para sport federation that oversees the wheelchair rugby team provided the primary researcher with access

[2]See "The Case: A Local Wheelchair Rugby Team" in the results for more detailed information about the para sport environment.

to the sport environment (see Appendix C). All participants in the sport environment provided consent to participate in the study (see Appendices D, E, and F). The mixed-methods data collection involved questionnaires, observations of the sport environment, semi-structured interviews with athletes, and unstructured interviews with both athletes and non-athletes. Specifically, seven wheelchair rugby athletes: (a) were observed in their sport environment, (b) completed a questionnaire, and (c) participated in an audio-recorded semi-structured interview discussing the key developmental relationships that impacted their development as a wheelchair rugby athlete. In order to acquire additional insight into the athletes' developmental relationships, two of the athletes and all seven non-athletes participated in unstructured interviews.

Quantitative Data

Questionnaires

Athletes completed a questionnaire (see Appendix G) to obtain demographic information, such as their age, gender, years of experience, type and severity of impairment (e.g., level of spinal cord injury), and to assess their developmental networks. Developmental networks were measured following Yip and Kram's (2017) protocol. During the first step, *name generation,* athletes named people who took an active interest and action in their development as a wheelchair rugby athlete. These individuals were considered as the athletes' developmental agents. In the second step, *name interpreter,* athletes rated each development agent on three items using a 7-point Likert scale ranging from 1 (*not at all*) to 7 (*maximum extent possible*): (1) "please indicate the extent to which this person provides opportunities that push you as an athlete", (2) "please indicate the extent to which this person creates opportunities for visibility

for you, and (3) “please indicate the extent to which this person opens doors for you as an athletes”. Questionnaires took approximately 15–20 minutes to complete.

Social Network Analysis

The data from all the questionnaires were entered into the network analytical and visualization software Gephi 0.9.2 (Bastian et al., 2009) to create a directed and weighted developmental network that represents *para sport development.* Accordingly, the para sport development network included 37 nodes (i.e., people) and 42 edges (i.e., developmental relationships). The weight of the edges was determined by averaging the three items from the scale that measured athlete support in the para sport environment. The network was visually displayed by using Gephi’s “ForceAtlas” layout—a force directed layout designed to spatialize small-world scale-free networks that is ideal for exploring real data and interpreting networks (Jacomy et al., 2014).

The developmental network was analyzed across three social network measures: (1) community detection, (2) degree centrality, and (3) weighted degree centrality (Blondel et al., 2008; Opsahl et al., 2010; Scott, 2017). First, a modularity optimization algorithm (Blondel et al., 2008) was used to detect groups of mutually connected nodes (i.e., communities), to identify naturally occurring clusters within the overall network. Second, degree centrality corresponds to the frequency of ties connecting individual nodes (Scott, 2017). As a directed network, two measures of degree centrality were used: outdegree and indegree. *Outdegree* corresponds to the number of outgoing ties, which was used to identify the number of developmental agents identified by each athlete (i.e., network size). *Indegree* corresponds to the number of incoming ties, which was used to identify the number of times each individual in the network was identified as a developmental agent in the athlete’s questionnaire responses. Lastly, weighted

degree centrality is a measure that combines the frequency and weight (i.e., strength) of ties (Opsahl et al., 2010). Two measures of weighted degree centrality were used: weighted outdegree and weighted indegree. *Weighted outdegree* combines the frequency and strength of outgoing ties, which was used to measure overall amount of support received. *Weighted indegree* combines the frequency and strength of incoming ties, which was used to measure the developmental contribution of each developmental agent.

Qualitative Data

Observations

An observer-as-participant model was used (Thorpe & Olive, 2016). The principal investigator (JL) was granted access to the para sport environment, where he observed team training sessions (approximately 2.5 hours in duration per session) and took notes about the developmental relationships in the environment. Naturalistic observations were conducted for 30 minutes before the training session began, during training (90 minutes), and 30 minutes after each training session. At first, JL acted as a silent observer, however, when asked for assistance, he also provided various forms of support, such as helping with chair transfers. After three observations, JL was invited to actively participate in the training sessions with the team. As an able-bodied person, this experience provided him with hands-on experience of the process of playing wheelchair rugby. Six observations were conducted over the course of two months, which totaled 15 hours of observation in the wheelchair rugby context.[3]

Semi-structured Interviews

During the semi-structured interviews, the wheelchair rugby athletes were asked a series of questions in relation to each developmental agent they identified during the "name

[3] The original goal of 10 observations was not possible due to the onset of COVID-19, which shut down all training sessions.

generation" portion of the questionnaire. Drawing from the developmental network literature (e.g., Higgins & Kram, 2001; Yip & Kram, 2017), an open-ended semi-structured interview guide (see Appendix H) was created (Smith & Sparkes, 2016). Participants were asked to describe (a) each developmental agent in detail along with the nature of the participant's relationship, (b) the outcomes associated with the developmental agents in relation to the participant's para sport development, and (c) the developmental outcomes associated with the developmental agents. Semi-structured interviews were conducted with all seven athlete participants and ranged from 44:15 to 149:38 minutes in duration *(M* = 84:36).

Unstructured Interviews

Whereas semi-structured interviews are conducted using a preplanned open-ended interview guide, unstructured interviews have little pre-set structure in combination with broad open-ended questions to allow the participants a "higher degree of control over what is said and how" (Smith & Sparkes, 2016, p. 104). This allowed us to target specific areas of inquiry that arose during the earlier phases of data collection in order to foster an understanding of developmental relationships in this context. First, three non-athletes (i.e., two administrators, one parent) who were not nominated as developmental agents were invited to participate in this study due to their high levels of involvement in the environment (e.g., frequent contact with the athletes). The goal was to acquire contextual information about the environment, such as the inner workings of the sport and the team itself, which served to inform the findings. Example questions included: "Can you please describe what is unique about wheelchair rugby and this team?", and "In what way do the athletes support one another?". Second, unstructured interviews were conducted with two athletes and four non-athletes who were nominated by one or more athlete as a developmental agent. These unstructured interviews were unique to each participant

and were therefore guided by (a) notes taken during the participant observations; (b) athlete responses to the questionnaire and the semi-structured interviews; and (c) the research questions, such as the outcomes associated with the developmental agents in relation to the athlete's developmental experiences. Examples of open-ended unstructured interview questions included: "Why do you think you were nominated as an important person?", "In what ways do you believe you have impacted the sport experience of this person?" and "This person described [outcome], what are some of the ways you feel like you have contributed to this?". Unstructured interviews ranged from 19:40 to 69:47 minutes in duration (M = 37:11).

Thematic Analysis

Braun et al.'s (2016) guidelines for thematic analysis were followed to identify patterns in the qualitative dataset in accordance with the research questions, the literature, and the quantitative findings. Importantly, the thematic analysis included observation notes and interviews conducted with athletes and non-athletes. The primary investigator engaged in the process of familiarization, which included the collection of data, the transcription, and immersing himself in the data by recursively re-engaging with the audio recordings and transcripts. This process involved engaging in analytical readings of the data and reflexive note taking. Next, with the quantitative findings in mind, qualitative extracts within the data (i.e., codes) were identified, labelled, and clustered into higher-level patterns to generate provisional themes. These themes were continuously refined and named throughout the analytical process until a final set of overarching themes, themes, and subthemes were generated. Lastly, the primary investigator engaged in the writing of data extracts, which included rich quotes along with descriptive and analytic commentary. Importantly, the entire analytical process was conducted reflexively and recursively.

We have selected the following list of socially-constructed characteristics to justify the quality and to guide the readers in judging the trustworthiness of this study: (1) credibility, (2) resonance, (3) transparency, (4) rich rigor, and (5) significant contribution (Burke, 2016; Smith & McGannon, 2018). First, *credibility* was demonstrated by spending a significant amount of time with the participants with an emphasis on building trust and rapport during observations. Second, *resonance* was displayed by providing rich quotations to reveal vibrant and resonant representations of participant experiences. Third, to foster *transparency,* the second and fourth authors served as critical friends by challenging the first author during the analytical process and the interpretation of the findings. Fourth, *rich rigor* was demonstrated by using a mixed-methods design and by collecting various complementary types of qualitative data to gather meaningful data driven by a sound theoretical framework (i.e., developmental network perspective, social network theory; see Higgins & Kram, 2001). Finally, given the novelty of the methodology, the conceptual and theoretical contribution of the study, and the implications of our findings, this study provides *significant contribution* to the para sport and mentoring literature.

Results

The results integrate the findings from the participant observations, the social network analysis of the developmental network, and the qualitative interview data. Accordingly, the results include a description of the case in question (i.e., a local wheelchair rugby team) and the para sport development network findings.

The Case: A Local Wheelchair Rugby Team

To provide context to the impact of developmental agents on the development of wheelchair rugby athletes, we provide a description of the sport, the developmental agents, and the team.

The Sport

The participants felt that wheelchair rugby, like many other para sports, provides athletes with an important forum to socialize and connect with peers. However, they also described a number of reasons why wheelchair rugby is unique among para sports. First, wheelchair rugby is fast paced, where physical contact is not only permitted, it is an integral part of the game. Second, the participants described how the eligibility criteria for participation in wheelchair rugby are strict, whereby each athlete must have some loss of function in all four limbs, classifying them a person with tetraplegia. Third, each player is classified according to their functionality on a scale of 0 to 3 points, with a higher number representing greater functional ability. Throughout the game, the coaches' responsibility is to ensure that the sum of the classification levels of the four athletes on the court does not total more than 8 points. Fourth, wheelchair rugby is a mixed gender sport. Female athletes are given a 0.5 reduction in points, and therefore it can be considered advantageous to have highly skilled females exhibiting lower functionality. Lastly, participants explained that it is common for wheelchair rugby teams to have a difficult time recruiting and retaining coaches. Therefore, many teams rely on the athletes to lead practices and/or take on the dual role of coach and athlete.

The Developmental Agents

The athletes collectively identified 34 developmental agents. Outdegree scores indicated that athletes included between three and eight ($M = 6$) development agents in their developmental network. Developmental agents included local teammates ($n = 4$), non-local teammates ($n = 5$), coaches ($n = 6$), rehabilitation specialists ($n = 4$), romantic partners ($n = 3$), siblings ($n = 2$), and individual parents ($n = 10$). Of these 10 parents, seven were biological, two were in-laws, and one was a stepparent. Local teammates were directly involved with the local

wheelchair rugby team, whereas non-local teammates (past or present) were from the provincial team (*n* = 2), national team (*n* = 1), an international team (*n* = 1), or another para sport (*n* = 1). Local and non-local teammates were differentiated by frequency in contact, and appeared to have noticeable differences in weighted indegree centrality scores (see Table 4.1). Coaches included the current local coach, the national team coach, and three former coaches at various levels (e.g., local, provincial). The rehabilitation specialists consisted of occupational therapists (n = 2), physiotherapists (*n* = 1) or kinesiologists (*n* = 1) who were highly involved during the rehabilitation of athletes with a spinal cord injury and with whom the participants developed close friendships.

The Team

The wheelchair rugby team included seven athletes and one coach. They practiced twice a week. They were one of two teams in the province, and therefore attended a number of national and international wheelchair rugby tournaments throughout the year. Application of the community detection algorithm (i.e., modularity optimization) revealed five developmental clusters within the team (see Figure 4.1). Two clusters represented athletes with weak ties to the team (green and blue), two clusters represented athletes with moderate ties to the team (pink and orange), and one cluster represented athletes with strong ties to the team (purple). The weakly connected clusters (green and blue) are characterized as developmental silos because they are each centered around one athlete whose developmental agents were predominantly outside of the local wheelchair rugby team. Both clusters are connected to the team via cut-points—a bridging node that, if removed, would result in disconnected clusters. Despite Iain (Athlete 2) being the most veteran player (green cluster), his indegree centrality score of 0 indicates that his peers did not perceive him as a developmental agent. This is likely because his 90-minute drive from the

practice location and his non-sport requirements (i.e., work and family) limits his attendance. Nonetheless, his weighted outdegree score suggests he is well supported (51.33). Curtis (Athlete 1, blue cluster) was also not perceived as a developmental agent (indegree = 0) but was relatively well supported by family (weighted outdegree = 27.67). His low indegree centrality score is likely because his spinal cord injury was still somewhat recent, and he had described experiencing a difficult transition into the wheelchair rugby environment.

