

Pernille Sina Lund

Effect of Smartphone Usage on
Mental Health and Sport Performance
among Canadian Athletes:
A Multiple Case Study

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Forord

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Summary

The purpose of this multiple case study was to investigate smartphone usage in a sample of Canadian athletes. More precisely, the study had three objectives, namely to examine (a) experiences and features of smartphone usage, (b) the perceived impact of smartphone usage on mental health and performance in sport and (c) the relation between real-time and self-perceived smartphone usage estimates.

Data were collected over nine months via focus groups, in-depth interviews, surveys and objective tracking of smartphone usage through a novel mobile application. These data were then investigated through document and content analysis and mapped out as narratives to represent athletes' voices.

The main findings showed that athletes have multifaceted and nuanced experiences with their smartphones. Social media applications (e.g., Instagram, Snapchat, and Facebook) accounted for a staggering amount of the participants' total smartphone usage over the assessed nine-month period. Most athletes had two or more social media-related apps in their top three most frequently used apps. The findings revealed that the prevalence of overnight smartphone usage from 12 am to 6 am compromised up to twenty percent of total active screen time.

The results supported the hypothesis that smartphone usage in and around the sport context elicited both beneficial and detrimental consequences. Data analysis suggested that social media usage was associated with more harmful than helpful effects on mental health and performance than other smartphone features and applications that the athletes utilized. The findings allude to associated changes in self-regulation capacity. Finally, the findings revealed a gap between real-time and self-perceived smartphone usage,

The overall findings provide the fundamentals for the development of guiding principles for smartphone usage for athletes and sports programs, and suggest areas of future research. It is, however, premature to propose universal guidelines for the use of smartphone and social media within the athletic community. Continued research is required to facilitate optimal performance outcomes and overall mental health of athletes within our device-driven society.

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1. Introduction

It is February 14th 2020, during the Biathlon World Championships in Anterselva, Italy; the Norwegian biathletes Tiril Eckhoff and Ingrid Landmark Tandrevold are considered medal favorites for the sprint competition. Regrettably, however, both athletes miss several shots resulting in a disappointing 57th and 59th place. Together they acknowledge that nerves and pressure detrimentally impacted their focus and hence their performance. In response to their poor showings, the athletes receive several harassing messages from spectators through social media. Later, Eckhoff reveals, after reading the comments directed at her on Facebook, that she felt like her world was going under (Fladen, 2020). Tandrevold decides to share some of the harassing messages on her Instagram profile and describes the experience the following way to the press:

We hit the bottom today. When you get such messages you just want to ‘log out’ of the entire world. I have a voice, and at least I can express that these messages are painful. I thought we were done with this type of behavior in 2020. When you already lie down, it is not okay to be pushed even further down. I consider turning off social media during the World Cup. It can generate positive energy. It can also generate negative energy. (Mueller & Bentsen, 2020)

The biathlon skiers’ experiences provide a brief insight into the realities of navigating complex and unique demands while performing at a high level. Athletes, like the rest of society, face the difficult task of managing smartphone and social media on a daily basis. However, remarkably little is known about athletes’ use of smartphone devices and features. As a result, there is a lack of empirically driven guidelines to support the regulation of smartphone usage in sport (Durand-Bush & DesClouds, 2018). In this paper, the compelling stories of four Canadian athletes are shared. In particular, their interactions and experiences with smartphones and social media are examined, along with features and implications of smartphone usage on their mental health and sport performance.

2. Theory

This section of the paper will briefly describe the development of smartphone technology and provide a literature review of smartphone usage in Canada (where the study is set). In addition, the reported effects of smartphone usage in the general population will be presented as well as the current knowledge of smartphone usage in the athletic population. Finally, an introduction to the potential association between an athlete's mental health, performance and smartphone usage will be made.

2.1 Smartphone Usage

2.1.1 Introduction. As the antic philosopher Heraclitus taught us, the only constant in life is change (Laertius, 1925). Though change is constant, the rate of change today is faster than ever before. The proof is in our pockets. Smartphone technology has seen rapid changes and exponential growth in use globally. Comprised within today's sleek and swift smartphone design is computing power that outdoes what was available to NASA and Neil Armstrong when he stepped on the moon and made his giant leap for mankind (Kaku, 2011). The technology tool that now fits in the palm of our hand used to fill up an enormous room.

Mirroring the astonishing development of technology, new communication technologies and social network platforms have transformed nearly every aspect of our lives, including communication, entertainment, finance, travel, and education (Steinhubl, Muse, & Topol, 2015). The digital developments in recent years make the world accessible with just a keystroke (Hawk, Eijnden, Lissa, & Bogt, 2019). Accordingly, smartphones with finger-based interface capable of running downloaded applications are widely used in the world and have become an essential component of modern life (Vogel, 2016).

On average, three out of four people own a smartphone in the top ten developed countries in the world (Newzoo, 2020). While most other developed countries have seen smartphone acquisition plateau in previous years, Canada is a bit of a global outlier because the number of smartphone owners is still increasing (Deloitte, 2019). In 2019, 88% of all Canadians owned a smartphone (Statistics Canada, 2019). In the same year, as many as 98% of Canadians aged 15-24 years owned a smartphone, and 97 % of

Canadian aged 18-24 years of age used their smartphone to check social media (Statistics Canada, 2019; Deloitte, 2019).

Social media has become a predominant communication medium for younger people (Fortes et al., 2019). Three out of four Canadian 18-24-year-olds report that the smartphone is their preferred device to check social media and that they use their phones for social media purposes at least once a day (Deloitte, 2019).

2.1.2 Ramifications of Smartphone Usage. Smartphone technology and social media are far from static, which requires adaptability and elasticity in research (Sanderson, 2018). Some researchers argue that the changes and developments in smartphone technology are occurring so quickly that it is challenging to provide up-to-date overviews of its consequences for its users (Bauer, Glenn, & Geddes, 2020). However, ongoing effort has been made to understand the role smartphones play in the general population and examine the ramifications of smartphones, mobile applications, and social media in a breadth of disciplines. Investigations range from a variety of issues from problematic use (e.g., can smartphone usage interrupt sleep?), to positive effects (e.g., can monitoring physical activity through smartphone applications improve aspects of health?) of smartphone usage (Shaw, Ellis, & Ziegler, 2018).

Understanding how people use smartphone devices is important, particularly when measuring the impact this might have on individuals, societal systems, and overarching values and beliefs (Ellis, Davidson, & Geyer, 2019). However, despite the decades of advances, understanding the overall impact of technology on people and society remains ambiguous. Studies regarding the relationship between the frequency and duration of smartphone use and mental health remain inconclusive. For instance, some findings suggest that increased amounts of time spent on smartphone may lead to negative outcomes such as increased stress, depression and destructive emotions (Bartholomew, Schoppe-Sullivan, Glassman, & Kamp Dush, 2012; O'Sullivan, 2017); Other investigations show that there is no significant relationship between duration of smartphone usage and depressive symptoms (Jelenchick, Eickhoff, & Moreno, 2013).

The literature displays that smartphone usage can have both positive and negative implications. With the purpose of providing a structured and organized overview of main findings, DesClouds & Durand (2020) present a table of

contemporary literature on the positive and negative ramifications of smartphone usage in the general population:

Positive implications of usage

Variables enhanced by smartphone usage:

- Social connectedness (Ryan, Allen, Gray, & McInerney, 2017)
- Communication (Bentley, Chrurch, Harrison, Lyons, & Rafalow, 2015)
- Identity management (Chan, Walker, & Gleaves, 2015)
- Self-disclosure (Best, Manktelo, & Taylor, 2014)
- Social and emotional support (Frison & Eggermont, 2015)
- Well-being (Wright, 2012)
- Learning (George & DeCristofaro, 2016)
- Cognitive support (Barr, Pennycook, Stolz, & Fugelsang 2015)
- Self-regulatory behaviors (Quelly, Norris, & DiPietro, 2015)

Negative implications of usage

Variables increased by smartphone usage:

- Stress, anxiety (Vahedi & Saiphoo, 2017)
- Fear of missing out (Przybylski, Murayama, DeHaan, & Gladwell, 2013)
- Impulsivity (Abramson et al., 2009)
- Mental health concerns (Oberst et al., 2017)
- Cognitive load (Fortes et al., 2019)
- Isolation and loneliness (Ryan et al., 2017)

Variables hindered by smartphone usage:

- Cognitive capacity, attention, and working memory (Marty-Dugas et al., 2018)
- Sleep quality (Carter et al., 2016)
- Task performance and information processing (Fortes et al., 2019)
- Productivity and efficiency (Carrier, Rosen, & Rökkum, 2018)
- Social presence (Chotpitayasunondh & Douglas, 2016)
- Self-control (Carrier et al., 2018);
- Well-being (Best et al., 2014)

As the tables convey, there is a nuanced interplay of both negative and positive effects of smartphone use in the general population. Up to this point, however, few studies have considered whether positive and negative implications may occur along a continuum, rather than within separated categories (DesClouds & Durand-Bush, 2020).

2.1.3 Smartphone usage in Athletes. While it is well documented that young adults in Canada have access to smartphones and technologies for interpersonal communication like social media, anecdotal evidence suggests that young Canadian athletes are included in this demographic of significant smartphone and social media users (Durand-Bush & DesClouds, 2018; Gregory, 2019).

Only a few studies in which athletes' use of smartphones and associated features (e.g., video calling, texting, social media, training apps) have been reported (Gould, Nalepa, & Mignano, 2020). Even fewer researchers have attempted to address the potential implications of smartphone usage on athletes' performance outcomes. These few existing studies suggest that social media usage prior to sport events could disrupt or inhibit concentration (Encel, Mesango, & Brown, 2017), decision-making (Fortes et al., 2019) and sleep quality (Jones, Kirschen, Kancharla & Hale, 2019; Schaefer, 2018), leading to conditions where less than optimal performance is likely.

Other parts of the literature report research have focused on athletes' self-presentation and content sharing behaviors in the mass media and on social media (Shreffler, Hanock & Schmidt, 2016; Smith & Sanderson, 2015; Vergeer & Mulder, 2019) However, the technology devices used to access social media, and the experiences associated with using social media features on smartphones have yet to be explored. Thus, there are considerable knowledge gaps regarding athletes' smartphone usage and social media usage features and potential implications of athletes navigating the ever-changing smartphone terrain.

2.2 Mental Health in Athletes

Mental health is characterized by a state of psychological, social, and emotional well-being in which the individuals are capable of feeling, thinking, and acting in ways that permit them to enjoy life, self-realize, cope with normal stressors in life, work efficiently, and contribute to their community (World Health Organization, 2018).

Research has shown that further discussion and deeper knowledge about how to navigate the complex and unique demands in athletes' daily lives is indispensable (Schinke, Stambulova, Si, & Moore, 2018). A great divide has long existed between the public view that high-performance athletes are unaffected and exempt from mental health challenges and the now well-documented evidence that athletes are susceptible to mental health challenges and illnesses (Van Slingerland et al., 2019). Elite athletes are *as* likely, or even *more* likely to have compromised mental health compared to the general population (Moesch et al., 2018; Reardon et al., 2019).

Athlete mental health can be illustrated through Westerhof & Keyes' (2010) dual-continuum model in which mental health and mental illness are conceptualized on two distinct yet connected continuums. Thus, the model holds that mental is understood as a multidimensional concept; mental health is more than the absence of mental health on a single health continuum (Westerhof, Bohlmeijer & Webster, 2010).

Moreover, both mental health and mental illness must be considered separately and united to fully understand the athlete's mental functioning, as they both are dynamic, interconnected constructs. As such, the occurrence or absence of mental illness specifies one dimension, while the other dimension represents the occurrence or absence of mental health. The two-continuum model of mental health and illness implies athletes can have a mental illness and still have good flourishing mental health or poor, languishing mental health without mental illness (Mjøsund et al., 2015).

Evidence shows that individuals who have lower than complete mental health (i.e. flourishing without mental illness) are functioning worse in terms of physical disease, psychosocial functioning and general work productivity (Keyes et al., 2008). Furthermore, languishing individuals function as weakly on most outcomes as individuals with a mental illness. This conveys the importance of optimizing mental health in sport and support athletes, coaches, and staff to realize and maintain optimal mental health so they can flourish, thrive, and perform well regardless of absence or pretense of mental illness (Van Slingerland et al., 2019).

Athletes must respond and adapt to stressors in their environment on a regular basis, creating vulnerabilities to mental health that do not exist for the general population (Schinke et al., 2018). The incidence of mental illness can be high among young adults as this time of life can be full of developmental life changes and environmental influences outside of sport (Reardon and Factor, 2010). Little research is

available in the literature that investigates what effect the use of smartphones, a device almost universally used by athletes, has on their mental health both in sport and life in general. Accordingly, Durand-Bush and DesClouds (2018) encouraged more evidence-based investigations and interventions tailored to optimize smartphone usage to potentially promote athletes' mental health and wellbeing.

2.3 Premise for Study

The current study is part of a larger project on athletes' smartphone usage initiated by the SEWP (Self-Regulation for Well-Being and Performance) Laboratory in Faculty of Health Sciences at the University of Ottawa and Poppy DesClouds, Mental Performance Consultant and doctoral candidate in School of Human Kinetics at the University of Ottawa.

SEWP is linked to the Canadian Centre for Mental Health in Sport (CCMHS), a specialized mental health clinic for sport. CCMHS is the first in Canada to offer a sport-centered model of care to support mental health and treat mental illness in athletes and coaches. In essence, CCMHS and SEWP address and implement research on the unique needs of high-performance athletes struggling with mental health and mental illness and fill a gap in the present sport and mental health systems. The mental health clinic is interdisciplinary and brings together research and specialists from sports sciences, psychology, medicine, health, counseling and business.

This study was conducted based on qualitative and quantitative data collected within DesClouds' doctoral research project examining the impact of mobile communication technology on athletes' performance and mental health. Correspondingly, this paper will outline both DesClouds' and the author's contribution to the larger project.

2.3.1 Purpose of Study

This multiple case study presents an in-depth examination of four Canadian athletes' smartphone usage using narratives to display the athletes' reality and "as-lived" perspectives. The purpose of the study is to present characteristics of the athletes' smartphone usage and their experiences of helpful and detrimental smartphone usage for performance and mental health.

2.3.2 Research questions

- I What characterizes the four Canadian athletes' smartphone usage and what are common features of usage?
- II How are positive and negative experiences with smartphones and social media described and perceived by the athletes? Are there any implications of athletes' smartphone usage on mental health and performance in sport?
- III How corresponding are the four athletes' actual and self-perceived smartphone usage estimates?