The two clusters moderately tied to the team were centered around Emily (Athlete 3, orange cluster) and Louis (Athlete 5, pink cluster). Emily (Athlete 3) was the newest athlete and did not have a spinal cord injury, which collectively might explain why she was not identified as a developmental agent (indegree = 0). Nonetheless, her three outgoing ties with other members of the team as well as her weighted outdegree score (32) suggests she was well supported in the para sport environment. This cluster also included the local coach, Djan. Notably, Djan was also the romantic partner of Audrey (Athlete 6). After Audrey's spinal cord injury, Djan was highly involved in her transition into wheelchair rugby and after three years of learning the game from the sidelines, Djan was asked to serve as the coach for this team. As a newly appointed coach, only three athletes nominated him as a developmental agent (outdegree = 3). Of the three, Emily (Athlete 3) attributed the greatest developmental contribution respective to her other developmental agents, landing Djan (Current Coach, Romantic Partner) a spot in the orange cluster. Next, the *pink* cluster included Louis (Athlete 5) and both his parents. This athlete only had one incoming and one outgoing tie to the wheelchair rugby team. Therefore, his contribution to the development of the team (weighted indegree = 3.33) and his support in the para sport environment (weighted outdegree = 18.67) were considered to be moderate.

Lastly, the *purple* cluster represented the developmental core. This cluster consisted of three athletes who were involved in the national team development system—Jesse (Athlete 4), Audrey (Athlete 6), and Harry (Athlete 7)—and nine of their developmental agents. These athletes all had incoming and outgoing ties to the team, which indicated that they all played a role in each other's para sport development (weighted indegree range = 6.00–29.00). At the center of this developmental core was Harry (Athlete 7), the top developmental contributor in the wheelchair rugby environment (weighted indegree = 29). This is likely attributed to his time serving the dual role of coach and athlete prior to Djan's (Current Coach, Romantic Partner) arrival. See Table 4.1 for athlete's social network measures.

Para Sport Development

The para sport development network consisted of 37 nodes and 42 edges (see Figure 4.1). According to the average weighted indegree scores across types of developmental agent (see Table 4.2), teammates (M = 11.17) and romantic partners (M = 7.67) appeared to have the biggest impact on the participants' development on this team (see Table 4.2). Notably, the developmental contribution of coaches (M = 5.48) was somewhat comparable to that of siblings (M = 5.00), parents (M = 4.57), and rehab specialists (M = 4.67). Furthermore, individual weighted indegree scores revealed the following top three key para sport developers: (1) Harry (Athlete 7; 29.00), (2) Djan (Current Coach, Romantic Partner; 17.33), and (3) Jade (Kinesiologist; 13.33). These findings are further examined across the following four themes from the qualitative interview data: integration into the wheelchair rugby community, facilitating sport continuity, athletic growth, and female role modelling.

Integration into the Wheelchair Rugby Community

The weighted indegree scores indicate that rehab specialists provided noticeable levels of para sport-related developmental support to athletes. This is especially true for Jade (Kinesiologist), whose weighted indegree score of 13.33 was third highest among developmental agents. Jade noted that her role is to help her clients with their rehabilitation and to foster a physically active lifestyle, which is accomplished via integration into the para sport community: "I've been involved in the wheelchair rugby community for about 20 years now. We try to put emphasis on the integration into the community during rehab and get them active and to continue to be active afterwards" (Jade, Kinesiologist). Corroborating this finding, every wheelchair rugby athlete with a spinal cord injury discussed how their initiation to wheelchair rugby occurred during the rehabilitation process. In fact, in order to foster integration and inclusion, Jade would initially accompany prospective athletes into the wheelchair rugby environment: "Jade [Kinesiologist] is amazing. 'Till this day, she still brings new guys, and it's not even part of her job! She does it outside of her job, outside of her working hours!" (Louis, Athlete 5).

The athletes emphasized the importance of making new athletes feel included as members of the team and community. For instance, separate interviews with Curtis (Athlete 1) and Harry (Athlete 7) provided insight into Curtis's integration into the team:

> I was really shy the first time I arrived at the gym. I still had my cervical collar and I was still messed up from my injury. Harry [Athlete 7] was the first to arrive and he approached me and started asking me a bunch of questions: "Do you want to try wheelchair rugby?", "Can I see your hands?". He convinced me to jump into a rugby wheelchair. Then, right away, he smashes into me. He then threw me a ball and asked me: "How do you feel?". He later convinced me to try another practice and he even

> loaned me a rugby wheelchair. He welcomed me with open arms and made sure I was comfortable. (Curtis, Athlete 1)

Corroborating this experience, Harry (Athlete 7) described:

> The first time I saw Curtis [Athlete 1], he had been in rehabilitation for five months and he had almost fully recovered. So I figured I would put him in a rugby wheelchair and give him a good bump. He has a pretty strong personality so initially he was like "ah no thanks I'm not really up for it, another time". But eventually he got into a chair and he was like "okay, this is pretty cool, I'll try to come from time to time", so I tried to support him. I wanted to make sure he was in a position where he would enjoy himself. I wanted him to have a good chair, good equipment. Next thing you know, he was coming to tournaments outside the country. (Athlete 7)

Facilitating Para sport Continuity

The athletes discussed barriers and obstacles to para sport participation, which led them to rely heavily on family members, such as romantic partners, siblings, and parents for support. For instance, participation in wheelchair rugby is financially straining due to the cost of equipment, as well as travelling expenses such as hotels and gas, as alluded to by Louis (Athlete 5):

> The equipment is so damn expensive. A rugby chair was about $5,000–6,000. That's a lot of money! We don't all have this kind of money, but I was lucky enough that when I started getting into the sport my mom [mother 4] and my dad [father 3] offered to chip in.

Furthermore, participants explained that their physical limitations associated with quadriplegia, such as limited function of the fingers and upper body (e.g., arms, chest, abs), make it difficult to accomplish certain tasks, such as taping their gloves on their hands, transferring from their chair,

and changing flat tires. Therefore, most athletes are accompanied by a family member who provides tangible help before, during, and after practice. For instance:

> We need to be available all the time, pretty much every night. Curtis [Athlete 1] has five rugby practices a week, on Tuesday he boxes, and on Thursday he sees his Kinesiologist. I've had a very busy retirement because I'm always trying to help and it requires a lot of travelling. [Sister] also travels with us, and if we're not available, [parent-in-law 1] and [parent-in-law 2] are usually available. And also, his rugby chair breaks all the time! So Jean [stepfather] is there to fix it. (Marie, Mother 1)

As another example, Djan (Current Coach, Romantic Partner) described:

> Transferring was an issue at first, because when they start out they are not that competent and often times they are worried about being transferred by people they don't really know. So yeah, I think that if I wasn't there I don't see how Audrey [Athlete 6] could have done it. And it's true for all players, if there isn't a parent or a girlfriend or whatever, people don't really come back as regularly as if they do.

Athletic Development

The developmental agents directly involved in the para sport environment, such as coaches, local teammates, and non-local teammates promoted athletic growth by providing a structure in practice, helping them learn the foundation of the game, and providing a connection between the local team and the national team.

Structure. Despite being identified as developmental agents, the developmental assistance of coaches was below the average. The qualitative data appeared to indicate this could be a result of the lack of learning opportunities for wheelchair rugby coaches to acquire knowledge and expertise about the sport: "There are no opportunities for high-performance

training for coaches in this discipline" (Josh, Club Representative). For this reason, Djan (Current Coach, Romantic Partner), an able-bodied coach, admitted that his lack of knowledge was his biggest weakness:

> I only recently took my first coaching workshop for Wheelchair rugby. It was very basic. The only go-to is watching games on YouTube and trying to pick up what's going on. This is challenging because my knowledge is my weakness, and I'm trying to coach athletes who have been playing for five, ten, fifteen years.

Despite his limited knowledge of the game, individual weighted indegree scores indicated that Djan (Current Coach, Romantic Partner) was the second highest developmental contributor to the overall para sport network. Collectively, the athletes explained his developmental value was primarily by bringing structure to practice, which was not the case prior to his arrival. Djan (Current Coach, Romantic Partner) explained:

> I think the main benefit for them right now is to have a bit more structure in their practices. Before I came, practice would quickly turn into a scrimmage for like the whole 90 minutes. It would just become a shitshow because people are pushing. They're just socializing and they are not getting the most out of it from a sport perspective.

Learning the Foundation. According to the weighted indegree scores, local teammates provided the greatest amount of developmental support and foundational knowledge in the para sport setting. Various participants explained that their peers were largely responsible for their technical and tactical knowledge, as well as helping them understand their roles on the court. For instance, Curtis (Athlete 1) explained how: "At first, I wasn't even able to hold a ball and throw it. You really start from the ground up. Harry [Athlete 7] would give me tricks on how to hold the ball to be able to throw it." As another example, Emily (Athlete 3) described:

> One day, my teammates spent about 30 minutes just trying to explain to me my role. They put Audrey [Athlete 6] on the court and they said "what she does, that's what you need to do". And then I took her place on the court and I had to try and do the same thing while they talked to me in real time to help me adjust.

Expert Knowledge and Advancement. Harry's (Athlete 7) weighted indegree score (29) indicates that he was the greatest contributor to athlete development in the network. Being the first player on the team to reach the national level, the participants explained that his impact was, in part, attributable to his access to the national team, which allowed him to distribute privileged knowledge among his teammates, and advocate for promising athletes. First, due to the limited number of athletes and coaches participating in wheelchair rugby, the growth of the game appears to be somewhat reliant on knowledge holders (i.e., experts), who are typically accessed via privileged environments, such as the national level. To this end, Harry (Athlete 7) was said to have access to advanced knowledge via a number of developmental agents from his experiences participating in wheelchair rugby on the national team (i.e., teammate [national]) and international experiences (i.e., teammate [international]). Louis (Athlete 5) explained:

> Harry [Athlete 7] was on the national team, so he was getting privileged information, advanced strategies and everything. He came back and acted like a leader by sharing that information with us, and you know, I think that just helped everybody else progress and evolve and improve exponentially. I could honestly say that's when I truly started to evolve and reach my full potential as a player.

When asked about his role as a developmental agent, Harry (Athlete 7) corroborated his role of promoting his teammates:

> To be on the national team, you have to be recruited by another player. So a month after Jesse [Athlete 4] arrived I reached out to [national team program director] and told him "this guy is going to be on the national team, you need to get him into the system". I even called the national team coach and told him "come to a practice, come meet him". One thing after the next and Jesse [Athlete 4] started taking things a bit more seriously, he bought himself a rugby wheelchair, and things escalated from there for him. So yeah, I think that I helped his progression.

Female Role Modelling

Both female athletes placed a large emphasis on the role modelling they received from other females. For instance, when asked why Audrey (Athlete 6) was included as a developmental agent, Emily (Athlete 3) explained: "Because she's one of my models. She's a female who has attained the highest level possible as a woman, and I hope to do the same one day in this sport." Accordingly, Audrey (Athlete 6), especially given her status as a female athlete within the national system, has played an integral role in the wheelchair rugby community for other female athletes. As an example, while volunteering at a tournament, Jade (Kinesiologist) described:

> I remember when Audrey [Athlete 6] went to her first tournament. All the women quad just surrounded her and started to ask her a bunch of questions "how is your athletic life, how is your personal life, do you want to be a mother, I am a mother, this one is a mother, do you have tips, how do you feel about being a woman quad in the sport field?"

However, according to Audrey (Athlete 6), there aren't many female wheelchair rugby athletes in close proximity to their team, which led her to integrate herself into an international network of female athletes who provide developmental support to one another. She described: "We have

a community of female wheelchair rugby athletes. We're only two in [local city], but we are huge in Canada and USA. We talk and call each other."

Discussion

The purpose of the study was to examine the developmental networks of athletes in a wheelchair rugby team. Using the developmental network perspective, our study gained insight into the structure of developmental networks, such as network size, strength of ties, and network diversity (Higgins & Kram, 2001; Yip & Kram, 2017). Accordingly, the findings in our study indicated that wheelchair rugby athletes surrounded themselves with three to nine developmental agents ($M = 6$). Despite the small size, the findings showed that wheelchair rugby athletes' developmental networks were highly diversified and included developmental agents directly linked to the sport environment (i.e., peers, coaches) and outside the para sport environment (i.e., parents, romantic partners, siblings, and rehabilitation specialists). Furthermore, the quality (i.e., strength) of the relationships appeared to vary as a function of the type of developmental agent (e.g., coaches vs. peers), which led to distinct developmental contributions, such as their integration into the wheelchair rugby community, continued participation in this para sport, and athletic development.

Athletes indicated that peer developmental agents provided the greatest amount of developmental contribution, which involved welcoming new members, helping them learn the sport, and sharing important knowledge and tricks. These findings resonate with the spinal cord injury mentorship literature, which has demonstrated the value and importance of peers for their role in providing knowledge, guidance, and support to people with spinal cord injury (Chemtob et al., 2018, Gainforth et al., 2019; Machida et al., 2013). Furthermore, both the quantitative and qualitative findings demonstrated the distinct value of one peer athlete (Harry, Athlete 7).

Specifically, as a member of the Canadian national team, Athlete 7 used the knowledge and connections gained from this environment to disseminate privileged information to his team (e.g., expert knowledge; advanced tactical strategy), as well as advocate for the advancement of some of his more skilled teammates. This finding provides preliminary support for the underexamined concept of *reachability* in developmental networks (Yip & Kram, 2017). Reachability draws from social capital theory and stipulates that access to individuals with higher status often leads to greater resources and information (Lin, 2002; Yip & Kram, 2017). Taken together, this finding suggests that "status" may be an optimal characteristic of peer developmental agents in the para sport environment. Specifically, national level athletes can be "knowledge holders" who could be key developers and contribute to the growth of para sport.

Further solidifying the contribution of peers, the female athletes in this study alluded to the importance of the peer relationship between female athletes. The desire for female role models in sport has been expressed from the perspective of athletes with (e.g., Alexander et al., 2020) and without (e.g., Fasting & Pfister, 2000) an impairment, as well as from the perspective of female coaches (e.g., Lefebvre et al., 2021). For instance, Alexander and colleagues (2020) found that despite the limited number of female Paralympic coaches, the female athletes in their study had a strong desire to work with female coaches who they felt would be more sensitive and understanding to various gender topics. The current results showed that the female athletes learned gender-specific matters, such as motherhood and sport/work-life balance from their female role models. However, the lack of female role models available to participants in Canada also encouraged the athletes in our study to expand their network to international sources. These findings strengthen the need to increase the number of women in all parts of the para sport community, including athletes, coaches, officials, and administrators. Recently, there have been

some initiatives designed to increase the recruitment and retention rates of women in sport leadership positions within Canada and around the world, such as Canada's Female Coach Mentorship Model and Australia's Female Coach Mentor Program. Additionally, the Alberta Women in Sport Leadership Impact Program in Canada was implemented from 2017 to 2020 to support the gender equity and diversity of leadership positions within various sport organizations (Culver et al., 2019). Although it appears there are a limited number of available female role models in sport today, these initiatives are imperative towards increasing the visibility of women in leadership positions to provide the next generation of athletes with female role models in sport (Alexander et al., 2020; Culver et al., 2019; Meier, 2015).

While previous research has advocated that para sport coaches can play an important role in facilitating the development of para sport athletes (Bentzen et al., 2021; Dehghansai et al., 2020; Tawse et al., 2012), the quantitative and qualitative findings in our study indicated that the developmental contribution of coaches in the wheelchair rugby environment was somewhat limited. Although the coaches brought a much needed structure to practices and games, the participants also felt their coaches lacked depth in technical and tactical knowledge in wheelchair rugby. One possible reason for this outcome may be the lack of formal educational opportunities provided to para sport coaches, a finding that has consistently been reported in the North American para sport literature (e.g., Dehghansai et al., 2020; Lepage et al., 2020). Moreover, this same literature has reported that para sport coaches relied on experiential and informal knowledge, such as informal mentoring, trial and error, and online forums (Dehghansai et al., 2020; Fairhurst et al. 2017; Lepage et al., 2020). Accordingly, providing para sport coaches with more educational opportunities, such as coaching workshops and mentoring programs, may help coaches acquire more advanced para sport coaching knowledge, which would serve to maximize

their value and developmental contribution. As such, this study provides additional support for the growing calls to provide para sport coaches with a diverse array of formalized educational opportunities (e.g., Fairhurst et al., 2017; Lepage et al., 2020). In the meantime, the limited contribution of coaches highlights the importance for athletes to foster other types of developmental relationships, such as with peers, parents, and romantic partners.

Lastly, the findings indicated that wheelchair rugby athletes surrounded themselves with a small number of developmental relationships ($M = 6$). This is in stark contrast from Lefebvre et al. (2021), whose examination of the developmental networks of elite coaches found that they had between 12 and 39 developmental agents in their networks. The discrepancy could be explained by the fact that people with impairments have lower perceived social support (Emerson et al., 2021) or because there are fewer teams and less people involved in para sport. A number of studies have found that larger developmental networks (i.e., network size) led to increases in developmental outcomes, such as personal satisfaction, performance, and career advancement (e.g., Dobrow et al., 2012; Higgins & Thomas, 2001). With this in mind, although the athletes' developmental networks were characterized by high diversity and several strong relationships, the developmental network literature suggests that it may still be beneficial for para sport athletes to expand and grow their developmental networks. Given the finding from this study that peers offered the greatest development contribution, it would perhaps be beneficial for athletes to be surrounded with more peer support. To this end, there is emerging evidence in the non-sport disability literature for the effectiveness of formal peer mentoring and peer support programs (Chemtob et al., 2018; Hillier et al., 2019). Therefore, researchers and para sport organizations should consider examining the value of peer mentoring programs in para sport as a means of maximizing para sport athletes' developmental opportunities.

Limitations and Future Directions

This study examined the developmental networks of wheelchair rugby athletes cross-sectionally. However, given that developmental networks are dynamic and change over time (Cummings & Higgins, 2006; Dobrow et al., 2012), it would be beneficial for future studies to examine how the structure of developmental networks of para sport athletes evolve. This might be particularly interesting for individuals with acquired impairments, such as a spinal cord injury, to examine the role of developmental networks throughout their rehabilitation and reintegration following the onset of their impairment. Furthermore, this is a case study using only one team, which limits the generalizability of the findings. Future studies may want to collect quantitative data from a larger sample of athletes to enable the researchers to conduct inferential analyses to examine the outcomes (e.g., performance, satisfaction) associated with various dimensions of network structure (e.g., network size, network diversity, strength of ties). Lastly, future studies should examine the developmental networks of coaches or athletes of other marginalized groups in sport, such as race, gender, and/or sexual diversity. For instance, given the increasing demand for female role models in sport and para sport (Alexander et al., 2020; Culver et al., 2019; Lefebvre et al., 2021), future research should use the developmental network perspective to further explore the value of female developmental agents for women in sport.

Conclusion

This study provided a nuanced understanding of how the relationships of wheelchair rugby athletes contributed to their engagement in para sport, their continued participation, and their athletic development. By situating athletes' social support systems within the developmental network perspective, this study provides empirical, conceptual, and methodological advancement for understanding the role of personal relationships in the athletic

development of para sport athletes. It is our hope that this study will encourage para sport scholars to continue to examine the optimal structure of developmental networks and its impact on the development of athletes and coaches in the para sport context in order to help progress the Paralympic Movement further.

References

Alexander, D., Bloom, G. A., & Taylor, S. L. (2020). Female Paralympic athlete views of effective and ineffective coaching practices. *Journal of Applied Sport Psychology*, *32*(1), 48–63.

Allan, V., Smith, B., Côté, J., Martin Ginis, K. A., & Latimer-Cheung, A. E. (2018). Narratives of participation among individuals with physical disabilities: A life-course analysis of athletes' experiences and development in parasport. *Psychology of Sport and Exercise, 37*, 170–178.

Bastian, M., Heymann, S., & Jacomy, M. (2009). *Gephi: An open source software for exploring and manipulating networks*. International AAAI Conference on Weblogs and Social Media [online].

Bentzen, M., Alexander, D., Bloom, G. A., & Kenttä, G. (2021). What do we know about parasport coaching? A scoping review. *Adapted Physical Activity Quarterly*, *38*(1), 109–137.

Blondel, V. D., Guillaume, J. L., Lambiotte, R., & Lefebvre, E. (2008). Fast unfolding of communities in large networks. *Journal of Statistical Mechanics: Theory and Experiment*, *2008*(10), P10008.

Braun, V., Clarke, B., & Weate, P. (2016). Using thematic analysis in sport and exercise research. In B. Smith & A. C. Sparkes (Eds.), *Routledge handbook of qualitative research in sport and exercise* (pp. 191–205). Routledge.

Burke, S. (2016). Rethinking 'validity' and 'trustworthiness' in qualitative inquiry: How might we judge the quality of qualitative research in sport and exercise sciences? In B. Smith &

A. C. Sparkes (Eds.), *Routledge handbook of qualitative research in sport and exercise* (pp. 330–339). Routledge.

Chang, J., Baek, P., & Kim, T. (2020). Women's developmental networks and career satisfaction: Developmental functions as a mediator. *Journal of Career Development.* Advance online publication. https://doi.org/10.1177/0894845319900005

Chanland, D. E., & Murphy, W. M. (2018). Propelling diverse leaders to the top: A developmental network approach. *Human Resource Management, 57*(1), 111–126.

Chemtob, K., Caron, J. G., Fortier, M. S., Latimer-Cheung, A. E., Zelaya, W., & Sweet, S. N. (2018). Exploring the peer mentorship experiences of adults with spinal cord injury. *Rehabilitation Psychology, 63*(4), 542–552.

Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and conducting mixed methods research.* Sage.

Culver, D. M., Kraft, E., Din, C., & Cayer, I. (2019). The Alberta women in sport leadership project: A social learning intervention for gender equity and leadership development. *Women in Sport and Physical Activity Journal*, *27*(2), 110–117.

Cummings, J. N., & Higgins, M. C. (2006). Relational instability at the network core: Support dynamics in developmental networks. *Social Networks*, *28*(1), 38–55.

Dehghansai, N., Lemez, S., Wattie, N., Pinder, R. A., & Baker, J. (2020). Understanding the development of elite parasport athletes using a constraint-led approach: Considerations for coaches and practitioners. *Frontiers in Psychology*, *11*, 502981.

Dobrow, S. R., Chandler, D. E., Murphy, W. M., & Kram, K. E. (2012). A review of developmental networks: Incorporating a mutuality perspective. *Journal of Management*, *38*(1), 210–242.