2.3.3 Hypothesis

- I Similar to young adults in the general population, athletes will heavily use smartphones and will heavily use social media features on their smartphone.
- II There will be benefits and drawbacks of athletes' smartphone usage in different domains of their lives.
- III There will be a gap between athletes' actual and self-perceived smartphone usage.

3. Methods

3.1 Study Design

The present study was constructed as a multiple case study and made use of a narrative approach to present athletes' perceptions and experiences. Study designs stem from researchers' disciplinary background and worldview, and the research purpose and questions being addressed (Harrison, Birks, Franklin, & Mills, 2017; Vincent & O'Mahoney, 2018). The next paragraphs describe the present study's epistemological position from which its design stems. In turn, participant selection, data collection, data analysis and ethical considerations are reported.

3.1.1 Constructivism and critical realism. As DesClouds' research was guided by critical realism, a constructivist worldview is an inevitable component of the conceptual framework guiding the current study. In short, critical realism provided a solid foundation for DesClouds' project for two reasons in particular. First, critical realism encourages the usage of *a priori* theory and existing empirical data to guide the research process (Fletcher, 2016). Second, it favors the use of multiple sources of information to construct a fluid process of induction and deduction, referred to as *retroduction* (Vincent & Wapshott, 2013). DesClouds' research was conceptualized as three separate studies in which both qualitative (Study 1 and 3) and quantitative (Study 2) data were collected. DesClouds utilized *retroduction*, particularly in Study 3, to understand and explain athletes' smartphone usage and examine the application of existing self-regulation and self-control models to investigate this topic.

Although the current study and that of DesClouds share a common epistemological foundation, research purposes and designs across these studies differed. While DesClouds' mixed-methods study aimed for breadth, the current study's research questions were focused on eliciting in-depth knowledge. Accordingly, the present multiple case study research design was deemed the most suitable one to prioritize inductive reasoning and interpretation of athletes' perceptions and experiences, rather than a design testing existing theory.

3.1.2 Multiple case study. Multiple case study research can be described as an extensive examination of a few units of analysis and often relies on various sources of information (Thagaard, 2013). Stake (2006) acknowledges that a case study approach can involve the use of both quantitative and qualitative methods, and this methodological flexibility has been applied to the current study. Bringing together and analyzing multiple sources of evidence was particularly appealing as this strategy is found to be mutually informative where together the multifarious data offer a more synergistic and comprehensive view of the issue being studied (Merriam, 2009). While some may argue that mixing qualitative and quantitative methods could threaten the veracity and strength of the research (Boblin, Ireland, Kirkpatrick, & Robertson, 2013; Malina, Nørrekilt, & Selto, 2011), it has been demonstrated that when the integrity of

the design is robust with a common thread, methodological flexibility can be accommodated (Merriam, 2009; Stake 1995).

3.1.3 Narrative analysis. Narrative analysis was a natural fit to the study's multiple case study approach as the objective of the study was to bring attention to athletes' voices and promote reflection of their reality. The narrative approach is based on the belief that narratives play an essential role in displaying people's reality and "as-lived" perspectives and experiences (Jones, 2009). Stake (1995) recommends episodes of storytelling in case study research to help illustrate aspects of the case and to complement this with rich descriptions to convey findings. Accordingly, it is argued that narratives have the capability of illuminating inside-the-case by displaying in-depth representations of complex and diverse lived stories (Mills, Durepos, & Wiebe, 2010; Smith & Sparkes, 2009; Merriam, 2009; Jowett, 2008). The term narrative is primarily used in this study, but this method of inquiry is also referred to as *non-fiction story* or *vignette* in other parts of the literature.

A review of the literature demonstrated that narrative analysis is not commonly used in sport psychology, even though calls have been made to do so. Smith and Sparkes (2009) suggest that the domain of sport and exercise psychologists could benefit from increased use of narrative analysis to reveal and foster knowledge on the complexities of people's lives from novel viewpoints.

3.2. Selection of Participants

In line with the multiple case study approach (Merriam, 2009), the participants were purposively selected from DesClouds' three studies to gain a rich understanding of athletes' experiences with smartphones (Creswell, 2008). Embedded in a purposeful sample strategy is the ability to maximize efficiency while identifying both similarities and differences between the cases (Morse & Niehays, 2009). Participants in DesClouds' studies were recruited through informational emails distributed to sport service departments at universities, via social media and word-of-mouth. Participants needed to meet the following criteria;

- a) the athlete is enrolled as a full-time college or university student in Canada, and qualifies as varsity athlete representing his/her academic institution,
- b) owns a smartphone equipped with Google's Android mobile operating system,

c) speaks and reads in English.

Several athletes from various individual and team sports took part in the three studies (Study 1, n = 21; Study 2, n = 21; Study 3, n=24). A selected few participants were interviewed multiple times over the course of the three separate studies, as they volunteered to do so. The desire to learn more about some of the information-rich cases motivated the present follow-up study. Thus, participants who met the initial criteria (a), (b) and (c) as listed above were purposively sampled for the multiple case study if they met the additional criterion of having participated in two or all of the three studies in order to access both qualitative and quantitative data to carry out the in-depth narrative analysis. To this end, four Canadian athletes were chosen as the sample for this respective study; three female athletes competed in volleyball, swimming, and cross-country skiing and one male athlete competed in rowing. The participants ranged in age from 20 to 23 years.

3.3 Data collection and Procedures

Data were initially collected by DesClouds across her three studies using four unique methods of data collection: focus group interviews, smartphone usage tracking, smartphone-assisted surveys, and individual interviews. The succession of the three studies reflects a funnel approach (Spradley, 1979) as the first study started with a broader exploration of smartphone usage experiences and then DesClouds proceeded to narrow down the investigation to more specific components of the topic in the subsequent studies.

3.3.1. Procedure and Data Collection Tools of Study 1. Study 1 was a qualitative focus group study with an explorative approach (n=21). The purpose of the study was to set the stage for an investigation on how athletes are using their smartphones and if their usage impacts their experience of being a student-athlete in positive and/or negative ways. As focus groups are often used as footsteps into a novel area of study or unfamiliar topic (Wilkinson, 1998), this methodology was deemed to be the most adequate first step of the investigation of smartphones in the context of sport. Focus groups can be viewed as “structured overhearing” of group discussions and can allow for the identification of both individual and collective perspectives and experiences interactively and efficiently (Barbour, 2010).

A multi-section semi-structured interview guide (see Appendix A) was developed to interview athletes from nine different sports in several focus groups. The interview guide for Study 1 covered the following topic areas: life as an athlete, preferences and priorities related to smartphone acquisition, prevalence and context of smartphone usage, restrictions on usage, role and control of smartphones and positive and negative experiences with smartphones. Using the interview guide to maintain structure, the moderator actively encouraged discussion between respondents and asked follow-up questions in order to elicit greater detail and information. The five focus groups ranged in time from 60 to 110 minutes. Two of the four athletes from the present study, the rower and the cross-country skier, participated in Study 1.

3.3.2. Procedure and Data Collection Tools of Study 2. Study 2 was a quantitative longitudinal study (n=21). The purpose was to assess varsity athletes' smartphone usage patterns and examine potential associations between usage and performance (i.g., perceived level of sport development, success and satisfaction), and psychosocial-behavioral variables summarized into profiles. These objectives were facilitated through a mobile application developed specifically for this project (DesClouds, Lamaarti, Durand-Bush, & El Saddil, 2018). All four athletes in the present study participated in Study 2.

A user-friendly mobile application was downloaded on every athlete's smartphone to automatically and remotely track the athletes' smartphone usage for up to nine months; assistance was provided if necessary. Tracking began after the completion of a demographic questionnaire via the application (See Appendix B). Besides collecting demographic information, the questionnaire incorporated self-reported measurements of how many hours a week the athlete typically study, train, work and use their smartphones.

The mobile application covertly and objectively collected usage data in the 'background' of regular smartphone activity. After the smartphone usage data was uploaded to a protected web server, it was subjected to algorithms with the purpose of extracting statistical details regarding the usage features. The researcher had a special

interest in collecting athletes' duration of usage, prevalent time-of-day-usage, and the most commonly used apps.

Additionally, the mobile application contained self-report surveys assessing psychosocial-behavioral variables (see Appendix C and D). The participants were prompted to answer a monthly survey in the mobile app, which took 15-20 minutes to complete each time. The answers were automatically uploaded to the research database. To assess mental health and psychosocial-behavioral profiles of the athletes, the following scales were incorporated into the mobile survey:

1. Self-regulation capacity (16 items) - Self-Regulation for the Enhancement of Performance and Well-Being (SEWP) Scale (Durand-Bush & DesClouds, 2016);
2. Attention (13 items, modified) - Cognitive Affective Mindfulness Scale Revised (Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007);
3. Self-presentation behaviors - general (11 items, modified) - Perfectionistic Self-Presentation Scale (PSPS) (Hewitt et al., 2003);
4. Self-presentation behaviors - social media-specific (14 items, modified) - The Modified Self-Presentation Tactics Scale (Lee, Quigley, Nesler, Corbett, & Tedeschi, 1999; Rosenberg, 2011);
5. Stress (10 items, modified) - Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983);
6. Self-efficacy (6 items, modified) - New General Self-Efficacy Scale (Chen, Gully, & Eden, 2001);
7. Mental health (14 items) - The Mental Health Continuum (MHC-SF) (Keyes, Wissing, Potgieter, Temane, Kruger, & van Rooy, 2008);
8. Loneliness (6 items) - The 6-Item De Jong Gierveld Loneliness Scale (Gierveld, 2006);
9. Communication (9 items, modified) - Interpersonal Communication Skills Test (COMSA-R2) (COMSA-R2, 2014);
10. Perceived Success, Satisfaction and Development in Sport;
11. Perceived Helpfulness of Smartphone.

The listed variables have been found to be important for sport performance and development (DesClouds et al., 2018), and were hypothesized to be impacted by smartphone usage (see Figure 1). It is acknowledged that variables, beyond those listed in Figure 1, may also impact performance and smartphone usage.

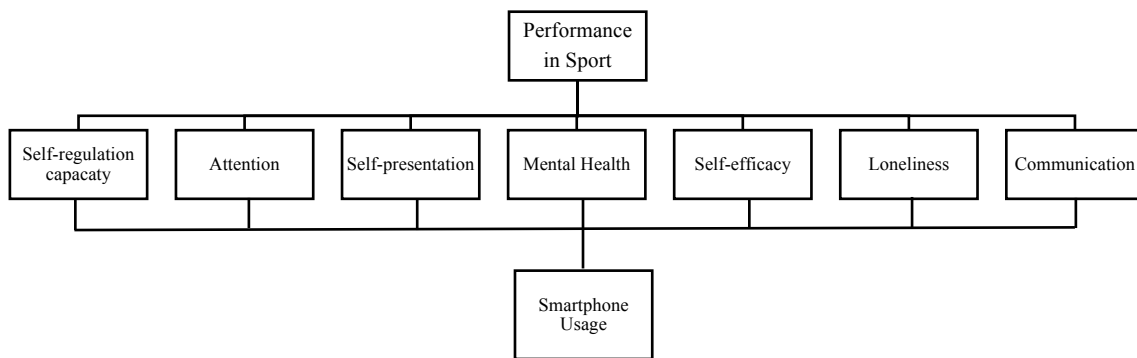


Figure 1. Self-regulation, attention, self-presentation, mental health, self-efficacy, loneliness and communication are important variables for sports performance and hypothesized to be impacted by smartphone usage (DesClouds, Lamaarti, Durand-Bush & El Saddil, 2018).

The monthly survey in the mobile app comprised both pre-existing and two novel scales to access the psychosocial-behavioral variables. Mental health was assessed using the pre-existing and psychometrically sound measure MHC-SF (Lamers, Westerhof, Bohlmeijer, ten Klooster & Keyes, 2011). The scale measures three subscales of mental health; emotional, psychological, and social well-being (Keyes et al, 2008). The form was used in its original form in the study to categorize the athlete’s mental health as either flourishing (high), languishing (low) or moderate. A comprehensive breakdown of the rest of the scales is provided to describe psychometric properties and modifications of each scale in Appendix C.

Some of the pre-existing scales were modified to condense the number of total items and reduce participant burden, while three questionnaires were developed specifically for the study. One of the questionnaires developed specifically for the study assessed perceived success, development and satisfaction with physical / technical / tactical / mental training sessions, team meetings, and competitions during the past

week. More specifically, the athletes were asked (a) to what extent they had developed (e.g., learned, stretched their limits) as an athlete as a result of performing the given activity; (b) how successful they were in performing the activity; (c) how satisfied they were with their performance in this activity. Thus, athlete performance was defined based on the athlete's weekly ratings of perceived development, success and development.

The same survey also assessed at what frequency, duration and level of intensity the athlete performed physical / technical / tactical / mental training sessions, team meetings, and competitions during the past week (see of Appendix D).

The second questionnaire developed for the study was a brief measure of self-regulation capacity through the SEWP-S 16-item measure scale informed by Zimmerman's model of self-regulated learning (Durand-Bush & DesClouds, 2016). The questionnaire aims to assess three-sub skills of self-regulation: execution of preparation, performance, and evaluation (Weinberg & Williams, 2010) Self-regulation is the capacity to "initiate, adjust, interrupt, terminate, or otherwise alter actions to promote attainment of personal goals, plans, or standards" (Heatherton & Baumeister, 1996, p. 91) and is, notably, found to facilitate athletic performance and psychosocial outcomes (Collins & Durand-Bush, 2014). In sport, lack of self-regulation may be reflected in errors in skill execution and poor tactical decision-making resulting in setbacks and underperformance (Weinberg & Williams, 2010).

Finally, an open-ended question was included to the survey to determine if and how athletes perceived their smartphone usage as being generally helpful or detrimental during the past month. The athlete also ranked to what extent their smartphone usage had been helpful or detrimental to them on an 8-point scale ranging from *not at all* helpful / detrimental to *extremely* helpful / detrimental.

The order of the scales presented in the application was randomly changed each month (e.g., the items of the mental Health Scale were always administered in the same order, but the scale itself might have been the first one that appeared in the survey the first month, but the ninth one that appeared the second month) to minimize learning effects.

The athletes received 'push-notifications' to complete the survey each month. A vast amount of psychosocial-behavioral data were collected as each scale in the survey

was answered by each participant via the mobile application as a single, contained unit every month. Thus, each variable was measured up to nine times for each participant.