Emerson, E., Fortune, N., Llewellyn, G., & Stancliffe, R. (2021). Loneliness, social support, social isolation and wellbeing among working age adults with and without disability: Cross sectional study. *Disability and Health Journal*, *14*(1), 100965.

Evans, M. B., Shirazipour, C. H., Allan, V., Zanhour, M., Sweet, S. N., Martin Ginis, K. A., & Latimer-Cheung, A. E. (2018). Integrating insights from the parasport community to understand optimal experiences: The quality parasport participation framework. *Psychology of Sport and Exercise*, *37*, 79–90.

Fairhurst, K. E., Bloom, G. A., & Harvey, W. J. (2017). The learning and mentoring experiences of Paralympic coaches. *Disability and Health Journal*, *10*(2), 240–246.

Fasting, K., & Pfister, G. (2000). Female and male coaches in the eyes of female elite soccer players. *European Physical Education Review*, *6*(1), 91–110.

Gainforth, H. L., Giroux, E. E., Shaw, R. B., Casemore, S., Clarke, T. Y., McBride, C. B., Garnett, C. V., & Sweet, S. N. (2019). Investigating characteristics of quality peer mentors with spinal cord injury. *Archives of Physical Medicine and Rehabilitation*, *100*(1), 1916–1923.

Gibson, K. (2016). Mixed-methods research in sport and exercise: Integrating qualitative research. In B. Smith and A. C. Sparkes (Eds.), *Routledge handbook of qualitative research in sport and exercise* (pp. 382–471). Routledge.

Hodge, K., & Sharp, L. (2016). Case studies. In B. Smith and A. C. Sparkes (Eds.), *Routledge handbook of qualitative research in sport and exercise* (pp. 62–74). Routledge.

Higgins, M. C., & Kram, K. E. (2001). Reconceptualizing mentoring at work: A developmental network perspective. *Academy of Management Review*, *26*(2), 264–288.

Higgins, M. C., & Thomas, D. A. (2001). Constellations and careers: Toward understanding the effects of multiple developmental relationships. *Journal of Organizational Behavior, 22*(3), 223–247.

Hillier, A., Goldstein, J., Tornatore, L., Byrne, E., & Johnson, H. M. (2019). Outcomes of a peer mentoring program for university students with disabilities. *Mentoring & Tutoring: Partnership in Learning*, *27*(5), 487–508.

Jacomy, M., Venturini, T., Heymann, S., & Bastian, M. (2014). ForceAtlas2, a continuous graph layout algorithm for handy network visualization designed for the Gephi software. *PloS One*, *9*(6), e98679.

Kulkarni, M. (2012). Social networks and career advancement of people with disabilities. *Human Resource Development Review*, *11*(2), 138–155.

Leeder, T. M., & Sawiuk, R. (2020). Reviewing the sports coach mentoring literature: A look back to take a step forward. *Sports Coaching Review*. Advance online publication. https://doi.org.10.1080/21640629.2020.1804170

Lefebvre, J. S., Bloom, G. A., & Duncan, L. R. (2021). A qualitative examination of the developmental networks of elite sport coaches. *Sport, Exercise, & Performance Psychology*. Advance online publication. https://doi.org/10.1037/spy0000254

Lefebvre, J. S., Bloom, G. A., & Loughead, T. M. (2020). A citation network analysis of career mentoring across disciplines: A roadmap for mentoring research in sport. *Psychology of Sport and Exercise*, *49*, 101676.

Lepage, P., Bloom, G. A., & Falcão, W. R. (2020). Development and acquisition of knowledge of youth parasport coaches. *Adapted Physical Activity Quarterly*, *37*(1), 72–89.

Lin, N. (2002). *Social capital: A theory of social structure.* Cambridge University Press.

Machida, M., Irwin, B., & Feltz, D. (2013). Resilience in competitive athletes with spinal cord injury: The role of sport participation. *Qualitative Health Research, 23*(8), 1054–1065.

Maxwell, J. A., & Mittapalli, K. (2010). Realism as a stance for mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), *Sage handbook of mixed methods in social & behavioral research* (pp. 145–168). Sage.

Meier, M. (2015). The value of female sporting role models. *Sport in Society, 18*(8), 968–982.

North, J. (2013). A critical realist approach to theorising coaching practice. In P. Potrac, W. D. Gilbert, & J. Denison (Eds.), *The routledge handbook of sports coaching* (pp. 133–144). Routledge.

Opsahl, T., Agneessens, F., & Skvoretz, J. (2010). Node centrality in weighted networks: Generalizing degree and shortest paths. *Social Networks*, *32*(3), 245–251.

Pawson, R., & Tilley, N. (1997). *Realist evaluation*. Sage.

Ryba, T. V., Wiltshire, G., North, J., & Ronkainen, N. J. (in press). Developing mixed methods research in sport and exercise psychology: Potential contributions of a critical realist perspective. *International Journal of Sport and Exercise Psychology.* https://doi.org/10.1080/1612197X.2020.1827002

Scott, J. (2017). *Social network analysis. Sage.*

Shannon-Baker, P. (2016). Making paradigms meaningful in mixed methods research. *Journal of Mixed Methods Research, 10*(4), 319–334.

Smith, B., & McGannon, K. R. (2018). Developing rigor in qualitative research: Problems and opportunities within sport and exercise psychology. *International Review of Sport and Exercise Psychology, 11*(1), 101–121.

Smith, B., & Sparkes, A. C. (2016). Interviews: Qualitative interviewing in the sport and exercise sciences. In B. Smith & A. C. Sparkes (Eds.), *Routledge handbook of qualitative research in sport and exercise* (pp. 103–123). Routledge.

Smith, B., Sparkes, A. C., Phoenix, C., & Kirby, J. (2012). Quantitative research in physical therapy: A critical discussion on mixed-method research. *Physical Therapy Reviews, 17*(6), 374–381.

Tawse, H., Bloom, G. A., Sabiston, C. M., & Reid, G. (2012). The role of coaches of wheelchair rugby in the development of athletes with a spinal cord injury. *Qualitative Research in Sport, Exercise and Health, 4*(2), 206–225.

Thorpe, H., & Olive, R. (2016). Conducting observations in sport and exercise settings. In B. Smith & A. C. Sparkes (Eds.), *Routledge handbook of qualitative research in sport and exercise* (pp. 124–138). Routledge.

Turner, J. A., Cardenas, D. D., Warms, C. A., & McClellan, C. B. (2001). Chronic pain associated with spinal cord injuries: A community survey. *Archives of Physical Medicine and Rehabilitation, 82*(4), 501–508.

Yip, J., & Kram, K. E. (2017). Developmental networks: Enhancing the science and practice of mentoring. In D. A. Clutterbuck, F. K. Kochan, L. G. Lunsford, N. Dominguez, & J. Haddock-Millar (Eds.), *Sage handbook of mentoring* (pp. 88–104). Sage.

Table 4.1

Athlete Characteristics

	Social Network Measures			
Participant	Indegree	Outdegree	Weighted Indegree	Weighted Outdegree
Curtis (Athlete 1)	0	7	–	27.67
Iain (Athlete 2)	0	9	–	51.33
Emily (Athlete 3)	0	7	–	32.00
Jesse (Athlete 4)	1	3	6.00	13.33
Louis (Athlete 5)	1	4	3.33	18.67
Audrey (Athlete 6)	1	8	6.33	37.33
Harry (Athlete 7)	5	4	29.00	22.33
M	**1.14**	**6**	**11.17**	**28.95**
SD	**1.78**	**2.31**	**11.96**	**12.75**

Note: Indegree = number of times identified as a developmental agent; outdegree = number of developmental agents identified; weighted indegree = amount of developmental support provided; weighted outdegree = amount of developmental support received.

Table 4.2

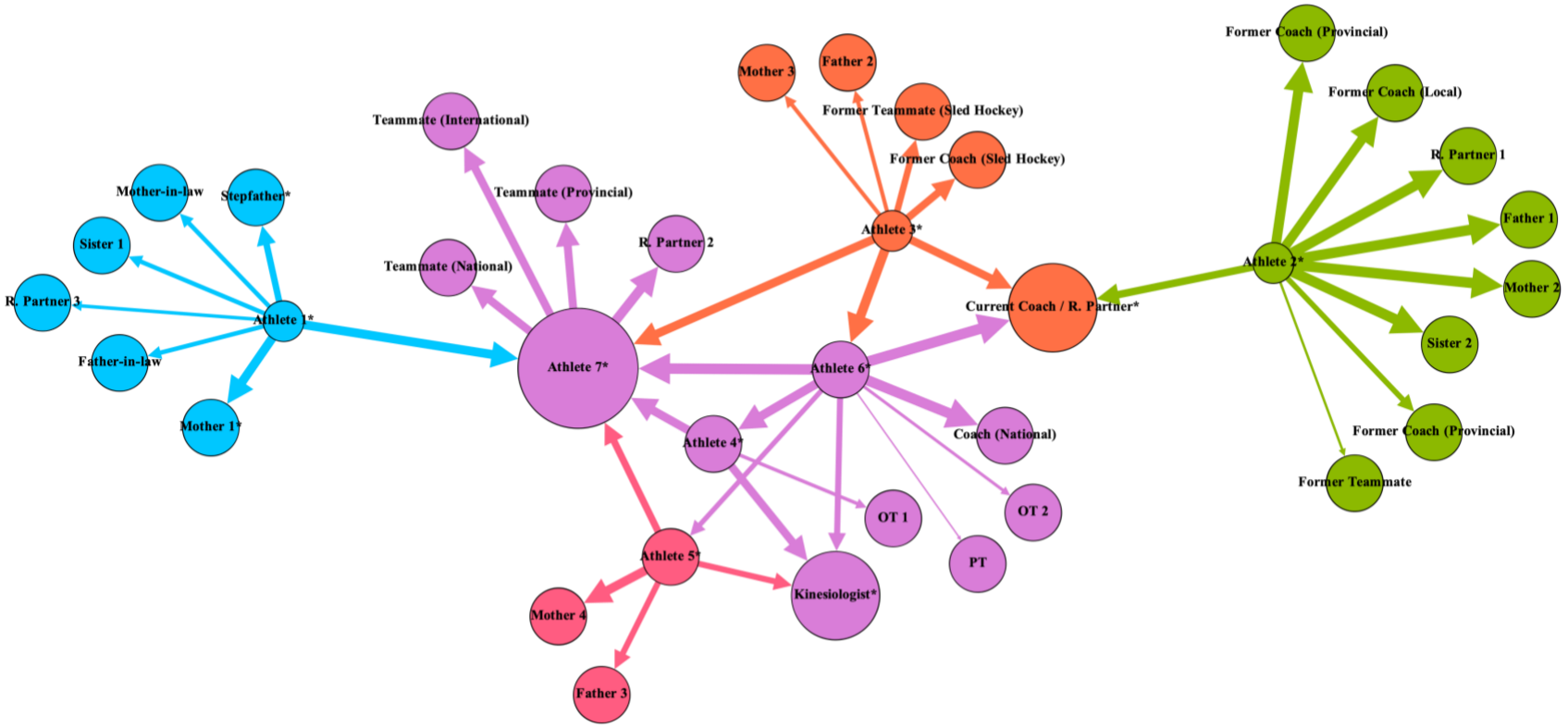
Developmental Agent Characteristics

		Weighted Indegree	
Type	*n*	*M*	SD
Parents	10	4.57	1.78
Siblings	2	5.00	2.82
Local Teammates	4	11.17	11.96
Non-local Teammates	5	4.40	1.59
Rehab Specialists	4	4.67	5.81
Romantic Partners	3	7.67	4.89
Coaches	6	5.48	5.20
M	**4.86**	**6.13**	**4.86**

Note: This table provides average weighted indegree scores across type of developmental agents to identify the average amount of support provided (i.e., developmental impact).

Figure 4.1

Para Sport Development Network



Note: The para sport development network is a directed, weighted, sociocentric developmental network consisting of 37 nodes (i.e., people) and 42 edges (i.e., developmental relationships). The size of each node represents indegree score (frequency of incoming developmental links), whereby a larger node indicates a higher frequency of incoming links. The direction of the edges indicates nomination of developmental agents, and the size of each edge indicates the weight (i.e., strength) of the developmental connection, whereby a larger edge indicates a stronger connection. Asterisks* indicate study participants.

Chapter 5

General Discussion

This doctoral dissertation consisted of five chapters. Chapter one contained an in-depth literature review, leading to the rationale and objectives of the dissertation. Specifically, the literature review provided an overview of mentoring theory and concepts, mentoring research in sport, contemporary approaches to mentoring, and the developmental network perspective. For several decades, mentoring has been viewed as a valuable type of a developmental relationship (Ragins & Kram, 2007). Although there is intuitive appeal for mentoring in sport, empirical research is limited compared to other domains, such as academic medicine, education, and industrial and organizational psychology (see Lefebvre et al., 2020). Among the studies conducted in sport, research has primarily explored the value and impact of mentoring relationships on the development of sport coaches (e.g., Fairhurst et al., 2017; Koh et al., 2014). Perhaps due to the scarcity of sport mentoring research, academics have recently been advocating for other ways to examine developmental relationships, such as the developmental network perspective (Higgins & Kram, 2001; Leeder & Sawiuk, 2020; Sawiuk et al., 2017). To this end, the overarching purpose of the dissertation was to advance the conceptual and empirical understanding of developmental relationships in sport by exploring mentoring and developmental networks. The purpose was achieved through a cohesive series of three manuscripts presented in chapters two, three, and four.

Overview of the Dissertation

Chapter two included a citation network analysis of the career mentoring literature (Lefebvre et al., 2020). With the purpose of bridging existing knowledge with the mentoring in sport literature, this comprehensive review systematically synthesized 1,819 mentoring texts

across multiple disciplines and evaluated this body of literature using citation network analysis. The review identified the major career mentoring disciplines and the most influential mentoring texts, uncovered a lack of interdisciplinary communication, and situated the sport mentoring texts. Informed by these findings, the review highlighted research gaps within the sport mentoring disciplines and suggested that sport mentoring scholars can fill these gaps by adopting knowledge from other mentoring disciplines. The developmental network perspective is one area that has been gaining particular recognition across other disciplines, and thus served to inform chapters three and four.

Chapter three qualitatively examined the developmental networks of elite sport coaches (Lefebvre et al., 2021) to identify their developmental agents, the outcomes resulting from these developmental relationships, and the types of assistance provided by their developmental agents. The findings indicated that coaches had a vast network of developmental relationships, that included coaches, athletes, management, and family, which collectively contributed to their development on a personal (e.g., core values, personal characteristics) and professional (e.g., coaching knowledge, promotions) level. In addition, the coaches' developmental agents provided both intentional and unintentional forms of developmental assistance, such as support, guidance, and role modelling.

Building from the findings in chapter three, chapter four was a mixed-methods case study examining the developmental networks of athletes in a wheelchair rugby team (Lefebvre et al., under review). The goal was to examine the structure of their developmental networks, including network size, network diversity, strength of ties, and reachability (Higgins & Kram, 2001; Yip & Kram, 2017). In doing so, the results indicated that wheelchair rugby athletes surrounded themselves with a small number of developmental agents. Additionally, the findings revealed

that their developmental networks were highly diversified and included developmental agents both inside and outside of the sport environment, including peers, coaches, family, and rehabilitation specialists. Lastly, the strength of these relationships varied as a function of the type of relationship, which led to distinct developmental contributions, including their integration into the sport community, continued participation in wheelchair rugby, and their athletic development.

Implications of the Findings

The remainder of this chapter will provide a scholarly discussion of the (a) theoretical, conceptual, and methodological implications of mentoring and developmental networks, (b) future areas of research that would advance our understanding of developmental relationships, and (c) practical implications from this program of study.

Theoretical, Conceptual, and Methodological Implications

From a theoretical perspective, the findings from this dissertation support the notion that mentoring and developmental networks are interconnected concepts. Indeed, according to Yip and Kram (2017), “traditional dyadic mentoring and developmental networks are not exclusive, but rather co-existing relational systems” (p. 98). This is likely because the developmental network perspective was initially conceptualized by Higgins and Kram (2001) as an extension and integration of mentoring. Specifically, Higgins and Kram (2001) theorized that developmental agents provided varying types and levels of Kram’s (1985) mentor functions, and that mentor role theory was a theoretical foundation of the developmental network perspective. This contention is supported across studies two and three, which have both demonstrated that the developmental agents of elite coaches and para sport athletes provided varying amounts of career

functions (e.g., increased professional exposure, feedback), and psychosocial functions (e.g., acting as a sounding board, role model).

This dissertation also demonstrated how the developmental network perspective can extend our understanding of developmental relationships. Specifically, the current findings showed that developmental relationships in sport can be characterized by traditional, peer, and reverse mentoring. Additionally, they can occur both within and outside of the sport environment, and in some cases, they can even be individuals with whom they had no relationships (e.g., unmet idols). Accordingly, the results of the studies in this dissertation support the contention that developmental relationships can concurrently exist outside of the traditional hierarchical structure of mentoring (Higgins & Kram, 2001; Yip & Kram, 2017). In addition, the findings indicated that developmental agents contributed to the personal and professional development of elite coaches by indirect and unintentional forms of support, such as anti-role modelling and the mere presence of an influential figure. In doing so, these findings exemplified that developmental agents provided forms of developmental assistance (i.e., mentor functions), that were not conceptualized within Kram's (1985) mentor role theory. This finding echoes the non-sport literature, which has found that developmental relationships, as a collective, provided assistance beyond the developmental functions typically found within mentoring relationships (Dobrow et al., 2012). These include various psychosocial subfunctions, career subfunctions, as well as positive and negative subfunctions of role modelling, such as inspiration, cultural guidance, anti-role modelling, among others (Cotton et al., 2011; Dobrow et al., 2012; Murphy & Kram 2010; Shen & Kram, 2011). Accordingly, this dissertation supports the notion that the developmental network perspective extends Kram's (1985) foundational theories.

In addition, the developmental network perspective further advances the conceptual implications of developmental relationships by drawing upon social network principles to provide insight into the implications of network structure (Higgins & Kram, 2001). Specifically, the developmental network perspective uniquely incorporates various structural characteristics, such as network size, network diversity, network strength, and reachability (Higgins & Kram, 2001; Murphy & Kram, 2010; Yip & Kram, 2017). Accordingly, by applying the developmental network perspective, this dissertation provided a descriptive account of the structural characteristics of two unique sport populations—elite coaches and para sport athletes. As indicated by Dobrow et al. (2012), "research on the nuances of structural properties within developmental networks moves well beyond the scope of traditional mentoring research" (p. 223). In support of this statement, the findings from this dissertation provided novel information about the differing quality and contribution of developmental relationships in sport. As an example, the findings from study three demonstrated that the developmental contributions of peers, coaches, and family members varied in strength, and resulted in distinct developmental outcomes.

Lastly, using social network theory as a guiding framework throughout all three studies led to a number of methodological contributions. First, previous citation networks analyses in the sport discipline involved citation networks ranging between 75 and 229 texts (e.g., Bruner et al., 2009, 2010; Gustafsson et al., 2014; Hancock et al., 2015). The size of the citation network in study one included 1,819 texts, which allowed for in-depth insight into multidisciplinary citation relations in a way that has not been previously conducted in sport research. Second, most if not all of the previous studies that examined social networks in sport were conducted using a quantitative research design (e.g., Fransen et al., 2015; Loughead et al., 2016). Study two used a

qualitative approach that implemented a unique graphic elicitation technique (i.e., relational maps) that subsequently provided an in-depth understanding into the complexities of developmental relationships that cannot be captured in quantitative designs. Third, Ryba et al.'s (in press) meta-study of mixed-methods research in sport (that examined published articles between 2017-2019) found that only 36% of the published research was situated within a philosophical paradigm. This is problematic because "the types of questions we ask, as well as the way we seek to answer them, are strongly influenced by our paradigms" (Gibson, 2016, p. 389). Accordingly, the inclusion of our critical realist perspective (see Ryba et al., in press; Shannon-Baker, 2016) highlights the value of having a paradigmatically grounded mixed-methods research. Taken together, this dissertation provided support for the application of the developmental network perspective to the sport context, which led to advances theoretically, conceptually, and methodologically. Moving forward, there remains ample avenues for future research.

Advancing the Field: Recommendations for Future Research

Collectively the findings from this program of study indicate that people acquire a complex web of relationships that include, but are not limited to, mentoring relationships. Echoing this finding, Yip and Kram (2017) argued that "mentoring relationships do not occur in a vacuum, but rather in a relational ecosystem comprised of multiple relationships" (p. 98). Moreover, the authors noted that these relationships are shaped by the broader cultural norms and beliefs about mentoring. To this end, they suggest that a complete understanding of the role and impact of developmental relationships on the personal growth and professional development of a person needs to consider the whole ecological system (Chandler et al., 2011; Yip & Kram, 2017). To this end, Chandler et al. (2011) proposed that developmental relationships exist within

a broader system consisting of multiple levels (see Bronfenbrenner, 1977, 1994): (1) the individual/ontological system (e.g., mentor/mentee characteristics), (2) the dyadic microsystem (e.g., mentor/mentee relationships), (3) the developmental network microsystem (e.g., network structure), (4) the organizational microsystem (e.g., mentoring programs), and (5) the macrosystem (e.g., the social context, culture). Although the current dissertation provided insight into the dyadic and network level of personal relationships, future research should examine these relationships within the broader ecological system by also considering the individual characteristics, the organizational context, and social culture. For instance, how does the organizational context shape developmental relationships? How does the culture within the sport environment, which is often hesitant to share trade secrets and can involve micro-politics (see Sawiuk et al., 2017), impact the opportunity to connect with prospective developmental agents?

One global limitation from the work in this dissertation was the use of cross-sectional research designs. Longitudinal research on developmental relationships in sport would be welcomed given that relationships in sport are dynamic and change over time (e.g., Côté et al., 2014; Herbison et al., 2019). Furthermore, despite emerging evidence in non-sport domains, little remains known about how or why networks change over time (Cummings & Higgins, 2006; Dobrow et al., 2012; Dobrow Riza & Higgins, 2019). Indeed, according to Dobrow Riza and Higgins (2019), “although mentoring scholars acknowledge that developmental relationships are by their very nature dynamic and changing, we lack a substantial body of research that shows how these developmental network characteristics shift with time” (p. 222). To this end, sport scholars should conduct longitudinal studies to examine the implications of developmental networks over time. This could provide insight into how developmental relationships help

coaches and athletes during important career stages and transitions and inform them on how to maximize their developmental networks over the course of their career.