3.3.3. Procedure and Data Collection Tools of Study 3. Study 3 was a qualitative multiple case study consisting of individual in-depth interviews (n=24). The purposes of the study were to examine characteristics of high and low smartphone users, explore how smartphone usage relates to self-control and self-presentation, and how athletes use social media to self-manage and self-present. Following the dialogic critical realism approach (Connelly, 2001), DesClouds designed a semi-structured interview guide that encouraged descriptions and re-descriptions of knowledge to emerge (See Appendix E). The interview guide for Study 3 consisted of the following topic areas: self-regulation and self-control, social media, use of smartphone to optimize self-regulation, learning, performance and well-being. Just like Study 1, Study 2 was conducted and audio recorded by Poppy DesClouds. Verbatim transcriptions of the audio recordings were completed by a facilitator and re-checked by DesCloud for accuracy (Patton, 2015). Only one of the athletes in the current study, the volleyball player, participated in Study 3.

3.4 Data Analysis

Narrative analytic procedures described by McNeill, Durand-Bush and Lemyre (2016) inspired the analysis of the qualitative data included in the present study. In the early stages of exploration, comprehensive reading of the transcribed data was the first analytic technique utilized to identify themes that stood out. The interview transcripts and surveys from the mobile application were systematically coded and analyzed; this provided an overview of shared and unique experiences with smartphones (Lune & Berg, 2016). Next, the researcher examined descriptions of types of smartphone usage collected from interviews and/or surveys. This examination revealed four main types of smartphone use: general smartphone usage, sport-specific smartphone usage, general social media usage and sport-specific social media usage. As a further method of classification, the data were categorized into 'detrimental usage' and 'helpful usage' sub-codes; supplemental themes/categories were then developed, namely 'facilitators to performance and mental health' and 'barriers to performance and mental health'.

Next, the quantitative data and statistical information extracted from the mobile tracking application were scrutinized with a focus on three trends: (1) each participant's monthly average usage, (2) the most popular apps used each month, and (3) prevalent usage time during the day. Stability over time and outstanding smartphone usage scores were compared and contrasted with the athlete's mental health scores, sport performance scores, and other psychosocial-behavioral variable scores depicted in their profile at the corresponding time. For example, the researcher explored questions like "What stands out in the different qualitative and quantitative data sets of each athlete? What are the noteworthy patterns? Do the patterns and any perceived extreme scores correspond with a specific time of year? Can the patterns resemble specific characteristics of the athlete's smartphone usage or mental health scores at a given time? Do the patterns correspond with the athlete's reported success, development, and/or satisfaction with training and competition scores? Do the self-report measurements of smartphone usage align with the objective measures derived from the tracking app?".

After several rounds of categorizing, matching, comparing, contrasting and combining information from the qualitative and quantitative data, the findings were merged to delineate a comprehensive storyline (Rubin & Rubin, 2005). The complex maps of smartphone usage data, demographic information, psychosocial-behavioral scale data and interview data were transformed into narratives consisting of 90-95% of the athlete's own words to mirror the voice of each respective athlete. The author adopted the viewpoint of a storyteller (Smith & Sparks, 2009) to enhance the natural flow and context of the first-person narrative (McNeill et al., 2016). While the coded themes from the first stages of the analysis were helpful to give an initial outline of the athletes' experiences, the author did make minor changes to the athletes' own words and stories to best represent their subjective experiences.

After discussing the content of the narratives with DesClouds, minor revisions were made to ensure coherence, authenticity, and comprehensiveness within the final composition. As such, authorial presence was provided to the narratives (Carless & Sparkes, 2008). It is important to recognize that the stories are representations of first-person narratives. While the stories belong to the participants, the selection of elements within the stories that are considered critical and interpretive responses to these stories belong to the researcher (Creswell, 2008).

3.5 Methodological Considerations and Data Limitations

There are constraints and opportunities with self-reports and interviews. While the author applauds participants' willingness to participate and share their highly valuable experiences, the researcher acknowledges the possibility that participants' answers in the interviews and self-report surveys may not be absolutely representative of their true reality as it requires great honesty and self-awareness on the part of the participant (Vincent & O'Mayhoney, 2018). There were indicators of embarrassment and feelings of guilt in questions about smartphone usage that might have impeded full transparency (e.g., one athlete described himself as a high smartphone user, and asked if that is a bad thing to be). The athletes were often trying to make excuses for social media usage and were reluctant to "admit" reliance on social media usage. It is important to recognize that a desire to act in line with perceived norms might have influenced answers and hence conclusions.

In line with a critical realist approach, the narratives developed from the data analysis were based on the language of the participants. One might question how the constructed narratives can be reflective of up to 90% of the participants' own words, when the narratives are based on both qualitative and quantitative results. Critchfield and Reed (2009) point out that, although translational efforts to assess everyday events through the lens of narrative qualitative principles is valuable in research, it can be incomplete as complementing quantitative data may convey concepts that are best captured in the "same language". To act on this point and verify the accuracy of athletes' wording, quantitative data from surveys were transformed into text based on the wording in the questionnaires. For example, a statement like "I was most satisfied with my mental training during January" was translated into text following an evaluation and comparison of the monthly scores on the sport participation questionnaire (see Appendix D). It is important to recognize that some of the actual wording belongs to the researcher.

Notably, there have been benefits and drawbacks of adopting data sets from another researcher in this research process. The collaboration has provided new ideas and detection of some errors in the original statistics. A potential unwanted consequence, however, of adopting data collected by another researcher is the

possibility of overlooking important information, for example, the context and non-verbal communication during the interviews (Oliver, Serovich, & Mason, 2005).

Of note also is that, in order to design and conduct a successful collaborative study, extensive initial preparatory time was invested into getting fully acquainted with the entire research project (including all three studies) and its expansive data set. Analysis of data from multiple study tools is complex (Creswell, Klassen, Plano Clark, & Smith, 2011). The remarkable amount of data can itself be a functional limitation, because it can cause researchers to lose track when trying to accomplish too much in one study, thus impeding the coherency of their research (Bryman, 2006).

Furthermore, sharing data sets with additional researchers and 'new blood' can compromise the privacy and confidentiality of the participants (Creswell, 2008). While the author had exclusive access to the data in this study, an updated confidentiality agreement was signed between the researchers to avoid violations of ethical limits, conditions, and principles.

3.6 Ethical considerations

Prior to the data collection, DesClouds contacted sport service directors from the institutions via email and telephone to explain the project objectives, potential benefits and risks, and nature of the study. With the support of sports services, invitations to interested athletes were forwarded on the researcher's behalf. The e-mail to the athletes outlined the nature of the study and asked interested athletes to contact the researcher. Ethical approval from the Research Ethics Board of all institutions was granted before the recruitment of athletes. Informed consent was signed by researchers, athletic directors, and study participants before beginning data collection.

The participants provided consent to participate in potential follow-up studies should they meet the selected criteria. Participants always have a right to expect that their personal information will not be disclosed, even in follow-up studies and when data sets from a research project are shared with other investigators (Saunders, Lewis, & Thornhill, 2012). The identification of participants was based on a participant ID number only; this ID number was linked to a password-protected participant key with *no* personal identifiers. Precautions to protect the confidentiality, privacy, and welfare

of the research participants were made and an updated confidentiality agreement between principle-investigator and co-investigators DesClouds, Durand-Bush, and Lund was contracted. Information about the participants and other research data were treated as highly confidential to fully protect from any unwanted disclosure and pseudonyms were made to protect anonymity.

Ethical considerations were also aimed at reduction of participant burden; in addition, the athletes were always given the option to withdraw from the study at any time and/or to disable the smartphone tracking software. The participants were also welcome to disable the app for a period of time or turn off notifications when an incomplete survey was pending.

An inevitable challenge of this approach was the possibility of missing values in the data collection, which may weaken the accuracy of tracked smartphone usage and comparison between actual and self-perceived usage. However, participants did not report significant usability or time concerns with the mobile survey and application. This might be due to: informing the participants about the non-intrusive nature of the application, the policy of de-identification, and the knowledge that the content within the applications would never be tracked (e.g., the actual content of text messages, etc.).

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Article

Effect of Smartphone Usage on Mental Health and Sport Performance among Canadian Athletes: A Multiple Case Study

Abstract

Objectives: The purpose of this multiple case study was to examine the impact of smartphone usage on athletes' performance and mental health by focusing attention on athletes' voices.

The current study was undertaken to investigate and acquire further insight into a theme that has been under-reported in the literature, namely the frequency and effects of athletes' of smartphone usage, and to identify what characterizes helpful and detrimental smartphone experiences in athletes.

Methodology: Data were collected through real-time tracking of smartphones, semi-structured interviews, focus groups and surveys over an academic year. In-device measurements of smartphone usage enabled, for the first time, objective measures and real-time tracking of the athletes' smartphone usage. Four non-fictional narratives were created through content and document analysis of the data in an effort to represent four Canadian athletes' experiences with smartphone usage. A female volleyball player, a male rower, a female swimmer and a female cross-country skier participated in the study (age 20–23 years).

Results: The narratives provide participants' first-hand experiences of smartphone usage; this personal accounting assists our understanding of the benefits and difficulties associated with smartphone usage for athletes' sport performance and mental health.

Conclusions: The storylines detailed how the athletes typically used their smartphones over the assessed nine-month period. The findings revealed that the athletes' most frequent used applications pertained to social media and a notable amount of usage hours took place overnight from 12 am to 6 am. Results suggest both benefits and drawbacks of smartphone usage among athletes. Social media usage, in particular, appeared to detrimentally distract athletes from crucial daily tasks and sleep, and compromise self-regulation. A gap between real-time and self-perceived smartphone usage was detected. The research results support the need for empirical guidelines to optimize athletes' experiences with mobile devices.

Keywords: mental health, athletes, smartphones, sport psychology, qualitative research

Introduction

Smartphone technology has seen rapid changes and exponential growth in utility globally in the present time and has become an indispensable component of modern life (Vogel, 2016). Mirroring the astonishing development of technology, new smartphone technologies and social network platforms have transformed nearly every aspect of our lives and societies, like communication, entertainment, finance, travel and education (Steinhubl, Muse, & Topol, 2015). This effect can also be observed in the sport industry where mass media, social media, and smartphone technologies have become dominant forces for the industry's growth and significance of over the past years (Kristiansen, Abrahamsen, & Pedersen, 2017; Sanderson, Snyder, Hull, & Gramlich, 2015).

Up to this point, the literature has focused on investigations of the impact of smartphone usage within the general population; little research, however, has been directed to the effects of the use of smartphone devices and features within the athletic population. As a result, there is an associated lack of empirically driven guidelines to support the regulation of smartphone usage in sport (Durand-Bush & DesClouds, 2018). Drawing on the literature that is available for the general population, it is evident that there are both benefits and drawbacks of smartphone usage (Ellis, Davidson, Shaw, & Geyer, 2019) which might prove valuable when exploring the athlete's perspective.

Motivated by the need for a thorough investigation on smartphone usage in athletes, and in the light of recent contributions to the literature regarding athletes' mental health and performance (Van Slingerland, 2019), four Canadian athletes' experiences with smartphone usage were investigated. This paper presents an examination and discussion of (a) trending features of smartphone usage and athletes' use of smartphone applications (b) detrimental and helpful usage experiences for athlete mental health and performance (c) athletes' actual and self-perceived smartphone usage.

Method

Sample and selection

The current study was part of a larger longitudinal project carried out by DesClouds and Durand-Bush on mobile technology communication in athletes (Durand-Bush & DesClouds, 2018). Canadian athletes were strategically and

purposefully sampled from DesClouds' three studies (Creswell, 2008). To fit the inclusion criteria for the current multiple case study, participants had to (a) be enrolled as full-time college or university students and qualify as varsity athletes at their academic institution, (b) own a smartphone equipped with Google's Android mobile operating system, (c) speak and read in English, and (d) participate in all or two of the three studies conducted by DesClouds. Age, gender, sport, academic year and program of study were not limiting factors for participant selection. Four Canadian athletes qualified for this study based on the above sampling criteria. The participants, three women and one man, represented four different sports and their ages ranged from 20 to 23 years. Ethical approval from all institutions was collected and informed consent was obtained from institutions and participants.

Data collection

Qualitative and quantitative data were collected from the following multiple sources by DesClouds and subjected to in-depth analysis and integration in the current study to provide a comprehensive account of athletes' smartphone usage experiences: focus group interviews (Study 1), remote smartphone usage tracking and psychosocial-behavioral assessments (Study 2), and individual interviews (Study 3).

Quantitative data. In Study 2, measures of smartphone usage were collected via a sport psychology mobile application (app) to assess, for the very first time, the prevalence of athletes' smartphone usage in a real-time objective manner (DesClouds, Lamaarti, Durand-Bush, & El Saddil, 2018). Research within psychology and social sciences on smartphone usage in the general population has, to this point, relied on self-reported assessments to quantify smartphone use. The current study assessed and compared objective and self-reported usage. In DesClouds' study, the research tool for objective usage was a study-specific sport psychology mobile application that automatically collected usage data over the course of a 9-month academic year. The tracking began after the participants submitted their consent and responded to a demographic questionnaire and self-reported assessments of weekly smartphone usage. The app was designed to remotely track participants' smartphone usage patterns without violating athlete's privacy; the app documented frequency and duration of usage related to text messages, emails, phone calls, video games, social media, photos, videos, music, etc.

In addition to the above tracking feature, the sport psychology mobile app included a self-report survey completed once per month throughout the academic year to assess a set of psychosocial variables found to be essential for sport performance; attention and mindfulness, loneliness, self-efficacy, stress, general self-presentation, social media self-presentation, communication, mental health, self-regulation, perception of helpfulness of phone usage, perceived success, development, and satisfaction regarding sporting activities (DesClouds et al., 2018).

The sport psychology mobile app utilized in Study 2 has been shown to be an appropriate and reliable instrument for the tracking of both real-time and self-report data of smartphone usage (DesClouds et al., 2018). The app allows for an efficient administration of demographic and self-report surveys on psychosocial variables related to both sport performance and smartphone usage. The app is also key for tracking changes in athletes' capacity, perceptions, and experiences over time (Desclouds et al, 2018).

Qualitative data. The focus group interviews in Study 1 were based on a semi-structured interview guide comprised of general and probing questions to explore breadth and depth of athletes' perceptions and experiences of smartphone and social media usage (Barbour, 2010). The semi-structured individual interviews (Rubin & Rubin, 2005; Castillo-Montoya, 2016) in Study 3 were carried out in an effort to understand how athletes employ their smartphone, particularly social media, to self-manage and self-present in their sport. Both interview guides were written to maintain direction without overbearing structure. All interviews were transcribed verbatim.