Lastly, along with the recognition for the value of mentoring as a developmental relationship for the growth, development, and advancement of people in sport, there has been a surge of interest in the applied realm of formalized mentoring—mentoring relationships initiated within mentoring programs. To this point, mentoring programs are being implemented across sport organizations (e.g., Swimming Canada's Coaching Mentoring Initiative; FINA, 2009), throughout coach education curriculum (e.g., National Coach Certification Program's Mentorship module; Coaching Association of Canada, 2020), and university athletic departments (e.g., Kerr Family Women in Sport Program; Zuckerman, 2018). However, one of the research gaps identified in chapter two is the need for more empirical examinations that assess the effectiveness of mentoring programs. In addition, chapters three and four both highlighted the value of mentoring programs for elite sport coaches, as well as para sport coaches and athletes. Aligned with these findings, a number of researchers are calling for the development, implementation, and evaluation of mentoring programs (Bloom, 2013; Grant et al., 2020; Jones et al., 2009; Koh et al., 2014). For instance, formal mentoring could serve to provide para sport coaches, who were found to lack educational opportunities, access to important knowledge and continued professional development. In sum, this dissertation adds to these calls and suggests that examining the formalization of developmental relationships could be an interesting avenue for future research.

Practical Implications: Formalizing Developmental Relationships

There are a number of ways that sport organizations, practitioners, and researchers can draw upon the findings from this dissertation to inform the development, implementation, and

evaluation of mentoring programs. For instance, stakeholders could consider developing mentoring programs that implement contemporary approaches to mentoring, such as peer mentoring (e.g., Hillier et al., 2019), facilitated peer mentoring (e.g., Mayer et al., 2014), group mentoring (e.g., Kroll et al., 2020), and e-mentoring (e.g., Grant et al., 2020). Given that organizations often have difficulty finding and compensating qualified traditional mentors (see Bloom, 2013), contemporary approaches could prove to be a useful alternative to circumvent such barriers. For instance, facilitated peer mentoring involves pairing two mentees who engage in lateral mentoring (i.e., mutual construction of knowledge), and assigning these pairs to more experienced traditional mentors (Files et al., 2008; Hillier et al., 2019). Accordingly, this mentoring structure would require a smaller number of qualified traditional mentors, while maintaining the benefits of both peer mentoring and traditional mentoring (Files et al., 2008). Another mentoring approach that is often used to overcome scarcities in local mentors is e-mentoring (Grant et al., 2020; Lewellen-Williams et al., 2006). Specifically, e-mentoring is a mentoring relationship that takes place primarily via online video-chat platforms, phone calls, e-mails, or text messaging, and can be implemented within any type of developmental relationship (Bierema, 2017; Butler et al., 2013). Although e-mentoring has been a viable option for decades (see Bierema & Merrian, 2002), organizations are only beginning to shift their attention to the benefits of e-mentoring (e.g., Grant et al., 2020). This shift is important now more than ever considering the restrictions and impact of COVID-19, which has resulted in increased isolation and lack of development opportunities. Therefore, e-mentoring could serve to stimulate the development of coaches on both a professional and psychosocial level.

In addition, mentoring programs can be designed to specifically integrate the developmental network perspective. For instance, researchers are advocating for the

developmental network perspective as a tool for the evaluation of mentoring programs (Srivastava, 2015; Yip & Kram, 2017). Indeed, according to Yip and Kram (2017), "the methodological tools of network analysis could be used to strengthen the understanding and evaluation of mentoring programs" (p. 98). Specifically, given that the developmental network perspective considers the collective impact of relationships, researchers and practitioners can use social network analysis to isolate the contribution of formal mentors and assess its impact on the larger developmental picture. Furthermore, a growing number of scholars in the non-sport disciplines, such as business, healthcare, and education, are exploring developmental network alternatives to mentoring programs altogether (e.g., Chandler et al., 2010; DeCastro et al., 2013; de Janasz & Sullivan, 2004; Yip & Kram, 2017). According to Chandler et al. (2010), programs that train people to build their own developmental networks can be a low-cost and effective alternative to mentoring programs:

> Formal programs should not be the only vehicles of mentoring, particularly when [developmental networks] is low-cost and of value to all parties. Rather, organizations should seek out ways to help people foster their own developmental networks that include relationships providing various types and amounts of support. (p. 48)

Within educational and training initiatives that are grounded in the developmental network perspective, practitioners can integrate activities where participants reflect on the current state of their developmental networks and engage in action planning for maximizing their developmental networks (see Murphy & Kram, 2014). In sum, sport organizations, practitioners, and researchers can benefit from formalizing developmental relationships within the context of developmental networks as a means for professional development.

Conclusion

This program of study adds to the growing body of literature that suggests people learn and develop with the assistance of multiple developmental agents. In other words, *it takes a village* of developmental relationships to maximize personal and professional growth. Taken together, this dissertation presented a series of manuscripts that contributed to our understanding of developmental relationships in sport. Chapter five discussed the theoretical, conceptual, and practical implications of mentoring and developmental networks and provided a number of future research avenues to further advance our understanding of developmental relationships. According to Chandler et al. (2011), "researchers have only 'scratched the surface' in terms of applying a social network perspective to mentoring" (p. 542). Echoing this sentiment, this dissertation provides a unique contribution to an underdeveloped emerging area of sport research, which has many possibilities for future exploration. To this end, it is hoped that this dissertation will inspire scholars to further explore developmental relationships, such as mentoring, within the broader context of developmental networks.

References

Bierema, L. L. (2017). eMentoring: Computer mediated career development for the future. In D. A. Clutterbuck, F. K. Kochan, L. G. Lunsford, N. Dominguez, & J. Haddock-Millar (Eds.), *Sage handbook of mentoring* (pp. 482–498). Sage.

Bierema, L. L., & Merriam, S. B. (2002). E-mentoring: Using computer mediated communication to enhance the mentoring process. *Innovative Higher Education*, *26*(3), 211–227.

Bloom, G. A. (2013). Mentoring for sports coaches. In P. Potrac, W. Gilbert, & J. Denison (Eds.), *The routledge handbook of sports coaching* (pp. 476–485). Routledge.

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist, 32*(7), 513–531.

Bronfenbrenner, U. (1994). Ecological models of human development. In T. Husén, & T. N. Postlethwaite (Eds.), *International Encyclopedia of Education* (pp. 1643–1647). Elsevier Science.

Bruner, M. W., Erickson, K., McFadden, K., & Côté, J. (2009). Tracing the origins of athlete development models in sport: A citation path analysis. *International Review of Sport and Exercise Psychology, 2*(1), 23–37.

Bruner, M. W., Erickson, K., Wilson, B., & Côté, J. (2010). An appraisal of athlete development models through citation network analysis. *Psychology of Sport and Exercise*, *11*(2), 133–139.

Butler, A. J., Whiteman, R. S., & Crow, G. M. (2013). Technology's role in fostering transformational educator mentoring. *International Journal of Mentoring and Coaching in Education*, *2*(3), 233–248.

Chandler, D. E., Hall, D. T., & Kram, K. E. (2010). A developmental network and relational savvy approach to talent development: A low-cost alternative. *Organizational Dynamics, 39*(1), 48–56.

Chandler, D. E., Kram, K. E., & Yip, J. (2011). An ecological systems perspective on mentoring at work: A review and future prospects. *The Academy of Management Annals, 5*(1), 519–570.

Coaching Association of Canada (2020). *Multi-sport NCCP mentorship.* Retrieved from https://coach.ca/nccp-mentorship

Côté, J., Turnnidge, J., & Evans, M. B. (2014). The dynamic process of development through sport. *Kinesiologia Slovenica, 20*(3) 14–26.

Cotton, R. D., Shen, Y., & Livne-Tarandach, R. (2011). On becoming extraordinary: The content and structure of the developmental networks of Major League Baseball Hall of Famers. *Academy of Management Journal, 54*(1), 15–46.

Cummings, J. N., & Higgins, M. C. (2006). Relational instability at the network core: Support dynamics in developmental networks. *Social Networks, 28*(1), 38–55.

DeCastro, R., Sambuco, D., Ubel, P. A., Stewart, A., & Jagsi, R. (2013). Mentor networks in academic medicine: Moving beyond a dyadic conception of mentoring for junior faculty researchers. *Academic Medicine, 88*(4), 488–496.

de Janasz, S. C., & Sullivan, S. E. (2004). Multiple mentoring in academe: Developing the professorial network. *Journal of Vocational Behavior, 64*(2), 263–283.

Dobrow, S. R., Chandler, D. E., Murphy, W. M., & Kram, K. E. (2012). A review of developmental networks: Incorporating a mutuality perspective. *Journal of Management, 38*(1), 210–242.

Dobrow Riza, S., & Higgins, M. C. (2019). The dynamics of developmental networks. *Academy of Management Discoveries*, *5*(3), 221–250.

Fairhurst, K. E., Bloom, G. A., & Harvey, W. J. (2017). The learning and mentoring experiences of Paralympic coaches. *Disability and Health Journal*, *10*(2), 240–246.

Files, J. A., Blair, J. E., Mayer, A. P., & Ko, M. G. (2008). Facilitated peer mentorship: A pilot program for academic advancement of female medical faculty. *Journal of Women's Health*, *17*(6), 1009–1015.

FINA (2009). *Swimming Canada announces new coaching mentoring initiative.* Retrieved from http://www.fina.org/news/swimming-canada-announces-new-coaching-mentoring-initiative

Fransen, K., Van Puyenbroeck, S., Loughead, T. M., Vanbeselaere, N., De Cuyper, B., Vande Broek, G., & Boen, F. (2015). Who takes the lead? Social network analysis as a pioneering tool to investigate shared leadership within sports teams. *Social Networks, 43*, 28–38.

Gibson, K. (2016). Mixed-methods research in sport and exercise: Integrating qualitative research. In B. Smith and A. C. Sparkes (Eds.), *Routledge handbook of qualitative research in sport and exercise* (pp. 382–471). Routledge.

Grant, M. A., Bloom, G. A., & Lefebvre, J. S. (2020). Lesson's learned: Coaches' perceptions of a pilot e-mentoring programme. *International Sport Coaching Journal, 7*(1), 22–30.

Gustafsson, H., Hancock, D. J., & Côté, J. (2014). Describing citation structures in sport burnout literature: A citation network analysis. *Psychology of Sport and Exercise*, *15*(6), 620–626.

Hancock, D. J., Rix-Lièvre, G., & Côté, J. (2015). Citation network analysis of research on sport officials: A lack of interconnectivity. *International Review of Sport and Exercise Psychology, 8*(1), 95–105.

Herbison, J. D., Vierimaa, M., Côté, J., & Martin, L. J. (2019). The dynamic nature of connection and its relation to character in youth sport. *International Journal of Sport and Exercise Psychology*, *17*(6), 568–577.

Higgins, M. C., & Kram, K. E. (2001). Reconceptualizing mentoring at work: A developmental network perspective. *Academy of Management Review*, *26*(2), 264–288.

Hillier, A., Goldstein, J., Tornatore, L., Byrne, E., & Johnson, H. M. (2019). Outcomes of a peer mentoring program for university students with disabilities. *Mentoring & Tutoring: Partnership in Learning*, *27*(5), 487–508.

Jones, R. L., Harris, R., & Miles, A. (2009). Mentoring in sports coaching: A review of the literature. *Physical Education and Sport Pedagogy*, *14*(3), 267–284.

Koh, K. T., Bloom, G. A., Fairhurst, K. E., Paiement, D. M., & Kee, Y. H. (2014). An investigation of a formalized mentoring program for novice basketball coaches. *International Journal of Sport Psychology, 45*(1), 11–32.

Kram, K. E. (1985). *Mentoring at work: Developmental relationships in organizational life.* Scott Foresman.

Kroll, J., Blake-Beard, S., & McMillian-Roberts, K. (2020). An exploration of the peer group mentoring experiences of university female basketball athletes. *Mentoring & Tutoring: Partnership in Learning*, *28*(2), 229–252.

Leeder, T. M., & Sawiuk, R. (2020). Reviewing the sports coach mentoring literature: A look back to take a step forward. *Sports Coaching Review*. Advance online publication. https://doi.org.10.1080/21640629.2020.1804170

Lefebvre, J. S., Alexander, D., Sweet, S. N., & Bloom, G. A. (under review). A mixed-methods case study examining the developmental networks of athletes in a wheelchair rugby team.

Lefebvre, J. S., Bloom, G. A., & Duncan, L. R. (2021). A qualitative examination of the developmental networks of elite sport coaches. *Sport, Exercise, & Performance Psychology*. Advance online publication. https://doi.org/10.1037/spy0000254

Lefebvre, J. S., Bloom, G. A., & Loughead, T. M. (2020). A citation network analysis of career mentoring across disciplines: A roadmap for mentoring research in sport. *Psychology of Sport and Exercise*, *49*, 101676.

Lewellen-Williams, C., Johnson, V. A., Deloney, L. A., Thomas, B. R., Goyol, A., & Henry-Tillman, R. (2006). The POD: A new model for mentoring underrepresented minority faculty. *Academic Medicine*, *81*(3), 275–279.

Loughead, T. M., Fransen, K., Van Puyenbroeck, S., Hoffmann, M., De Cuyper, B., Vanbeselaere, N., & Boen, F. (2016). An examination of the relationship between athlete leadership and cohesion using social network analysis. *Journal of Sports Sciences, 34*(21), 2063–2073.

Mayer, A. P., Blair, J. E., Ko, M. G., Patel, S. I., & Files, J. A. (2014). Long-term follow-up of a facilitated peer mentoring program. *Medical Teacher*, *36*(3), 260–266.

Murphy, W. M., & Kram, K. E. (2010). Understanding non-work relationships in developmental networks. *Career Development International*, *15*(7), 637–663.

Murphy, W. M., & Kram, K. E. (2014). *Strategic relationships at work: Creating your circle of mentors, sponsors, and peers for success in business and life.* McGraw-Hill.

Ragins, B. R., & Kram, K. E. (2007). The roots and meaning of mentoring. In B. R. Ragins & K. E. Kram (Eds.), *The handbook of mentoring at work: Theory, research, and practice* (pp. 3–15). Sage.

Ryba, T. V., Wiltshire, G., North, J., & Ronkainen, N. J. (in press). Developing mixed methods research in sport and exercise psychology: Potential contributions of a critical realist perspective. *International Journal of Sport and Exercise Psychology.* https://doi.org/10.1080/1612197X.2020.1827002

Sawiuk, R., Taylor, W. G., & Groom, R. (2017). An analysis of the value of multiple mentors in formalised elite coach mentoring programmes. *Physical Education and Sport Pedagogy*, *22*(4), 403–413.

Shannon-Baker, P. (2016). Making paradigms meaningful in mixed methods research. *Journal of Mixed Methods Research*, *10*(4), 319–334.

Shen, Y., & Kram, K. E. (2011). Expatriates' developmental networks: Network diversity, base, and support functions. *Career Development International*, *16*(6), 528–551.

Srivastava, S. B. (2015). Network intervention: Assessing the effects of formal mentoring on workplace networks. *Social Forces*, *94*(1), 427–452.

Yip, J., & Kram, K. E. (2017). Developmental networks: Enhancing the science and practice of mentoring. In D. A. Clutterbuck, F. K. Kochan, L. G. Lunsford, N. Dominguez, & J. Haddock-Millar (Eds.), *Sage handbook of mentoring* (pp. 88–104). Sage.

Zuckerman, E. (2018). A $3.5-million gift to McGill aims to level playing field for female athletes. *McGill Newsroom.* Retrieved from https://www.mcgill.ca/newsroom/channels/news/35-million-gift-mcgill-aims-level-playing-field-female-athletes-289865

Appendix A

Informed Consent Form

This study is in partial fulfillment of the requirements for the degree of Doctor of Philosophy for Jordan Lefebvre, a graduate student in sport psychology in the Department of Kinesiology and Physical Education at McGill University. We would like to invite you to participate in our study titled, "A developmental network approach to understanding coach mentoring".

If you choose to participate in this study you will be requested, without payment, to partake in a 90-minute audiotaped interview. During this interview, we will be discussing the key mentoring relationships that have impacted your personal and professional development as a coach. You will then be asked a series of questions to discuss these mentoring relationships in more depth. Approximately 10–14 days after your first interview, we will conduct a 15–20 minute follow-up interview that will be conducted over phone or skype.

Prior to publication, you will receive copies of the results and conclusions of the study. Any and all information you provide throughout the study will remain confidential. Only the principal investigator, Jordan Lefebvre, and the faculty supervisor, Dr. Gordon A. Bloom, will have access to identifiable data. All audio files and the digital copies of interview transcripts will be securely stored in encrypted folders on a password-protected computer for a period of seven years. Any paper copies of notes will be converted to digital files. After ensuring they were converted accurately, the paper copies will be destroyed. Seven years after the study ends all the data will be destroyed. The information will be used for publication purposes and scholarly journals or for presentations at conferences.

Your name and identity will not be revealed at any time. The McGill Research Ethics Board has reviewed this study for compliance with its ethical standards.

Your participation in this study is voluntary and not mandatory. You are free to refuse to answer any questions or withdraw from participation at any time for any reason.

After reading the above statement and having had the directions verbally explained, it is now possible for you to provide consent and voluntarily agree to participate in this research project based on the terms outlined in this consent form.

You will be provided with a signed copy of this consent form for your records. Please contact the Research Ethics Officer at 514-398-6831, or Lynda.mcneil@mcgill.ca, if you have any questions or concerns regarding your rights and welfare as a participant in this study.

Please sign below if you agree to participate in this study.

I agree to the audiotaping of the interviews with the understanding that these recordings will be used solely for the purpose of transcribing these sessions. **Yes** □ **No** □

_____ _____
Signature Date

_____ _____
Researcher's Signature Date

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Appendix B

Coach Interview Guide

Pre-Interview Routine

- Introduction of researcher.
- Overview of the study, including a definition of a developmental agent and a developmental network.

Section A. Background Involvement in Coaching

1. Briefly tell me about your athletic career.

2. Briefly summarize the evolution of your coaching career.

Section B. Identification of Developmental Network (Graphical Interview Method)

As we have discussed earlier, a core aspect of this interview involves identifying and discussing some of the important individuals that have influenced your development both as a person and as a coach. To begin we will start by creating a relational map of your mentoring relationships.

3. Name the individual(s) whom you believe (currently or in the past) takes/took an active interest in and concerted action to advance your career. Think broadly, these may be people from your work or outside of work (e.g., mentors, coaches, family members, peers, professional contacts, friends, etc).

4. If you imagine standing here in the middle, how would you order those people you mentioned, such that their positions in the circles reflect their importance to your career?
    a. Please explain why you have chosen to position the post-it notes in this way.

Section C. Developers' Influence

Now that we have created the relational map, I want to ask you a series of questions to discuss how these individuals have influenced your personal and professional development. We will start with the most influential person, and work our way down.

5. Please describe your relationship with this person?
    a. Duration of relationship?
    b. What does this person mean to you? How close do you feel with this person?
    c. How often do you communicate with this person?

6. What aspects of your **professional development** do you feel you can attribute to this person?
    a. Probe for specific examples.
    b. Professional, interpersonal knowledge, intrapersonal knowledge.
    c. Can you give me examples of what this person did for you and how they did it?

7. What aspects of your **personal development** do you feel you can attribute to this person?
    a. Probe for specific examples.
    b. Can you give me examples of what this person did for you and how they did it?

Section D. Summary and Concluding Questions

8. Is there something that we didn't cover in the interview that you would you like to add?

9. Do you have any final comments or questions?

Probes: Key phrases to stimulate reflection

- Can you expand on that?
- Can you clarify that?
- That's interesting, tell me more about that.
- Could you please tell me more about this?

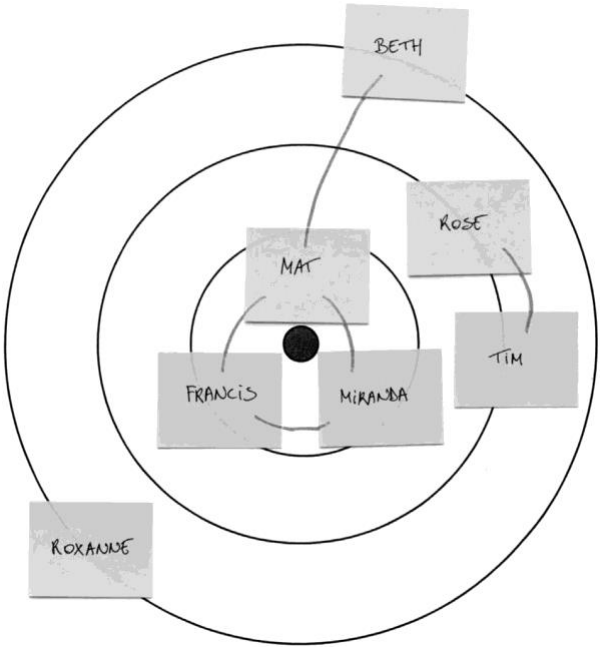

Figure 1. Example relational map

Appendix C

Letter of Collaboration

Montréal, 15 Octobre 2019

Au comité d'évaluation d'éthiques à McGill

Object : Lettre de collaboration

Mesdames, messieurs

La présente est pour confirmer la collaboration de Parasports Québec au projet de recherche « An examination of athletes' mentoring experiences in Wheelchair Rugby », dirigé par l'étudiant au doctorat Jordan Lefebvre et son superviseur Dr. Gordon Bloom.

Notre rôle de fédération sportive du rugby en fauteuil roulant nous amène à chercher plus d'information sur ce sport et sur ses pratiquants. Notre nouveau plan stratégique vise à élargir nos actions en collaboration avec la recherche universitaire afin d'améliorer les connaissances sur les parasports et de rendre le sport comme vecteur de réadaptation et d'intégration sociale pour les personnes vivant avec des limitations physiques.

Dans le cadre de ce projet, Parasports Québec collaborera à la mise en relation entre l'équipe de recherches et les athlètes de rugby en fauteuil roulant au Québec. Nous souhaitons que les résultats puissent servir à améliorer le recrutement et l'intégration de nouveaux athlètes, mais aussi à améliorer la connaissance sur les effets bénéfiques du sport pour les personnes vivant avec des limitations. Nous souhaitons à terme influencer positivement la formation des intervenants – enseignants, éducateurs physiques, kinésiologues, ergothérapeutes, médecins, etc. – pour les sensibiliser à la nécessité du sport pour leur future clientèle.

Nous vous remercions de l'attention que vous porterez à cette demande.

Cordialement,

Francis Ménard
Directeur général
Parasports Québec

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Appendix D

Letter of Information
"Wheelchair Rugby"

This research is being conducted by Jordan Lefebvre and Professor Gordon Bloom from the department of Kinesiology and Physical Education at McGill University in collaboration with Parasports Québec. Parasports Québec will serve as the liaison between the researchers and participants and will be granting Jordan Lefebvre access to the sport environment.

What is this study about?

The purpose of this research is to better understand the mentoring experiences of elite wheelchair rugby athletes, and how these experiences play a role in their development and daily experiences. To accomplish this, the study will involve collecting data from both wheelchair athletes and a select group of the individuals in their surrounding environment (non-athletes) that are deemed to have had an impact on athlete development.

> ***Wheelchair rugby athletes:*** Athletes will be asked to do one or more of the following: (1) complete a questionnaire package, on three separate occasions, that takes approximately 30 minutes each; (2) partake in a 90-minute audio-recorded interview discussing the key relationships that have impacted their sport experiences, personal development, and rehabilitation; (3) partake in a 30-minute audio-recorded interview discussing their involvement and impact on the development of other athletes, as a mentor, in their environment; (4) be observed in their sport environment, which could also include brief audio-recorded conversations.
>
> ***Non-athlete mentors:*** Non-athletes who have been identified by one or more athletes to have had an impact on their development will be asked to partake in a 30-minute audio-recorded interview discussing their involvement and impact on the development of these individuals.