In sum, the quantitative and qualitative data spanned several topical areas, including the participants' (a) demographic profile, which included personal information related to sport, work, school, mental illness, and injuries, (b) smartphone usage in sport, school, work, and home contexts, (c) sport performance captured through perceptions of success, development, satisfaction regarding several sport-related activities, and (d) psychosocial profile integrating a range of variables from mental health, communication, to self-regulation.

Analysis

The first author did initial readings of all the interview transcripts, smartphone usage data, demographic information and psychosocial scale data to get familiarized with the data sets provided by DesClouds. The multiple data sources of evidence were merged and analyzed through document analysis (Bowen, 2009) and conventional content analysis (Hsieh & Shannin, 2005) to explore the great amount of information. Content analysis served to ascertain trends in the data emerging from different methods (Grbich, 2007) and document analysis enabled the identification of themes connected to the central questions of the research (Goldstein & Reibold, 2004).

Data on each athlete were summarized to best represent their unique perceptions and experiences and hence provide the reader with an intimate understanding of and subsequent interest in each case and how the storylines are interrelated (Smith & Sparkes, 2009). Any data that could potentially violate the athletes' confidentiality and anonymity were excluded from the study.

Next, the first author constructed four narrative stories (Smith & Sparks, 2009). Special emphasis was placed on trending features in the athletes' smartphone usage and the potential impact of smartphone usage on their mental health and performance in sport. Narrative analysis focuses on presenting participants' actual words and life experiences (Jowett & Frost, 2007). While it is acknowledged that the non-fictional narratives represent about 90% of the participants' own words, they also include the first author's words, serving to interpret the data and clarify athletes' original descriptions (Denzel, 2005). With this being said, readers are also encouraged to construct their own understanding while reading the four narratives that are presented below.

Results

Caroline, a volleyball player with two Instagram accounts

I play volleyball in a Premier League club and recently signed with a new European volleyball team. I am in the fifth year of my program of study and final year of eligibility for university sports. I think of myself as being somewhere between a high and moderate smartphone user because I definitely do not feel the pressure to have my phone on me all of the time. My estimate is that I use my phone for approximately 20

hours a week, and the tracking app shows that I use my phone less than I thought, approximately 15 hours a week.

The biggest stressors I face as an athlete are making sure I get quality school work done and deliver high athletic performances all while maintaining good mental and physical wellbeing. Mental health is important to me as I have been diagnosed with both depression and anxiety in the past. Over the past nine months, my mental health has predominantly been flourishing and I have experienced positive well-being. Most weeks, I engage in mental training such as goal setting, relaxation, and journaling. I am usually satisfied with the development and success of my mental training activities.

I take part in sports training all year long, typically with higher intensity during competition season from September to May. Most of the year, I have been satisfied with my sport and have experienced a high degree of success and development in competition settings, physical and mental training, as well as meetings in my sport environment.

Notably, back in September when I had just started playing with a new team, I felt like I had a drop in my development and success in my sport. I used my phone the most in September, twenty hours more than in an average month. This marks the start of spending more hours instant messaging my friends and family through WhatsApp and Facebook. I felt jealous of what friends were doing back at home and I was lonelier and more stressed in September compared to August. I also experienced a drop in my self-regulation capacity. In September, I felt like my smartphone usage was less helpful to me compared to the previous month.

However, I felt my absolute best in my sport in January, that is, in January I felt satisfied and successful with my mental training more than ever and felt less lonely and more mindful, in general. Also, my phone usage went down ten hours per week from December to January, and I started to feel like my smartphone was less detrimental compared to previous months.

Overall, I would say that my phone improves interactions with my friends and teammates, particularly through Facebook Messenger and Snapchat. Built-in applications like the calendar, reminders, prompts, to-do-lists, and alarms help me exert more control over my day-to-day life. I also really value sleep tracking tools. While there are a lot of tools available to keep track of performance-related information, I continue to use paper-based methods to track this rather than my phone.

The phone has its positive uses, but it can also be a distraction, especially when doing work at school or training. While my smartphone does not impede my day-to-day functioning, I do get distracted by it. For me, personally, it can be difficult to resist the temptation to check notifications, especially at night. For example, 15 percent of my total smartphone usage is overnight from midnight to six o'clock in the morning. I find focusing on studying is more challenging when my phone is nearby because what is happening on Instagram is way more interesting than what is happening in my anatomy notes. I also check my phone when I am bored and not interested in what is going on around me. For example, my team has used the app 'Team Builder' to upload workouts and watch videos and stuff. For those purposes, the app was super helpful. But, because the phones were out in the weight room, girls were getting distracted by them. We had to put a 'selfie punishment' in place as repercussion if you got caught on Snapchat. My younger teammates and rookies at school are constantly on their phones, trying to maintain their 'Snap Streaks' by sending pictures of their shoes to everyone. I coach a youth volleyball team, and it is like their phones have grown into an extra limb.

Personally, I find that I can cut myself off the phone when I get 'sucked into it'. I try really hard to abide by my personal standards for when it is appropriate and not appropriate to use my smartphone. Sometimes, I physically separate myself from my phone, particularly during family events. I would like to be better at keeping my phone across the room on do-not-disturb-mode to maintain a strict regimen for sleep. When I keep the phone across the room, the physical distance often keeps me from reaching for my phone when I am in bed. I use wireless headphones at training, so that I can use my phone to support my warm-ups and training, while keeping a physical distance from it, leaving it on the bench. I don't use my smartphone at practice, except during warmup to get motivated with music and videos of myself playing. The night before my volleyball games, and even during pre-game preparation, I play specific music playlists and videos on my phone to motivate myself and to remind myself what I can do to be successful. I watch international volleyball players who play my position and I follow a bunch of athletes I look up to on Instagram.

On the other hand, after my volleyball games, I don't feel like being a part of a group, especially after a loss when I am disappointed. To take myself away from everyone else, I do find myself on my phone a lot, mindlessly scrolling through

Instagram or texting my mom. It is hard to resist my phone when it allows me to be introverted when in a large group of people.

Instagram is by far my most used smartphone application. Some months, I spend two-thirds of my total usage time on Instagram. I have two Instagram accounts, one personal account and one account exclusive for volleyball and related sport consulting. My personal account is only for the people I want following me, while the volleyball account is public. Instagram is the only platform I use for my volleyball content. On my volleyball account, I try to portray an honest picture of my matches, my training and the perseverance needed to succeed. I do this mostly because I am aware of the kids who follow me and I aspire to be a genuine role model for them to show that hard work pays off.

Using my volleyball-focused Instagram account, I try to market myself as an athlete who has just finished university and is now embarking on her first professional contract overseas. I do this purposefully with the hopes of drawing sponsorships. While I am not extremely active on this account, I do try to post once a day to maintain and grow my followers, as I know that is what sponsors look for. I try to take care of self-promotion during down-time when I am not doing anything related to sport. I hate thinking about what I should be posting from day-to-day to gain more followers. The other day I even Googled 'How to gain more followers on Instagram' so that I do not have to be on my phone as often.

My personal Instagram account is quite artsy. I post pictures of concerts, travels and landscapes. I get more concerned about others' perceptions on my personal account, as compared to my volleyball account, particularly whether people will perceive me differently than I intended. I am worried that people will think that I'm trying to show off. I spend more time on my personal account deciding which picture to post than on my volleyball account. While some of the comments I receive on my volleyball account on Instagram are awesome to read, some are really not. Using social media influences me to compare myself to other athletes in both helpful and unhelpful ways for my performance and well-being. On my volleyball account, I compare the 'likes' and the content of the comments I get to what other accounts have gotten, and that type of comparison has been more on the negative side. I find that I compare my own 'likes' and comments more on my volleyball account than on my personal account. I have been questioning why I am not like the people I see on social media. I get disappointed when

I do not get as many likes as I wanted, and I see that my teammate posts pretty much the same as me and gets more likes. However, after working with some psychological practitioners on reframing my thoughts, I am in a different place now compared to three years ago, Still, my mental health sways from moderate to flourishing from time to time.

Lina, a swimmer with good self-regulation

I've been swimming pretty much year-round since I was 9 years old, and now I am 21. I am in the third year of my program of study and sports eligibility. I feel like I lean towards being a heavy smartphone user because my phone is usually with me. While I estimated that I spend about 10 hours per week on my smartphone, the tracking application shows that I use my smartphone for approximately 14 hours a week on average. However, my monthly usage does fluctuate and on average I only spent 7 hours per week in July, while I spent 24 hours per week the next month. My usage is spread throughout the day and I spend 15 percent of my total screen time overnight. Snapchat, Instagram, and text messaging app are the apps I use most frequently. In general, I do not see my smartphone as detrimental to my athletic career and I would actually say my smartphone can be helpful to me.

Throughout the academic year, I consistently participate in training with moderate to high-intensity levels, and increase my training volume during the winter. When I competed in February, my perceptions of my success, development, and satisfaction regarding my race performance were extremely high. I felt that I had made progress in my performances, but I also felt more stressed and lonelier than in previous months. I used my phone six hours more than my monthly average during this time, and spent most of my active hours on Snapchat and Instagram where I present my training and daily life. I perceived my smartphone usage to be very helpful in January, but only somewhat helpful in February. My mental health has predominantly been flourishing but it dropped to a moderate level in February following more screen time than my average usage in January. My ability to self-regulate was also lower in February compared to January.

I am satisfied with my performance in training most months, but this dropped during the last months of the summer. In July and August, I felt disappointed and dissatisfied with my training. I spent 66 extra hours on my phone in August compared

to July, and I felt like my smartphone was only somewhat helpful to me during this time. My self-regulation capacity and self-efficacy went down a touch from July to August.

One of the benefits of being a varsity athlete is that training forces me to be productive. With less time to manage after training and competitions, I must have a detailed schedule of what I am doing. This applies pressure to start schoolwork; I love that. Even though I do not see my smartphone as a detriment, I try to reduce my usage to not interrupt my tight schedule. I use a paper agenda instead of an electronic calendar to keep track of my tasks, because I like to have schemes and plans laid out on paper instead of scrolling through plans on my phone. Occasionally, I use my phone when I am in class, even though I try to follow the 'no phone' policy imposed by teachers at school. I definitely enjoy scrolling through my phone when I am bored. Sometimes I get frustrated when I feel the *need* to look at my phone. I hate it when that happens. I will tell myself, '*OK - get out of the house*'. Then I will leave the phone and go outside for a few hours, because I hate it when I am looking at it all the time. So, if I am on vacation or doing some activity, I leave it behind. I just do not take the phone and sometimes I need that. Sometimes, I just forget about my phone. When I went to work the other day, I left it at home and did not go back to pick it up.

In contrast to my teammates, I do not use my phone at practice or in competitions. During competitions with the swimming team, we all try to cheer our teammates on while they are competing. Sometimes some of my teammates are glued to their phones and end up missing the live races in front of them. This not only upsets our coach but me as well. Personally, it can be hard when you come back from a shitty race to find a bunch of people on their phones. Sometimes teammates have no clue how I have performed even though they were physically present. In situations like that, I get frustrated and want to ask them why they were not watching when they were literally sitting in the audience.

I find that nowadays, the smartphone is convenient and crucial when meeting up with people. Communication between people and making plans is stressful because you have to be available all of the time in case things happen last minute. I think a smartphone is an essential tool that you can't live without because everyone has it. If no one had smartphones, then it would be fine and we would not miss out on anything... First year of university, I had FOMO, Fear Of Missing Out, very often. That year I was

living on campus, and I was totally relying on staying connected to my phone to meet up with people. I noticed that I was not in control over my smartphone back then because I always wanted to be included. I felt like I was relying on my phone for plans and always needed my phone near me in case some sort of plans or social happening emerged. I get frustrated that I feel the need to rely on my phone, but I don't experience FOMO *as much* anymore.

Eric, a rower in a love-hate-relationship with his phone

I am on the varsity rowing team at my university in my fourth year. The best part of being a varsity athlete is traveling, going to all the different schools and meeting all the people. I consider my smartphone to be an essential tool in my day-to-day life. Is that bad to say? I am a heavy smartphone user, but not in the way that I am constantly looking at it during the day. The applications I use most are YouTube, Instagram, Grindr and text messaging. At times I perceive my own smartphone usage to be extremely helpful. I estimated that I use my phone for about 30 hours per week and the tracking application showed that I average 32 hours of usage per week.

I barely practice mental training to develop mental abilities for rowing and participate in team meetings to discuss sport-related information even more rarely. For the most part, I have high levels of mental health. The beginning of the new year, especially January, has been an exception. My mental health went from flourishing to moderate in January. I was only somewhat satisfied with the success and development in my psychical training. During this time, my self-regulatory capacity dropped, and my smartphone usage was higher than average. My training has been most intense during the spring, and I experienced extreme development, success and satisfaction with my competition in the beginning of March. The month before this specific competition in March, I spent less about 30 hours a week on my phone, which is close to my average.

I use my phone for *everything* during my day. If I am at home, I use timers to do laundry and cooking, communicate and send messages, use banking apps, stream music on my TV with my phone, stream Netflix, and stream YouTube. If I ever want to get anywhere, I use Google maps and Uber because it is so much easier than calling a cab. In business class, we read a study about Uber and its seamless way of paying. They have made everything so easy, why not use it? I normally use my phone to do *something*. But, that being said, I do not just stare at my phone all the time.

However, my phone is always a part of my life and I can just yell a voice command at it, so, it is really handy.

Most days I bring my phone to practice to listen to music on the bus and check my gym schedule. I post on social media a lot when travelling with the team and during competitions. For example, on my Snapchat story, I post pictures with the filter of the university to tell other people where we are and how we are doing. Through Facebook Messenger, we get everyone together for breakfast or practices before we race. I don't bring my phone to competitions when I need to protect it from rain and bad weather.

Being an athlete, I do watch how much my smartphone affects my posture. When I am standing up, I will notice how much I am looking down and how much that's actually affecting my shoulders, so I will try to correct myself and stop doing that. When I am using my phone in bed and I am in a bad position with my head titled on my pillow, I will think '*Oh, get off your phone, and do something more productive like yoga or something else*'. For a short time, I had a yoga app to do something beneficial on my phone. I have also tried calorie counter apps. Unfortunately, I did not really use either, so I just deleted the apps.

It is great having my smartphone for school; I always use my phone in class and when studying. If you need a PDF printed off before class, you can quickly just send it to your printer from home, or just on-the-go when you get to school. A lot of the time I will take notes on One Note during class and the notes will be saved on the phone as well. If I am on the bus, I will take the phone out and study for a little bit, and if I miss part of a prof's lecture, I can text one of the other students in the class. It is very distracting sometimes when people in front of you in class are being unproductive on their computers and phones, which is most of the time in class. You will see people on Facebook, texting, watching YouTube and even watching a whole movie on Netflix with subtitles.

Even though I find my phone helpful, I do not feel like I am in control of my smartphone. Most months, my smartphone usage has been extremely detrimental to me. I think that I spend way too much time on YouTube; it is often more than 60 hours per month. Most months, I spend half of my total screen time on YouTube only. YouTube gets me trapped in their recommended videos, especially before bed. Or if I see stuff like 'Can you solve this riddle?', I think to myself '*Oh sure, I can...!*' Also, I can get into a deep conversation with someone at night that suddenly takes two hours. I

typically spend 20 percent of my total screen time overnight starting from midnight to six o'clock in the morning.

Nevertheless, I typically do not limit my usage. I have tried not using my smartphone for about three days at a time. But, you really need your stuff on your phone as a student-athlete; you *need* to check it. When I'm with my friends, I must say it is relaxing to be without it. I *love* it. We play the 'phone game' whenever we go to a restaurant. We stack up all of the phones in the middle of the table and the first person to touch it will have to buy desserts or drinks for everyone. Those people who use their phone when they hang out with other people really bug me. I do not want to be like that.

Marie, a skier who joined the dark side

I am 20 years old, and I have been cross country skiing pretty much forever, just like the rest of my family. I come from a big family of skiers. I am in the third year of my program of study, but my second year of eligibility. Some people do not realize how much of a commitment being a student-athlete is; you have to be really decisive. As a varsity athlete, I often worry about not having enough time to study or to recover from training. I often feel stressed and lonely and my mental health is moderate.

I would say I am a moderate to low smartphone user because I prefer using my computer to using my phone. I estimated that I use my phone 14 hours per week and the tracking app showed that I averaged 11 hours of usage per week. I prefer using my computer to my phone because I have had it so much longer and it is a bigger part of my daily life. Days where I have access to my computer, I will barely use my phone. But, if I am out a lot during the day, I will use my phone as a second computer. For example, I bus for an hour per day, so I read and study on my phone during that commute.

I find that my phone can be somewhat helpful and extremely unhelpful at the same time. It is very detrimental to my daily life routines when I mindlessly waste time on social media using YouTube, Facebook, Instagram and Twitter when I should rather be sleeping or studying. I felt like I wasted a lot of time on my phone in December and January, and I found my phone to be extremely unhelpful during this time. My usage was higher than average, and I spent 11 hours more on my phone in January compared to the previous month. In that same period, I felt lonely and stressed, my mental health was still moderate, and I perceived my development, success and satisfaction in training and competitions to be poor.

However, my smartphone has also become an essential device in my life. I held off from getting a phone for such a long time and was like *'Not gonna get a phone! Not gonna join the dark side!'* Just because I did not want to waste so much time on it. Now that I have a phone, I have come to realize how helpful it is in certain areas. For example, it makes it easy to communicate with my coach, friends, and family, check emails and reminders, log workouts, check my schedule, and organize things on the go.

As a skier, there are times when I simply cannot use my phone. In the wintertime, in minus 20 degrees, my battery gets messed up or my phone dies if I bring it with me to training or ski races. And so, I just leave it somewhere, like in my car, when I'm skiing. Additionally, my house is built in a small depression or dip in the ground and as a result, I do not get cell reception when I am at home. I cannot call or send text messages, but I still have Wi-Fi and I can use Facebook Messenger as a substitute for regular texting.

I communicate a lot through Facebook Messenger, Snapchat, Instagram, Facebook, and email. My coach contacts us through email. Still, my preferred methods of communication with others are face-to-face or phone calls. You can call somebody, talk to them for a minute, and cover what you would have talked about in like 15 messages. Messaging can be so slow and annoying.

I use Spotify every day for 'pump up' music during my warm-up. I bring my phone with me to the gym because the team actually has an app for gym workouts. I look at my phone several times during the workout to double-check the training program. However, I find it disturbing to have my phone close by when focusing on competition. So, I have a book that I use to map out the day and write down details about my races. It works better for me, but I could see how the use of a phone might be helpful for scheduling too.

I try to stop looking at my phone an hour or two before a competition, or even store it somewhere out of reach to stay focused. I turn to the online results on my phone quite a bit though, to see how my teammates and I are doing throughout the competition when we start at different times. Also, if I am away from home during races, I call and message home quite a bit. Hearing familiar voices can help bring my stress level down. How much I call depends on the level of the competition and how stressed out I am. Sometimes it is nice talking to your parents before competing and other times, they can actually stress me out more!

The night before a race, my coach has a ‘no screen time’ policy one hour before bed. On non-competition days, I do use my phone before I go to sleep, but I have an app on my phone that turns off the blue light on the screen so it does not impact my sleep as much. My smartphone usage peaks in the morning, but social media can be disturbing when I go to sleep.

I have my ways of restricting my smartphone usage when I’m in class or studying. In class, I put it on silent and try not to look at my phone. But, sometimes I will still check things out. To manage my smartphone usage when studying on my own, I use my phone timer to tell me when to work and when to take a break. I also use another app that limits and blocks the apps that usually disturb me. For example, I put a restriction on how much time I am allowed to spend on YouTube and Facebook before the apps are automatically shut off for the rest of the day. When the app gets disabled, I feel guilty and think ‘*What did I just do to myself?*’. To avoid that feeling, I have learned how to modify how much time I have left that day before the shutdown.

Discussion

In this current study, qualitative and quantitative data were collected within a nine-month period in order to provide insight into the real-life stories of athletes as they relate to their smartphone usage. The study provides preliminary guidance for other athletes, and enlightens areas of future research in the development of sports programs that can lay a foundation for leveraging athletes’ use of social media and smartphones. Three different data sets were used to examine the impact of smartphone usage on mental health and performance in four athletes. The investigation revealed that, while the athletes’ smartphones provided significant convenience opportunities to communicate, self-manage and motivate, the integration of smartphones into everyday routines also presented challenges for the athletes’ mental health and performance outcomes. The study results support the notion that smartphones and social media can impact the athletes’ professional and private lives through an interplay of positive and negative influences (DesClouds & Durand-Bush, 2018).

For the most parts of the nine-month period, the four participants reported optimal mental health with absence of mental illness coupled with flourishing mental health scores. During or following months characterized by higher than the athlete’s

average smartphone usage, mental health scores declined to moderate while perceived success, development, and satisfaction with sport-related activities declined. Thus, less than optimal mental health and under-performance scores coincided with the same month or the following month of increased smartphone usage. One athlete notably reported that she perceived an increase in well-being and in mastery and success in sport following a month of reduced phone usage. Furthermore, the findings are in line with results from previously published studies that imply that the mere presence of smartphones can induce mental health concerns and hinder well-being (Barr, Pennycook, Stolz, & Fugelsang, 2015; Thornton, 2014) and that lower than complete mental health reduces performance (Kellmann et al., 2019; Roberts, Faull & Tod, 2016).

However, it can be disputed whether it is the smartphone device itself or the features or applications used that are the cause of these findings (DesClouds et al., 2018). In the interviews with the athletes in Study 1 and 3, smartphone usage and social media usage were strongly associated. Conversations often reverted to discussions of social media use when talking about smartphone usage. Moreover, the objective tracking showed that social media apps represented a large proportion of the athletes' total smartphone usage (e.g., the volleyball player could spend two-thirds of total smartphone usage on Instagram and the rower often spent half of his active smartphone hours on YouTube).

The four participants reported moderate to high self-regulation capacity through the psychosocial assessments in Study 2. However, a salient pattern of reduced self-regulation capacity could be traced back to periods of higher smartphone usage and corresponding social media usage. The volleyball player's story illustrated the potential of social media to hinder self-regulatory processes; the social media usage and Instagram usage gave rise to negative social comparisons and feelings of inferiority. This finding suggests that comparisons imposed by social media may inhibit optimal performance states by compromising self-regulation. At the same time, however, the volleyball player reported that seeing other athletes' videos and pictures on Instagram positively motivated her to increase her efforts in training and competition, and to successfully manage her learning and development.

The narrative analysis in this study lends support to findings that some smartphone usage has the potential to facilitate communication (Dolev-Cohen & Barak, 2013) and self-regulation (Quelly, Norris, & DiPietro, 2015) through instant feedback

and accessibility of information from coaches and other supportive networks from anywhere in the world. The athletes in this study noted the usefulness of selective smartphone apps, namely those that facilitated access to plans and workouts, tracked their performance, helped manage their travel, and provided a platform for listening to motivational music. To expand on this, the smartphone can also be a useful tool to navigate the multiple obligations imposed on student-athletes as they fulfill their dual roles. Given the need for increasing rather than decreasing self-capacity in sport, more research should be targeted at purpose-driven smartphone features that can provide strategies to enhance performance throughout a season.

The athletes reported mixed attitudes related to social media, especially Instagram, Facebook, Snapchat, and YouTube. Some athletes attached a value to social media comments and coverage in line with perceived intrinsic and extrinsic benefits (e.g., coverage, recognition, popularity, branding, endorsement opportunities) (Kristiansen et al., 2017). However, inherent with embracing social media is the possibility of both rewards and risks. The volleyball player described that being on a public network at times was difficult to control and that comments on her Instagram profile could feel intrusive and unwanted. This is noteworthy, as unfavorable mass media attention has been found to negatively impact the mental health of some athletes. Findings even suggest that it can aggravate organizational, competitive, and personal stressors (Kristiansen & Hanstad, 2012). Based on scholarly work on environmental stressors and negative effects of media for the athletic population, it is suggested that sports organizations offer stakeholders (e.g., athletes, coaches, staff members) general media training to educate and put into perspective. In addition, organizations should encourage, among athletes, an emphasis on mental and physical health over a sole focus on performance to reduce the negative effects of the mass media and social media. Similarly, organizations should provide a task-oriented over an outcome-oriented climate to increase well-being and positive affect and performance (Standage, Duda & Pensgaard, 2007). In this way, it is incumbent upon organizations to provide an environment of social support (i.e. emotional and informational support), thus affording the athletes the personal coping tools necessary to address issues inherent when interfacing with public and social media (Kristiansen & Roberts, 2011).

The athletes' narratives in this study show a coexistence of opposing emotions toward smartphone usage. For instance, the rower expressed a love-hate-relationship

with his phone; he reported the dichotomy of needing it, but hating that he needed it. Similarly, he reported during most months that while he found his phone extremely helpful on some level, he also found it harmful on other levels. The swimmer expressed the fear of missing out as a strong motive to use her smartphone and social media. She felt compelled to be phone-accessible, suggesting that being without her phone induced stress. This is in line with other literature highlighting that smartphones can be a source for interconnectedness and equally a source of stress and negative emotions (DesClouds & Durand-Bush, 2020; Van Deursen et al., 2015).

Furthermore, all of the athletes reported that navigating from app to app to stay connected to the world via text messages, email, calls and social media could potentially reduce focus during important times like training, competition, studying and going to sleep. Taken together, this supports previous findings emphasizing that social media usage prior to sports events can disrupt athletes' concentration (Encel, Mesango & Brown, 2017) and decision-making (Fortes et al., 2019). Research findings point to the benefits of practicing mindfulness to mitigate these undesirable effects of smartphone usage (Robins, 2017; Rosen et al., 2018; Wu, 2015).

Interestingly, the volleyball player mentioned that she often scrolled on her phone after a poor performance in sport. In her case, this acted as an antidote to emotional distress. The swimmer noted similar behavior among her teammates; she suggested they could often be physically present yet mentally disengaged during competitions due to phone usage. The swimmer expressed that this withdrawal and presumed lack of engagement between teammates was, to her, inappropriate and frustrating. As underperformance in sport can be reflected in conflict among teammates (Collins & Durand-Bush, 2014), more research is needed to effectively evaluate if and how smartphones generate conflicts between teammates.

The investigation of usage throughout the day revealed that the prevalence of overnight smartphone usage from 12 am to 6 am accounted for a staggering amount of the participants' usage, up to 20 percent of total active screen time. Athlete overnight usage is alarming considering the importance of sufficient psychological preparation in sport; lack of sleep may interfere with optimal psychological readiness before performance (Encel, et al.) This observation is noteworthy in light of recent findings. In Jones' (2019) study, it was reported that social media usage the night before sport performances could lead to disrupted or inhibited sleep, which in turn, led to

performance decrements, reduced ability to maximize training responses, and under-recovery. As such, athlete fatigue or exhaustion after using the phone at night seems to have compacted perceptions of quality of training and performance as a result. The present findings support the position that employing avoidance strategies like social media breaks, specifically before going to sleep and prior to sport performances, may act as a buffer against reduced performance (Kristiansen et al., 2017). However, as supported by the volleyball player's story, practicing self-control and attention control appear to be essential components of phone avoidance (Cheever, Rosen, Carrier, & Chavez, 2014).

Given the prevalence with which athletes seem to use social media, it is naturally unrealistic to expect athletes to stop using these platforms entirely or not use them throughout the day. Moreover, restrictions should be put in place at times where social media usage tend to have a negative impact, like the overnight period. When proposing guidelines, it is essential to recognize that guidelines may be context- and time-limited as characteristics of athletes' smartphone and social media usage are not static, and hence, adaptation is a vital element in approaching the progressing and multifaceted field that is social media and smartphone technology (Sanderson, 2018).

The study also displayed the relationship between perceived and actual smartphone usage of the athletes, both in terms of time and applications accessed. Based on data collected by way of the smartphone usage tracker, the athletes mainly used applications pertaining to social media, SMS, MMS, emails, and music; this finding was confirmed in the interviews in Study 1 and 2. The athletes were in tune with *what* they used their smartphones for, but less so when estimating *how much time* they spent on their phones. It is noteworthy that the self-report assessments of the average duration of smartphone usage aligned poorly with the objective measures of real-time smartphone usage.