Is my participation voluntary?

Yes. Although it be would be greatly appreciated if you would answer all material as frankly as possible, you should not feel obliged to answer any material that you find objectionable or that makes you feel uncomfortable. You may also withdraw at any time without experiencing negative consequences. Should you withdraw from the study, all your data will also be withdrawn. However, information collected from other participants will not be withdrawn. There are no known physical, psychological, economical, or social risks associated with this study.

What will happen to my responses?

We will keep your responses confidential. All the data will be de-identified and your name will be kept in a secure location, which will only be accessed by the primary researchers. Although the data may be published in professional journals or presented at scientific conferences, any such presentations will involve general findings that will be in aggregate form. The findings will never breach individual confidentiality. Should you be interested, you are entitled to a copy of

the findings, which could come in the form of the actual refereed publication or a general summary.

Will I be compensated for my participation?

There will be no compensation for participation in this study.

What if I have concerns?

Any questions about study participation may be directed to Jordan Lefebvre at the information listed below. Any ethical concerns about the study may be directed to the Associate Director of Research Ethics at Lynda.mcneil@mcgill.ca or 514-398-6831.

Again, thank you. Your interest in participating in this research study is greatly appreciated.

This study has been granted clearance according to the recommended principles of Canadian ethics guidelines, and Queen's policies.

Sincerely,

Jordan S. Lefebvre
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Appendix E

Athlete Consent Form

This study is in partial fulfillment of the requirements for the degree of Doctor of Philosophy for Jordan Lefebvre, a graduate student in sport psychology in the Department of Kinesiology and Physical Education at McGill University. We would like to invite you to participate in our study titled, "An examination of athletes' mentoring experiences in Wheelchair Rugby". If you choose to participate in this study, you agree to participate in one or more of the following:

1. To complete a questionnaire package, on three separate occasions, that takes approximately 30 minutes each.
2. To partake in a 90-minute audio-recorded interview discussing the key relationships that have impacted your sport experiences, personal development, and rehabilitation.
3. To partake in a 30-minute audio-recorded interview discussing your involvement and impact on the development of certain individuals in your environment.
4. You may be observed in your sport environment. This could also include brief audio-recorded conversations.

Any and all information you provide throughout the study will remain confidential. Only the principal investigator, Jordan Lefebvre, and the faculty supervisor, Professor Gordon A. Bloom, will have access to identifiable data. All questionnaires, observation notes, audio files, and the digital copies of interview transcripts will be securely stored in encrypted folders on a password-protected computer for a period of seven years. Any paper copies of notes will be converted to digital files. After ensuring they were converted accurately, the paper copies will be destroyed. Seven years after the study ends all the data will be destroyed. The information will be used for publication purposes and scholarly journals or for presentations at conferences. Your name and identity will not be revealed at any time. The McGill Research Ethics Board has reviewed this study for compliance with its ethical standards. Your participation in this study is voluntary and not mandatory. You are free to refuse to answer any questions or withdraw from participation at any time for any reason. If you choose to withdraw during or right after the study, all information obtained up until that point will be withdrawn unless you specify otherwise at the time of withdrawal. Once data has been de-identified or combined for publication, it may not be possible to withdraw your data in its entirety. We can only remove it from analysis and from use in future publications. Identifiable and de-identified data will be kept for 7 years. Importantly, information collected from other participants will not be withdrawn. For more information about the study, please contact Jordan Lefebvre (see contact details below).

Please sign below if you have read the above information and consent to participate in this study. Agreeing to participate in this study does not waive any of your rights or release the researchers from their responsibilities. To ensure the study is being conducted properly, authorized individuals, such as a member of the Research Ethics Board, may have access to your information. A copy of this consent form will be given to you and the researcher will keep a copy.

Please contact the Associate Director of Research Ethics at Lynda.mcneil@mcgill.ca or 514-398-6831, if you have any questions or concerns regarding your rights and welfare as a participant in this study. Please sign below if you agree to participate in this study.

I agree to the audio-recording of the interviews with the understanding that these recordings will be used solely for the purpose of transcribing these sessions. **Yes** □ **No** □

You are entitled to a summary of the findings at the conclusion of the study. Would you like to receive a summary of the findings? **Yes** □ **No** □

_____
Participant's Name (please print)

_____ _____
Participant's Signature Date

_____ _____
Researcher's Signature Date

Jordan S. Lefebvre
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Appendix F

Non-athlete Consent Form

This study is in partial fulfillment of the requirements for the degree of Doctor of Philosophy for Jordan Lefebvre, a graduate student in sport psychology in the Department of Kinesiology and Physical Education at McGill University. We would like to invite you to participate in our study titled, "An examination of athletes' mentoring experiences in Wheelchair Rugby". You are being asked to participate because you have been identified as one of the rugby wheelchair athletes as a developmental agent or mentor. Therefore, if you choose to participate in this study you agree to participate in a 30-minute audio-recorded interview discussing your involvement and impact on the development of certain individuals in your environment.

Any and all information you provide throughout the study will remain confidential. Only the principal investigator, Jordan Lefebvre, and the faculty supervisor, Professor Gordon A. Bloom, will have access to identifiable data. All questionnaires, observation notes, audio files, and the digital copies of interview transcripts will be securely stored in encrypted folders on a password-protected computer for a period of seven years. Any paper copies of notes will be converted to digital files. After ensuring they were converted accurately, the paper copies will be destroyed. Seven years after the study ends all the data will be destroyed. The information will be used for publication purposes and scholarly journals or for presentations at conferences. Your name and identity will not be revealed at any time. The McGill Research Ethics Board has reviewed this study for compliance with its ethical standards. Your participation in this study is voluntary and not mandatory. You are free to refuse to answer any questions or withdraw from participation at any time for any reason. If you choose to withdraw during or right after the study, all information obtained up until that point will be withdrawn unless you specify otherwise at the time of withdrawal. Once data has been de-identified or combined for publication, it may not be possible to withdraw your data in its entirety. We can only remove it from analysis and from use in future publications. Identifiable and de-identified data will be kept for 7 years. Importantly, information collected from other participants will not be withdrawn. For more information about the study, please contact Jordan Lefebvre (see contact details below).

Please sign below if you have read the above information and consent to participate in this study. Agreeing to participate in this study does not waive any of your rights or release the researchers from their responsibilities. To ensure the study is being conducted properly, authorized individuals, such as a member of the Research Ethics Board, may have access to your information. A copy of this consent form will be given to you and the researcher will keep a copy.

Please contact the Associate Director of Research Ethics at Lynda.mcneil@mcgill.ca or 514-398-6831, if you have any questions or concerns regarding your rights and welfare as a participant in this study. Please sign below if you agree to participate in this study.

I agree to the audio-recording of the interviews with the understanding that these recordings will be used solely for the purpose of transcribing these sessions. **Yes** □ **No** □

You are entitled to a summary of the findings at the conclusion of the study. Would you like to receive a summary of the findings? **Yes** □ **No** □

_____
Participant's Name (please print)

_____ _____
Participant's Signature Date

_____ _____
Researcher's Signature Date

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Appendix G

Athlete Questionnaire

Name? (Note that all responses will be kept confidential)
_____

How old are you?
_____

What is your Gender?

- ○ Male
- ○ Female
- ○ Non-binary (gender-fluid, transgender, etc)

Please list all types of sport and physical activity that you participate in:

Recreationally _____
Competitively _____

How many years have you been participating in Wheelchair Rugby?
_____

How many years have you been on this particular team?
_____

Date of SCI
____/__/__ (YYYY/MM/DD)

Level of SCI
_____

Cause of SCI
_____
_____
_____

Do you know your American Spinal Injury Association (ASIA) Impairment Scale (AIS) classification?

- ○ Yes
- ○ No

If yes, please specify your American Spinal Injury Association (ASIA) Impairment Scale (AIS) classification.

- ○ A
- ○ B
- ○ C
- ○ D
- ○ E

If no, which of the following best describes you?

- ○ No feeling or movement below the level of the injury.
- ○ Feeling all the way down to your rectum/bum but no use of muscles.
- ○ Limited movement or muscle contractions below level of the injury but these serve no useful function.
- ○ Functional, but not necessarily full use of at least half of the muscle groups below the level of the injury.
- ○ Feeling and movement is normal below level of injury.

What is your primary mode of mobility outside your home?

- ○ Manual Wheelchair
- ○ Power Wheelchair
- ○ Walker
- ○ 3 Wheel Mobility Scooter
- ○ Braces
- ○ Cane
- ○ Walk Independently
- ○ Other (please specify) _____

Assessment of Developmental Network

Think about the people (developmental agents) who have taken an active *interest* and *action* by assisting you in the following areas of development:

- Your development as a wheelchair rugby athlete
- You development as a person
- Your rehabilitation, social reintegration, and daily living experiences

Think broadly, these may be people from your sport environment, or outside of your sport environment (e.g., mentors, teammates, coaches, family members, friends, peers, etc)

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Please answer the series of questions below for each person identified above.
Name of person listed as 1: _____

Please indicate one of the following that best describes your relationship with each person

- ○ Teammate
- ○ Coach
- ○ Family member
- ○ Community member with a disability (outside of your sport environment)
- ○ Community member (outside of your sport environment)
- ○ Friend (outside of your sport environment)
- ○ Other _____

How often do you communicate with this person?

- ○ Less than once a month
- ○ Once or twice a month
- ○ Three to five times per month
- ○ A few times a week
- ○ Daily

How close do you feel is your relationship with this person?

- ○ Very close
- ○ Close
- ○ Less than close
- ○ Distant

Support in the sport environment
Please indicate the extent to which the person does the following (career support):

	Never/not at all						Maximum extent possible
○ Provides you with opportunities that pushes you as an athlete	1	2	3	4	5	6	7
○ Creates opportunities for visibility for you	1	2	3	4	5	6	7
○ Opens doors for you as an athlete	1	2	3	4	5	6	7

- Repeat for each developmental agent -

Appendix H

Athlete Interview Guide

Pre-Interview Routine

- Introduction of researcher.
- Overview of the study, including a definition of including a definition of a developmental agent and a developmental network.

Section A. Background Involvement

1. If comfortable, briefly tell me about your spinal cord injury.
    a. When/How?
    b. Tell us about your integration into wheelchair rugby.

2. Briefly tell me about your athletic career.

Section B. Developers' Influence

Now that we identified your developmental agents (see questionnaire), I want to ask you a series of questions to discuss how these individuals have influenced development. We will start with the most influential person, and work our way down.

3. Please describe your relationship with this person?
    a. Duration of relationship?
    b. What does this person mean to you? How close do you feel with this person?
    c. How often do you communicate with this person?

4. What aspects of your **development as an athlete** do you feel you can attribute to this person?
    a. Probe for specific examples.
    b. Overall experience, training, competition.
    c. Can you give me examples of what this person did for you and how they did it?

5. What aspects of your **personal development** do you feel you can attribute to this person?
    a. Probe for specific examples.
    b. Can you give me examples of what this person did for you and how they did it?

6. What aspects of your **rehabilitation** do you feel you can attribute to this person
    a. Probe for specific examples.
    b. Can you give me examples of what this person did for you and how they did it?

Section C. Summary and Concluding Questions

7. Is there something that we didn't cover in the interview that you would you like to add?

8. Do you have any final comments or questions?

Probes: Key phrases to stimulate reflection

- Can you expand on that?
- Can you clarify that?
- That's interesting, tell me more about that.
- Could you please tell me more about this?