Overall, there was an inconsistency between subjective and objective estimates of time spent on their smartphones. This suggests that some athletes may not be fully conscious or aware of their smartphone and social media usage. The rower and cross-country skier reported that they feared falling into a "rabbit hole" with their smartphones; this created stress and concern for not having enough time for quality training, recovery from training and academic studies. Levy (2016) reported that self-monitoring activities, like videotaping smartphone usage, can unveil how we are driven

by unconscious habits with our devices. These self-monitoring activities could also assist in identifying triggers that typically distract us from important tasks and allow us to reset our attention to what we need or want in the present moment. Similarly, applied psychology research is pointing to self-reflection strategies to increase learning, well-being, and performance in sport (Collins & Durand-Bush, 2010). Thus, one might argue that the athletes would benefit from practicing self-examination and reflection based on the objective tracking measurements of smartphone usage, such as the mobile monitoring app utilized in this study. Such reflection could be assisted by sport psychology practitioners, which are uniquely positioned to help athletes and coaches to gain insight into and monitoring thoughts, feeling and behaviors to reach goals and optimize performance and well-being (Dithurbide et al., 2019; Weinberg & Gould, 2015).

Secondly, the gap between athletes' perceived and real-time smartphone usage lends support to Ellis's (2019) belief that self-report of smartphone use is a modest measure when attempting to quantify or predict typical smartphone behaviors in the general population. Hence, the finding reported in this study supports the assumption that accompanying self-report data with objective usage tracking can provide more reliable measures of smartphone usage leading to evidence-based conclusions regarding the impact of smartphone devices (Ellis et al., 2019; Fernee, Sonck, & Scherpenzeel, 2013). For this reason, the mobile app developed for this study can also a useful research tool for other research projects involving smartphone and social media behavior.

Limitations

It must be acknowledged that this study did not attempt to make broad generalizations because of noted research limitations. Firstly, the sample is small in number and represents a relatively homogenous group. Secondly, the mobile research tracking tool was available exclusively to users of Android phones; this therefore excluded all potential participants using iOS devices. The latter group could potentially display different usage profiles (Shaw, Ellis, & Kendrich, 2016). Thirdly, the study results may reflect the effects of social desirability, even though precautions were taken (i.e. assuring anonymized responses, confidentiality agreements, declaring no 'right' or 'wrong' answers). Athletes in the study were, at times, hesitant to respond because of

perceived judgments on the part of the researcher. As an example, one athlete timidly asked if it was a bad thing to perceive the smartphone as an essential tool in daily life. Lastly, the participants all reported trying to actively moderate aspects of their smartphone usage (e.g., trying not to compare as much, trying to experience less FOMO, wanting to leave their phone more often). One can then postulate that this pre-existing desire to change smartphone-related behavior could have motivated participation in the study.

While acknowledging the above study limitations, the findings can provide insight and direct future areas of research. One recommendation for future research would be to further analyze the data from “Global Consumer Mobile Survey Results 2019 Canadian Edition” (Deloitte, 2019) with a focus on Canadian athlete’s smartphone usage. The researcher acknowledges at this time the generosity of Deloitte in offering the raw data to us.

This study investigated details of changes at an individual level throughout a nine-month academic year; it did not provide snapshots of specific training sessions and competitions at a given point of time. It would be valuable to follow up with a cross-sectional study to investigate in detail the implications of smartphone usage and social media prior to and during isolated events of training and competition.

While this study has examined the subject from the athletes’ perspective, future research could examine smartphone usage in sports with focused input from coaches and support staff; this, combined with the findings of this study, could provide a more complete picture of the impact of smartphone usage within the full sports community.

Conclusion

The main findings showed that athletes have multifaceted and nuanced experiences with their smartphones. Specifically, social media applications (Instagram, YouTube, Snapchat, and Facebook) accounted for a staggering amount of the participants’ total smartphone usage over the assessed nine-month period. Most athletes had two or more social media-related apps in their top three most frequently used apps. The findings revealed that the prevalence of overnight smartphone usage from 12 am to 6 am compromised up to twenty percent of the athletes’ total active screen time. The results supported the stance that smartphone usage in and around the sport context elicited both beneficial and detrimental consequences. Data analysis suggested that

social media usage was associated with more harmful than helpful effects on mental health and performance than other smartphone features and applications that the athletes utilized. The findings allude to associated changes in self-regulation capacity. Finally, the findings provided insight into the evident gap between the athletes' actual and self-perceived smartphone usage.

An in-depth examination of the narratives, aside from being theoretically interesting to the researcher, can be beneficial to mental performance consultants, coaches, and athletes. Hearing "in the athletes' own words" the unique benefits and challenges of smartphone usage can assist the sporting community to develop interventions that address the challenges and nurture the benefits of smartphones (Smith & Sparks, 2009). This examination and novel monitoring of smartphone usage have provided a first step towards filling important knowledge gaps about the relationship between athletes and smartphone technology. Further, research is needed to determine how athletes may leverage smartphone and social media usage to facilitate optimal performance outcomes and overall mental health.

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Appendix A

Semi-Structured Interview Guide for Study 1 (Focus Groups)

INTRODUCTIONS

1. Please share with the group a bit about yourself (e.g., name, institution, sport, and area of study).

A. GENERAL OPENING QUESTIONS

1. When and how did you start playing your varsity sport?
2. What motivated you to participate in this study?

B. VARSITY ATHLETICS

1. What does it mean and take to be a varsity athlete?
 - What demands are placed on you as a student-athlete?
 - What is the best part of being a varsity student-athlete?
 - What is the most difficult part of being a varsity student-athlete?

C. SMARTPHONE ACQUISITION

[Addresses: preferences and priorities]

1. What kind of smartphone do you have?
 - Why do you have this particular make and model of smartphone?
 - How long have you owned a smartphone (not this one in particular, but a smartphone of any kind)?
 - How did you end up with a smartphone? Was it a planned, major investment?
2. Do you consider your smartphone to be an essential tool/device or can you live without it?
3. Have you ever considered or tried not using your smartphone for an extended period of time?
 - If yes, why? What was the experience like?
 - If no, why not?

D. SMARTPHONE USAGE

[Addresses: perceptions of usage; opens dialogue related to prevalence and context of usage]

General

1. Primarily, what do you use your smartphone for?
 - What are the main features you use on a day-to-day basis?
 - Is there anything you have tried to use your smartphone for, but failed?
 - Is there anything you wish your smartphone could do, but it doesn't?
2. Would you characterize yourself as a heavy, moderate, or light smartphone user?
 - What leads you to characterize yourself this way (e.g., in comparison to others)?

In-Depth

Sport

1. Do you bring your smartphone with you to training, practice, and competitions?

- How do you use your smartphone in these contexts?
 - What is the majority of your smartphone usage in training, practice, and/or competition related to? (i.e., your sport, or an unrelated context/situation)
 - What features do you use most often when you are at training, practice, and/or competition? Explain (i.e., why these features and how do you use them?)
 - At training, practice, and/or competition, when (e.g., before, during, after) and where (e.g., in change room, on the field, in the car on the way home) exactly do you use these features?
2. Is any of your smartphone usage specifically related to your sport training, practice, or competition? Explain.
- What features do you use most often related to sport?
3. Is there anything notable or unique about the ways in which you and athletes on your team (or with whom you train) use their smartphones?
- Have you noticed/experienced any usage trends within your team (or training group)?
 - Have you noticed/experienced anything you would classify as negative or detrimental usage within your team (or training group)?
 - Have you noticed/experienced anything you would classify as positive or productive usage within your team (or training group)?

Academic

1. Do you bring your smartphone with you to class?
- How do you use your smartphone in class?
 - What is the majority of your usage in class related to? (i.e., school, or an unrelated context/situation)
 - What features do you use most often when you are in class?
2. Is any of your smartphone usage related to school (i.e., work, studying, organization)? Explain.
- What features do you use most often related to school?
3. Based on your own experience and observations, is there anything notable or unique about the ways students at your school use their smartphones?
- Have you noticed/experienced any usage trends within your school?
 - Have you noticed/experience anything you would classify as negative or detrimental usage?
 - Have you noticed/experienced anything you would classify as positive or productive usage?

Age Demographic

1. What do you believe characterizes the way people your age interact with and use their smartphones? (as opposed to your parents, or people in high school, for example)

Gender

1. What is your perception of the differences between how men and women use their smartphones?

Communication

1. What is your preferred method of communication?
2. What would you say is your strongest form of communication? Why?
3. Would you classify yourself as a good communicator? Explain.
4. To what extent do you communicate using your smartphone? What features do you use?
5. Have you experienced miscommunication via your smartphone? Explain.
6. How does your team (or training mates) use smartphones to communicate?
7. Would you say communication via your smartphone is 'good', 'bad', or both? Explain.

E. RESTRICTIONS ON USAGE

[Addresses: various rules and restrictions related to smartphone usage and potential reasons for their implementation]

1. How often is your smartphone on you or very nearby you?
2. How do you feel when you cannot check or interact with your smartphone?
3. Do you try to self-impose any restrictions on your own smartphone usage? (i.e., turn it off one hour before bed, don't check it during class, etc.). Explain.
4. Do you and your friends have any 'rules' in place related to phone usage when you are in social situations together? Explain.
5. What rules or restrictions for smartphone usage do you have to abide by, that are implemented by someone else, such as your teachers, coaches, parents, etc.? Explain.

F. ROLE AND CONTROL OF SMARTPHONES

[Addresses: various perceptions of the role smartphones have in their life, as well as the magnitude of this role]

1. Generally speaking, what role does your smartphone have in your life? (e.g., an organizational tool, the hub of your social life, a source of entertainment, etc.)
2. Do you feel that you always have control over your smartphone and your smartphone usage? Explain.

G. OVERALL EXPERIENCES

1. Are there any additional experiences, anecdotes, or opinions you would like to share - positive or negative - related to smartphone usage in your day-to-day life?

SUMMARY OF QUESTIONS AND COMMENTS

1. What do you take away from this interview?
2. Would you like to add anything else?
3. Thank you for your participation in this study.

Appendix B
Demographic Questionnaire

This questionnaire must be completed before data tracking can commence.

1. Gender:
 - Male
 - Female
 - You don't have an option that applies to me. I identify as (please specify)

2. Age: _____

3. Primary language: French English Other Please specify

4. Ethnicity (please check all that apply):
 1. English Canadian
 2. French Canadian
 3. Aboriginal
 4. British
 5. German
 6. Scottish
 7. Irish
 8. Dutch
 9. Scandinavian
 10. Asian
 11. Russian
 12. East Indian
 13. Chinese
 14. African
 15. Arab
 16. South American
 17. Caribbean
 18. Eastern European
 19. Southern European
 20. Other (please specify) _____

5. Marital status:
 - Single
 - In a relationship
 - Married
 - Separated
 - Divorced
 - Widowed

6. Number of dependent children under 18 years of age (indicate 0 if you have no children): _____

7. At what academic institution do you currently study (e.g., University of Ottawa, Carleton University, Algonquin College, La Cité Collégiale)?

8. In what university or college program are you currently enrolled (e.g., Human Kinetics, Psychology, Biology)?

9. Please indicate your year of study (as considered official by your academic institution):

- First year university (undergraduate) / first year college
- Second year university (undergraduate) / second year college
- Third year university (undergraduate) / third year college
- Fourth year university (undergraduate) / fourth year college
- Fifth year university (undergraduate) / fifth year college
- Master's
- PhD
- Other (please specify)

10. How many courses are you taking/registered in each semester this year?

Fall semester: _____

Winter semester: _____

Spring/Summer semester: _____

11. How many **hours per week** do you typically:

- study / do homework for your courses: _____
- train / compete for your sport: _____
- work outside school / sport (if you have a job): _____
- use your smartphone: _____

12. In what varsity sport are you competing this year? (e.g., badminton [doubles], badminton [singles], baseball, basketball, cross-country, curling, fencing, figure skating, football, golf, hockey, indoor soccer, rugby, soccer, softball, swimming, track, volleyball, wrestling).

If you compete in more than one sport, please indicate your main one.

13. In what year of athletic eligibility are you currently competing?

- 1
- 2
- 3
- 4
- 5

14. Please check one or more items based on what currently best describes you:

1. Starter
2. Non-starter
3. Starter / non-starter does not apply to me
4. I do not know if I'm a starter or non-starter
5. Redshirt (I am not using a year of eligibility this season)
6. Injured

If injured, please indicate the **type** and **date** of injury (ex. broken ankle - September 5, 2012):

—

15. Please indicate the make and model of your smartphone:

Make: _____

Model: _____

16. Do you use your smartphone while:

- a. You are at practice/training: Never Rarely Sometimes Often Always
- b. You are at competition: Never Rarely Sometimes Often Always
- c. You are in class: Never Rarely Sometimes Often Always
- d. You are studying: Never Rarely Sometimes Often Always

17. Do you generally limit/restrict the use of your mobile phone for the following reasons? (check all that apply)

1. I limit my usage for my own personal reasons (ex. while studying, before bedtime, after I've reached my phone plan's data usage limit)
2. I limit my usage because I abide by the 'no phone' policy imposed by one or more of my teachers in school
3. I limit my usage because I abide by the 'no phone' policy imposed by my coach(es) at training
4. I limit my usage because I abide by the 'no phone' policy imposed by my coach(es) at competitions
5. I limit my usage because I abide by the usage limit imposed by my parent(s)
6. I typically do not limit my usage

18. Please identify the three greatest stressors you experience as a student-athlete. When answering, consider the dual-role you play and the demands you face:

1. _____
2. _____
3. _____

19. Have you been previously diagnosed with a mental illness (ex. depression, anorexia nervosa, bipolar disorder, anxiety disorder, attention deficit disorder, obsessive-compulsive disorder, alcohol abuse) by a medical professional (ex. psychologist, psychiatrist, physician)?

- Yes

- No
- I prefer not to say

a. If yes, please indicate the mental illness(es) and the year you were diagnosed (ex. depression, 2013), **if you feel comfortable doing so**:

- b. If yes, are you currently taking medication to treat the mental illness(es)?
- Yes
 - No
 - I prefer not to say

20. Have you had a concussion in the past?

- Yes
- No
- I prefer not to say

a. If yes, please indicate **how many concussions you have had** and **the year you sustained them** (e.g., 2 concussions, 2014 and 2015):

Appendix C

Comprehensive Breakdown of Scales Used in Study 2

Note that the complete mobile survey, including all scales below, were administered during pilot testing of the mobile application prior to the commencement of Study 2.

1. The **Self-Regulation for the Enhancement of Performance and Well-Being Scale (SEWP-S)**

(Durand-Bush & DesClouds, 2016), is a novel 16-item measure of self-regulation for performance and well-being, informed by Zimmerman's (2000) model of Self-Regulated Learning. The scale is used to evaluate three subscales of self-regulation: preparation, performance, and evaluation, using a 5-point Likert scale ranging from "strongly agree" to "strongly disagree". As the SEWP-S is a novel scale, basic psychometric properties will be assessed.

2. The **Cognitive and Affective Mindfulness Scale-Revised (CAMS-R)** is a 12-item measure of mindfulness, specifically, mindful approaches to thoughts and feelings. The measure is used to evaluate four domains of mindfulness: attention, present-focus, awareness, and acceptance, using a 4-point Likert scale ranging from "rarely/not at all" to "almost always". The CAMS-R shows convergent and discriminant validity, and has been replicated in student, community, and clinical samples (Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007). For the purposes of this study, one additional item has been added to the CAMS-R: "I pay attention to sensations in my body". This item has been constructed to target participants' mindful approach to physical 'feel' – an important element of sport performance (Durand-Bush et al., 2015).

3. The **Perfectionistic Self-Presentation Scale (PSPS)** is a 27-item measure of perfectionistic selfpresentation, that is, one's striving to either present perfection or to avoid presenting imperfections. The measure can be used to evaluate three sub-scales of perfectionistic self-presentation: perfectionistic self-promotion, nondisclosure of imperfection, and nondisplay of imperfection, using a 7-point Likert scale ranging from "strongly disagree" to "strongly agree". The PSPS has demonstrated acceptable psychometric properties (Hewett et al., 2003). To reduce participant burden in this study, the scale was reduced from 27 to 11 items - 3 items from the nondisclosure subscale, 4 items from the nondisplay subscale, and 4 items from the self-promotion subscale.

4. The original **Self-Presentation Tactics Scale** is a 64-item measure of impression management, specifically, individuals' tendency to use self-presentation tactics regrouped under the following subscales: excuse, justification, disclaimer, self-handicapping, apology, ingratiation, intimidation, supplication, entitlement, enhancement, blasting, and exemplification. The self-presentation tactics scale measures a 2-factor structure of assertive and defensive self-presentation, using a 9-point Likert scale, ranging from "very infrequently" to "very frequently", and demonstrated acceptable psychometric properties (Lee, Quigley, Nesler, Corbett, & Tedeschi, 1999). Rosenberg (2011) created a 38-item, Modified Self-Presentation Tactics Scale, to measure self-presentation tactics on Facebook within four sub-categories of

manipulation, damage control, self-promotion, and rolemodel (Rosenberg, 2011). This modified scale by Rosenberg (2011) is what we have adapted into our 14-item measure of social media self-presentation tactics. Basic psychometric properties will be assessed.

5. The **Perceived Stress Scale (PSS)** is a 14-item measure of global perceived stress, designed to assess the degree to which individuals appraise their situation as stressful. The measure employs a 5-point Likert scale, ranging from “never” to “very often”. Importantly, the PSS is used to measure perceived stress, and not psychological symptomatology. The PSS has been shown to be both valid and reliable in community samples (Cohen, Kamarck, & Mermelstein, 1983). To reduce participant burden in this study, the scale has been reduced from fourteen to ten items.

6. The **New General Self-Efficacy Scale (NGSE)** is an 8-item, unidimensional measure of self-efficacy, that is, participants' perceived ability to perform successfully across a range of achievement situations. The NGSE is distinct from measures of self-esteem. The NGSE has shown acceptable psychometric properties in student populations (Chen, Gully, & Eden, 2001). To reduce participant burden in this study, the scale was reduced from eight to six items.

7. The **Mental Health Continuum-Short Form (MHC-SF)** is a 14-item measure of mental health used to assess three subscales of emotional, psychological, and social well-being, as well as to categorize respondents as either flourishing, languishing, or moderate mental health (Keyes, 2008). The MHC-SF is psychometrically sound (Lamers, Westerhof, Bohlmeiger, ten Klooster, & Keyes, 2011) and is being used in its complete, original form for this study.

8. The 6-Item De Jong Gierveld **Loneliness Scale** was derived from an original 11-item scale measuring emotional and social loneliness. The 6-item measure is composed of two subscales assessing emotional loneliness and social loneliness using a 5-point Likert scale ranging from “yes!” to “no!”. The scale is psychometrically sound (Gierveld & Tilburg, 2006) and is being used in its complete, original form for this study.

9. The **Communication Skills Assessment** is a 25-items measure, regrouped under five subscales: insightfulness, verbal expression, assertiveness, listening skills, and emotional management. The measure is scored using a 5-point Likert scale ranging from “completely true” to “completely false”. It has acceptable psychometric properties with younger and older populations (COMSAR2, 2014). To reduce participant burden, the measure was reduced from 25 to 9 items, and will be used to assess participants' communication skills in two specific contexts: (a) in-person (or face-to-face) communication, and (b) social media communication.

10. The **Sport Participation Questionnaire** (Durand-Bush, 2016) is a 7-day recall questionnaire that was developed specifically for Study 2. The questionnaire was informed by prominent physical activity recall questionnaires [i.e., International Physical Activity Questionnaire (Craig et al., 2003), Adolescent Physical Activity Response Questionnaire (Booth, Okely, Chey, & Bauman, 2002)]. Participants will be asked to rate their participation in sport-related activities, as well as their perceived

development, success, and satisfaction in (a) competition, (b) dryland practice/training, (c) technical/tactical practice/training, (d) mental practice/training, (e) sport-specific meetings, and (f) other sport-related activities over the past week (optional). Each participant will be asked to report the frequency, duration, and intensity of each activity, and then rate their perceived development, success, and satisfaction, respectively, each on a 3-point scale (e.g., 'developed extremely', 'developed moderately', 'did not develop'). The Sport Participation Questionnaire has been pilot tested with athletes and will also be administered during pilot testing of the app, and basic psychometric properties will be assessed.

Appendix D

Mobile Survey

Mindfulness Scale

Please consider the past month when responding to the following items:

Rarely / Not at all	Sometimes	Often	Almost always
1	2	3	4

1. It is easy for me to concentrate on what I am doing.
2. I am preoccupied by the future. (R)
3. I can tolerate painful thoughts and feelings.
4. I can accept things I cannot change.
5. I pay attention to sensations in my body.
6. I am attuned to how I feel in the moment and can describe this.
7. I am easily distracted. (R)
8. I am preoccupied by the past. (R)
9. I can easily track my thoughts and feelings.
10. I notice thoughts going through my mind without judging them.
11. I accept the emotions I experience.
12. I am able to focus on the present moment.
13. I can pay close attention to one thing for a long period of time.

Scoring: Add all scores (R = reverse scores 2, 7, 8)

Emotional and Social Loneliness Scale

Please consider the past month when rating your agreement with each of the following statements.

Strongly Disagree	Disagree	Somewhat Disagree	Don't Agree / Don't Disagree	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

1. I experience a general sense of emptiness.
2. There are plenty of people I can rely on when I have problems. ®
3. There are many people I can trust completely. ®
4. There are enough people I feel close to. ®
5. I miss having people around.
6. I often feel rejected.

Scoring: Add all scores (R = reverse scores 2, 3, 4)

Self-Presentation Scale

Please consider your general perceptions when rating your agreement with each of the following statements.

Strongly Disagree	Disagree	Somewhat Disagree	Don't Agree / Don't Disagree	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

1. It is okay to show others that I am not perfect. (R)
2. I will do almost anything to cover up a mistake.
3. I try always to present a picture of perfection.
4. It would be awful if I made a fool of myself in front of others.
5. If I seem perfect, others will see me more positively.
6. I never let others know how hard I work on things.
7. I would like to appear more competent than I really am.
8. It doesn't matter if there is a flaw in my looks. (R)
9. I do not want people to see me do something unless I am very good at it.
10. I must appear to be in control of my actions at all times.
11. Admitting failure to others is the worst possible thing.
12. I like to gossip at times.
13. There have been occasions when I took advantage of someone.

Scoring: Add scores for items within each subscale (R = reverse scores 1, 8)

- Perfectionistic Self-Promotion: items 3, 5, 8, 10
- Non-display of Imperfection: items 2, 4, 7, 9
- Nondisclosure of Imperfection: items 1, 6, 11
- Items 12 and 13 are measures of Social Desirability

Social Media Self-Presentation Scale

Please consider your use of social media during the past month when rating the items below:

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

1. I claim credit on social media for doing things I did not do.
2. I make excuses on social media for poor performances.
3. I put others down on social media in order to make myself look better.
4. I try to convince others on social media that I am not responsible for negative events.
5. I flatter others on social media to get them to do things for me.
6. I make negative statements on social media about others who belong to rival/competitive groups.
7. I apologize on social media when I have done something wrong.
8. On social media, I justify ahead of time actions others may not like.
9. On social media, I try to make up for any harm I have done to others.
10. I tell people on social media about my positive accomplishments.
11. I point out on social media the positive things I do.
12. I compliment people on social media to get positive reactions from them.
13. On social media, I act in ways I think others should act.
14. I try to serve as a positive role model on social media.

Scoring: Calculate the mean score for each subscale

- Manipulation: items 1, 3-6
- Damage control: items 7-9
- Self-promotion: items 2, 10-12
- Role Modeling: items 13-14

Self-Efficacy Scale

Please consider the past month when rating your agreement with each of the following statements.

Strongly Disagree	Disagree	Don't Agree / Don't Disagree	Agree	Strongly Agree
1	2	3	4	5

1. I am able to achieve most goals that I set for myself.
2. When facing difficult tasks, I am certain that I will accomplish them.
3. In general, I think that I can obtain outcomes that are important to me.
4. I am able to successfully overcome many challenges.
5. I am confident that I can perform effectively on many different tasks.
6. Even when things are tough, I can perform quite well.

Scoring: Add all scores

Communication Scale

Please consider the past month when responding to the following items and rate each of them based on your activities (a) in person, and (b) on social media.

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

	In Person	On Social Media
1. When I talk to others, I put myself in their shoes to try to understand what they are feeling.		
2. I can tell when someone doesn't understand what I'm saying.		
3. I manage to express my ideas clearly.		
4. I don't react well in emotionally charged situations. (R)		
5. People tend to misinterpret what I say. (R)		
6. I find it hard to express my feelings to others. (R)		
7. I have difficulty putting my thoughts into words. (R)		
8. I avoid discussing touchy topics. (R)		
9. I'm a good listener regardless of what others are telling me.		

Scoring: Add all scores (R = reverse score)

Mental Health Scale

Never	Rarely (once or twice)	Sometimes (about once a week)	Often (about 2 or 3 times a week)	Very Often (almost every day)	Always (every day)
0	1	2	3	4	5

During the past month, how often did you feel ...

1. happy
2. interested in life
3. satisfied with life
4. that you had something important to contribute to society
5. that you belonged to a community (like a social group, or your neighborhood)
6. that society is a good place, or is becoming a better place, for all people
7. that people are basically good
8. that the way society works makes sense to you
9. that you liked most parts of your personality
10. that you are good at managing the responsibilities of your daily life
11. that you had warm and trusting relationships with others
12. that you had experiences that challenged you to grow and become a better person
13. that you were confident to think or express your own ideas and opinions
14. that your life has a sense of direction or meaning to it.

Continuous Scoring: Sum, 0-70 range (use 10 point categories if desired).

Categorical Diagnosis: a diagnosis of **flourishing** is made if someone feels 1 of the 3 hedonic well-being symptoms (items 1-3) "every day" or "almost every day" and feels 6 of the 11 positive functioning symptoms (items 4-14) "every day" or "almost every day" in the past month. **Languishing** is the diagnosis when someone feels 1 of the 3 hedonic well-being symptoms (items 1-3) "never" or "once or twice" and feels 6 of the 11 positive functioning symptoms (items 4-8 are indicators of Social well-being and 9-14 are indicators of Psychological well-being) "never" or "once or twice" in the past month. Individuals who are neither "languishing" nor "flourishing" are then coded as "**moderately mentally healthy.**"

Symptom Clusters and Dimensions:

Cluster 1; Items 1-3 = Hedonic, Emotional Well-Being Cluster 2; Items 4-8 = Eudaimonic, Social Well-Being Item 4 = Social Contribution Item 5 = Social Integration Item 6 = Social Actualization (i.e., Social Growth) Item 7 = Social Acceptance Item 8 = Social Coherence (i.e., Social Interest) Cluster 3; Items 9-14 = Eudaimonic, Psychological Well-Being Item 9 = Self Acceptance Item 10 = Environmental Mastery Item 11 = Positive Relations with Others Item 12 = Personal Growth Item 13 = Autonomy Item 14 = Purpose in Life

Stress Scale

Please consider the last 7 days when responding to the items.

Not at all	Not really	Very little	A bit	Somewhat	Quite a bit	Very much	Extremely
1	2	3	4	5	6	7	8

1. I feel calm. (R)
2. I feel rushed and do not seem to have enough time.
3. I suffer from physical aches and pains (ex. sore back, headaches, tensed neck, stomach aches).
4. I feel preoccupied, tormented, or worried.
5. I feel confused (ex. my thoughts are muddled) and cannot focus my attention.
6. I feel full of energy and keen. (R)
7. I feel a great weight on my shoulders.
8. I have difficulty controlling my reactions, emotions, or gestures.
9. I feel stressed.
10. I have difficulty sleeping.

Scoring: Add all scores (R = reverse score)

SEWP-S: Self-Regulation for the Enhancement of Performance and Well-Being Scale

Strongly Disagree	Disagree	Don't Agree / Don't Disagree	Agree	Strongly Agree
1	2	3	4	5

Please consider the past month when rating your agreement with each of the following statements.

Preparation

- ___ 1. I determine what I need to do to perform well.
- ___ 2. I am confident that I can perform well even when things don't go my way.
- ___ 3. I set goals for myself.
- ___ 4. I plan a course of action to achieve my goals.
- ___ 5. I am driven to perform all necessary tasks to achieve my goals.

Performance

- ___ 6. I get easily distracted while performing.^(R)
- ___ 7. I am able to resist temptations that prevent me from successfully performing tasks.
- ___ 8. I question or talk to myself to stay on track during performances.
- ___ 9. I notice and correct mistakes while I perform.
- ___ 10. I cannot perform well once I experience something unpleasant or upsetting.^(R)

Evaluation

- ___ 11. I recognize when I have accomplished my goals.
- ___ 12. I change the way I do things when I see a problem with the way I perform.

- ___ 13. When I perform poorly, I take responsibility for my actions.
- ___ 14. When I make progress toward my goals, I feel good and reward myself.
- ___ 15. I am never satisfied with my performances. ^(R)
- ___ 16. I evaluate my performances against the goals I set for myself.

Perception of Smartphone Usage

1. Over the last month, to what extent has your smartphone usage been **helpful** to you?

Not at all	Not really	Very little	A bit	Somewhat	Quite a bit	Very much	Extremely
1	2	3	4	5	6	7	8

Please explain (e.g., give examples)

2. Over the last month, to what extent has your smartphone usage been **detrimental** to you?

Not at all	Not really	Very little	A bit	Somewhat	Quite a bit	Very much	Extremely
1	2	3	4	5	6	7	8

Please explain (e.g., give examples)

Sport Participation Questionnaire

PLEASE READ THIS FIRST...

We want to know about the time you spent participating in different sporting activities related to your varsity sport during the last 7 days (not counting today). Here are instructions to follow:

1. For each of the 6 types of sporting activities presented below, please indicate the number of times you did the activity, how long it lasted, the intensity at which you did the activity, how much it helped you to develop, and how successful and satisfied you were with the activity.
2. If you did not participate in a particular activity, check the box that says, 'Did not participate'.
3. If you participated in a sporting activity that is not represented in the 6 that are outlined below, please add the information at the end of the table in the section that says "OTHER".

Type of sporting activity	Frequency How many times did you perform the activity during the last 7 days?	Duration Overall, approximately how much time did you spend performing the activity during the last 7 days?	Intensity On average, at what level of intensity did you perform the activity during the last 7 days? a. mild (hardly any increase in your heart rate, breathing rate, sweating and/or body heat) b. moderate (slight increase in your heart rate, breathing rate, sweating and/or body heat) c. intense (big increase in your heart rate, breathing rate, sweating and/or body heat)	Perceived development, success, satisfaction During the last 7 days, to what extent have you developed (ex. learned, stretched your limits) as an athlete as a result of performing the activity? How successful were you in performing the activity? How satisfied are you with your performance in this activity?
1. COMPETITION (sport "contest") Game, race, match, or other competitive event in which you performed sport-related skills <input type="checkbox"/> Did not participate	Frequency <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 or more	Duration <input type="checkbox"/> under 30min <input type="checkbox"/> 30min to 1hr <input type="checkbox"/> 1 to 2hrs <input type="checkbox"/> 2 to 4hrs <input type="checkbox"/> 4 to 6hrs <input type="checkbox"/> 6 to 8hrs <input type="checkbox"/> 8 to 10hrs <input type="checkbox"/> over 10hrs	Intensity <input type="checkbox"/> mild <input type="checkbox"/> moderate <input type="checkbox"/> intense	Development <input type="checkbox"/> developed extremely <input type="checkbox"/> developed moderately <input type="checkbox"/> did not develop Success <input type="checkbox"/> extremely successful <input type="checkbox"/> somewhat successful <input type="checkbox"/> unsuccessful Satisfaction <input type="checkbox"/> extremely satisfied <input type="checkbox"/> somewhat satisfied <input type="checkbox"/> dissatisfied
2. PRACTICE / TRAINING ("dry-land" training) Physical training to develop fitness / strength / flexibility for your sport (e.g., go for a run, lift weights, stretch, do yoga session, do resistance, circuit, and/or interval training) <input type="checkbox"/> Did not participate	Frequency <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 or more	Duration <input type="checkbox"/> under 30min <input type="checkbox"/> 30min to 1hr <input type="checkbox"/> 1 to 2hrs <input type="checkbox"/> 2 to 4hrs <input type="checkbox"/> 4 to 6hrs <input type="checkbox"/> 6 to 8hrs <input type="checkbox"/> 8 to 10hrs <input type="checkbox"/> over 10hrs	Intensity <input type="checkbox"/> mild <input type="checkbox"/> moderate <input type="checkbox"/> intense	Development <input type="checkbox"/> developed extremely <input type="checkbox"/> developed moderately <input type="checkbox"/> did not develop Success <input type="checkbox"/> extremely successful <input type="checkbox"/> somewhat successful <input type="checkbox"/> unsuccessful Satisfaction <input type="checkbox"/> extremely satisfied <input type="checkbox"/> somewhat satisfied <input type="checkbox"/> dissatisfied
3. PRACTICE / TRAINING ("sport" training) Technical / tactical training to develop sport-specific skills (e.g., do skating drill on the ice, practice formation on soccer field, train beam routine in gymnastics, work on skip drill on the track) <input type="checkbox"/> Did not participate	Frequency <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 or more	Duration <input type="checkbox"/> under 30min <input type="checkbox"/> 30min to 1hr <input type="checkbox"/> 1 to 2hrs <input type="checkbox"/> 2 to 4hrs <input type="checkbox"/> 4 to 6hrs <input type="checkbox"/> 6 to 8hrs <input type="checkbox"/> 8 to 10hrs <input type="checkbox"/> over 10hrs	Intensity <input type="checkbox"/> mild <input type="checkbox"/> moderate <input type="checkbox"/> intense	Development <input type="checkbox"/> developed extremely <input type="checkbox"/> developed moderately <input type="checkbox"/> did not develop Success <input type="checkbox"/> extremely successful <input type="checkbox"/> somewhat successful <input type="checkbox"/> unsuccessful Satisfaction <input type="checkbox"/> extremely satisfied <input type="checkbox"/> somewhat satisfied <input type="checkbox"/> dissatisfied

<p>4. PRACTICE / TRAINING ("mind" training) Mental training to develop mental abilities and character for your sport (e.g., set goals with coach, do relaxation exercise with sport psychology consultant, do team building activity, write in journal to evaluate performance)</p> <p><input type="checkbox"/> Did not participate</p>	<p>Frequency</p> <p><input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 or more</p>	<p>Duration</p> <p><input type="checkbox"/> under 30min <input type="checkbox"/> 30min to 1hr <input type="checkbox"/> 1 to 2hrs <input type="checkbox"/> 2 to 4hrs <input type="checkbox"/> 4 to 6hrs <input type="checkbox"/> 6 to 8hrs <input type="checkbox"/> 8 to 10hrs <input type="checkbox"/> over 10hrs</p>	<p>Intensity</p> <p><input type="checkbox"/> mild <input type="checkbox"/> moderate <input type="checkbox"/> intense</p>	<p>Development</p> <p><input type="checkbox"/> developed extremely <input type="checkbox"/> developed moderately <input type="checkbox"/> did not develop</p> <p>Success</p> <p><input type="checkbox"/> extremely successful <input type="checkbox"/> somewhat successful <input type="checkbox"/> unsuccessful</p> <p>Satisfaction</p> <p><input type="checkbox"/> extremely satisfied <input type="checkbox"/> somewhat satisfied <input type="checkbox"/> dissatisfied</p>
<p>5. MEETING ("planning, instructing, or debrief") Individual or group meeting with coach / teammates to discuss sport-related information, knowledge, skills (e.g., meet with team to plan for the next competition, go over the training schedule for the season with coach, watch a video clip with coach and teammates to evaluate to last game, meet with leader/captain to discuss an issue, meet with coach right after the race to evaluate performance).</p> <p><input type="checkbox"/> Did not participate</p>	<p>Frequency</p> <p><input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 or more</p>	<p>Duration</p> <p><input type="checkbox"/> under 30min <input type="checkbox"/> 30min to 1hr <input type="checkbox"/> 1 to 2hrs <input type="checkbox"/> 2 to 4hrs <input type="checkbox"/> 4 to 6hrs <input type="checkbox"/> 6 to 8hrs <input type="checkbox"/> 8 to 10hrs <input type="checkbox"/> over 10hrs</p>	<p>Method of communication (check all that apply)</p> <p><input type="checkbox"/> face to face <input type="checkbox"/> over the phone <input type="checkbox"/> over skype or facetime <input type="checkbox"/> over email or text</p>	<p>Development</p> <p><input type="checkbox"/> developed extremely <input type="checkbox"/> developed moderately <input type="checkbox"/> did not develop</p> <p>Success</p> <p><input type="checkbox"/> extremely successful <input type="checkbox"/> somewhat successful <input type="checkbox"/> unsuccessful</p> <p>Satisfaction</p> <p><input type="checkbox"/> extremely satisfied <input type="checkbox"/> somewhat satisfied <input type="checkbox"/> dissatisfied</p>
<p>7. OTHER Additional sport-related activity not represented in 6 previous types - SPECIFY</p> <p>_____</p> <p>_____</p> <p><input type="checkbox"/> Did not participate</p>	<p>Frequency</p> <p><input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 or more</p>	<p>Duration</p> <p><input type="checkbox"/> under 30min <input type="checkbox"/> 30min to 1hr <input type="checkbox"/> 1 to 2hrs <input type="checkbox"/> 2 to 4hrs <input type="checkbox"/> 4 to 6hrs <input type="checkbox"/> 6 to 8hrs <input type="checkbox"/> 8 to 10hrs <input type="checkbox"/> over 10hrs</p>	<p>Intensity (if relevant)</p> <p><input type="checkbox"/> mild <input type="checkbox"/> moderate <input type="checkbox"/> intense</p>	<p>Development</p> <p><input type="checkbox"/> developed extremely <input type="checkbox"/> developed moderately <input type="checkbox"/> did not develop</p> <p>Success</p> <p><input type="checkbox"/> extremely successful <input type="checkbox"/> somewhat successful <input type="checkbox"/> unsuccessful</p> <p>Satisfaction</p> <p><input type="checkbox"/> extremely satisfied <input type="checkbox"/> somewhat satisfied <input type="checkbox"/> dissatisfied</p>

Appendix E
Semi-Structured Interview for Study 3 (Multiple Case Study)

GENERAL OPENING QUESTIONS

1. What was your experience of participating in Study 2?
2. What motivated you to participate in this study?

Interviewer: *The purpose of this study is to examine if and how you use your smartphone, including social media, to manage yourself and your environment so my questions will pertain to this.*

A. SELF-REGULATION / SELF-CONTROL

General

1. Does using your smartphone help you to function on a daily basis and if so, how (e.g., reminds you to go to your physio appointment, makes you feel better when you see a compliment on social media)? Does using it sometimes impede your functioning and if so, how (e.g., distracts you when doing homework, you find it hard to turn your phone off or put your phone down, makes it difficult for you to fall asleep, you lose track of time when using your phone)?
2. Does using your smartphone help you to manage or respond well to your environment and if so, how (e.g., you reach out to a friend when you see on social media that he needs help)? Does using it sometimes lead you to respond poorly to your environment and if so, how (e.g., you lash out at someone in a response to her text message, causes you to spend too much time responding on social media and then experience fatigue, stress, or anxiety as a result)?
3. Overall, does using your smartphone lead you to have more or less control over your personal, sport, and academic life (e.g., it helps me to keep track of everything I have to do, makes me waste valuable time)? Please explain and give examples.

In-depth

Forethought (Preparation)

1. Does using your smartphone ever help you to prepare or get ready to learn and perform in sport and school? Or does using it prevent you from preparing to learn and perform?
Explain. For example, does it help you:
 - a. Set goals
 - b. Make plans or to-do lists
 - c. Prioritize activities and demands based on deadlines
 - d. Manage your time
 - e. Keep track of elements of tasks (e.g., assignments, tests, training, practice, competition) you must learn or perform?

2. Does using your smartphone help you to get motivated and confident to learn and perform in sport and school? Or does using it prevent you from feeling this way? Explain.

Performance

1. During learning or performance situations in sport and school:

- a. Does using your smartphone ever help you to focus and remind yourself of what you need to do to succeed or achieve your goals? Or does using it prevent you from focusing and recalling important information? Explain.
- b. Do you recognize when it is appropriate and inappropriate to use your cell phone?
Do you act accordingly based on what is appropriate or inappropriate (e.g., can you resist the temptation to check your phone while training because it may interfere with your focus, intensity, and motivation to continue)?
- c. Does using your smartphone ever lead to you become emotional to the point where you feel energized or on the contrary, depleted? Does this impact your learning and performance? Explain.
- d. Do you ever use your smartphone to observe, track, and/or record specific aspects of your learning or performance? If so, how (e.g., watch videos, write notes, journal)?
- e. Has using your smartphone ever showed you something about yourself of which you were otherwise unaware (e.g., through a picture, video, graph, tracking app)?
Was this information helpful or unhelpful? Explain.

Self-Reflection

1. Does using your smartphone ever help you to reflect on or evaluate your learning or performance in sport and school? Or does using it after learning or performance situations prevent you from engaging in self-reflection? Explain.
2. Do you ever use any features or functions on your smartphone in order to compare your performance to the performance of others (e.g., teammates, opposition, friends, acquaintances, strangers, etc.)? If so, how and is this helpful or unhelpful?
3. [Social Media] Do you ever display or discuss your learning or performance outcomes in sport and school via social media? How so?
4. Do you feel that you honestly depict your feelings, judgements, and reactions to your learning or performance in sport and school over social media? Or, do you ever portray an overly optimistic or overly pessimistic version of your learning or performance?
5. How quickly following learning or performance situations in sport and school do you reconnect with your smartphone? Generally, what do you do first when you reconnect with your smartphone? (i.e., is this related to sport, school, or something else?)
6. Does your satisfaction or dissatisfaction with your learning or performance in sport and school influence when and how you next interact with your smartphone? Explain.

B. SOCIAL MEDIA

1. What forms of social media do you typically use via your smartphone?

- a. How often during the day?
2. What are some of your reasons for using social media? (e.g., entertainment, boredom, socializing, etc.)
3. How do you describe or portray yourself on social media? (e.g., as an athlete, student, socialite, etc.).
4. What do your social media profiles say or reveal about you? (e.g., as an athlete, student, socialite, etc.).
5. Do you have one identity that you strive to maintain on social media? Or, many? Explain.
 - a. Do you spend a lot of time building and managing this(these) identity(ies)?
 - b. What kinds of things do you need to do in order to manage and maintain this(these) online identity(ies)?
 - c. Do you think others see you as you'd like them to?
 - d. Do you ever get concerned that others will perceive you differently than you intended?
6. Generally, are you satisfied or dissatisfied with your identity(ies) and image on social media?
7. How much do(es) your online identity(ies) reflect your 'true' identity, personality, and lifestyle in your daily life? Explain.

C. USE OF SMARTPHONE TO OPTIMIZE SELF-REGULATION, LEARNING, PERFORMANCE, AND WELL-BEING

1. Overall, are there ways in which you could start or stop using your smartphone to optimize your learning, performance, and well-being as a student-athlete?
2. Are there any smartphone-related rules or regulations you would need to see enforced or lifted (within your school, sport, or peer group) to help you develop and maintain optimal performance and well-being as a student-athlete?
3. Is there any advice you would give to younger generations of student-athletes in order for them to get the most of their smartphone usage to maximize their learning, performance, and well-being? Explain.

SUMMARY OF QUESTIONS & COMMENTS

1. What do you take away from this interview?
2. Would you like to add anything else?
3. Thank you for your participation in this study.