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The Self-Regulation and Smartphone Usage Model: A Framework to Help Athletes Manage Smartphone Usage

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Self-regulation is essential for optimal development, performance, and well-being in sport, and smartphones may support and hinder this self-regulation. The relationship between smartphones and self-regulation has seldom been investigated in sport. Thus, the purpose of this study was to examine self-regulatory processes, conditions, and outcomes related to athletes' smartphone usage. Twenty-four competitive and high-performance athletes from eight sports participated in individual interviews informed by the models of self-regulated learning and self-regulatory strength. Themes created from a directed content analysis aligned with components of both models and were integrated with new themes to form the "Self-regulation and Smartphone Usage Model" (SSUM). The SSUM illustrates a cyclical model of self-regulation and smartphone usage across five components: self-regulation capacity, processes, conditions, outcomes, and competencies. While self-regulation demands can be increased because of smartphones and lead to depletion, smartphones can be powerful vehicles to strengthen self-regulation competencies.

Keywords: self-control, self-regulated learning, self-regulatory strength, depletion

Self-regulated learning (SRL) refers to "self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals" (Zimmerman, 2000, p. 14). Effective SRL processes such as strategic planning, self-monitoring, and self-reflection have been associated with enhanced performance and well-being in sport (Dubuc-Charbonneau & Durand-Bush, 2015; Englert, 2016; Kitsantas et al., 2017). Self-regulatory strength (SRS), a global energy resource used to exert volitional control (Englert, 2016), is also important for optimal athletic performance, particularly for motor impulse control, anxiety and attention regulation, and persistence (Englert, 2016; Furley et al., 2013).

Smartphone Usage

A new component of the sport context that athletes must regulate is the smartphone. Research in the sport psychology domain is predominantly focused on athletes' use of social media (e.g., David et al., 2018; Encel et al., 2017; Fortes et al., 2019; Sanderson & Hull, 2015). Only a few studies explicitly pertain to the smartphone usage of athletes (DesClouds & Durand-Bush, 2021; DesClouds et al., 2022; DesClouds et al., 2018; Fortes et al., 2019; Greco et al., 2017). This work has shown that athletes use their phones for a variety of purposes, including to supplement self-regulatory behaviors (e.g., enhance self-observation through video, support strategic planning through leaderboard apps) in and around the sport context (DesClouds & Durand-Bush, 2021). DesClouds et al. (2022) suggested that self-regulation might buffer the negative implications of athlete smartphone usage (e.g., stress, distraction, disengagement, loneliness) and facilitate positive capabilities through the supplementation of self-regulation processes. Other studies have shown that such processes may be essential for using smartphones in facilitative ways (e.g., Carrier et al., 2015; Hofmann et al., 2017; Khang et al., 2013).

There are also drawbacks to using smartphones in the sport context, such as concentration disruption (Encel et al., 2017), increased cognitive load (Fortes et al., 2019), and mental fatigue (Fortes et al., 2019; Greco et al., 2017). To gain more insight into the nuanced relationship between athletes' smartphone usage and self-regulation skills like attentional control, scholars have expressed a need to look at the context, purpose, and time of usage as well as characteristics of individual users (DesClouds & Durand-Bush, 2021; Ellis, 2019; Odgers & Jensen, 2020). Studies integrating frameworks that can account for the continuum of smartphone usage are needed. To date, there are no empirical investigations incorporating self-regulation frameworks to study and empirically inform guidelines to help athletes optimize the use of smartphones (Durand-Bush & DesClouds, 2018).

Self-Regulation Frameworks

There are two widely supported self-regulation frameworks that shed light on self-regulatory processes to either control impulses (i.e., model of SRS, Baumeister et al., 2007) or accomplish tasks (i.e., model of SRL, Zimmerman, 2000).

Model of SRL

Zimmerman's (2000) model of SRL is a proactive, goal-centered model that presents self-regulation as a cyclical occurrence of several cognitive processes. The model involves three phases of forethought, performance, and self-reflection, which encompass both covert processes (e.g., strategic planning, self-recording, attentional control, self-evaluation) and self-beliefs that guide planning and adaptation, and impact overall self-regulation capacity. With a focus on performance and learning in sport (e.g., Dubuc-Charbonneau & Durand-Bush, 2015; Kitsantas et al., 2017), the SRL framework lends itself well to examining how usage might support athletes' performance and development. However,

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Zimmerman's model does not take into consideration the potential for self-regulation overload or a peak threshold at which self-regulation demands may become too excessive for an individual to handle. Equally, the SRL model does not consider convergence between self-regulation attempts in differing and potentially overlapping domains (e.g., home and sport), which is a fundamental feature of smartphone usage. For these reasons, it is important to also consider the SRS model.

Model of SRS

The model of SRS (Baumeister et al., 2007) focuses on self-regulation capacity and self-control. It involves a primary resource of SRS, which becomes depleted as individuals complete a self-control task (e.g., executive function, adaptive behavior, self-presentation). The main tenet of the model is that acts of self-control at a particular moment in time will reduce self-control performance at a subsequent moment in time. As SRS diminishes, individuals can enter a state of ego depletion, whereby subsequent self-control processes are inhibited until an adequate level of strength is replenished. Self-regulation is regarded as a finite, domain-general resource used to exercise self-control and implement other executive functions including focus, persistence, decision making, and emotional regulation. Furthermore, SRS can be built over time and replenished once it is depleted (Bauer & Baumeister, 2010). Notably, the SRS model differs from models of attention and cognitive load by focusing on a subsequent reduction in self-regulation, rather than a concurrent inhibition to attention or working memory (Schmeichel & Baumeister, 2004). This is imperative in the sport context in which smartphone usage is often regarded for its ability to negatively impact subsequent performance outcomes (e.g., Encel et al., 2017; Fortes et al., 2019). The SRS model has been used to explain sport-related factors (e.g., performance, choking, anxiety, impulse control, defeat; see Englert, 2016 for overview) as well as conditions of self-regulation depletion and failure. The model of SRS is limited in its explanations of underlying psychological mechanisms and processes. As well, the notion of ego depletion has been reexamined and expanded by several researchers (e.g., Englert, 2016). Nevertheless, the model of SRS can help to contextualize—from a social-cognitive perspective—the potential for smartphones to limit self-regulation capacity due to multiple demands.

Summary and Purpose

The SRL model is arguably a valuable framework to study smartphones as a context-specific self-regulatory tool and examine how various self-regulation processes are developed and supported by smartphones. Complementary to this, the SRS model is well suited to explore cross-domain self-regulation demands as well as global self-regulation capacity and failure. Both models have been referenced in sport psychology research to demonstrate the importance of self-regulation capacity to attain optimal performance and well-being (e.g., Dubuc-Charbonneau & Durand-Bush, 2015; Englert, 2016; Kitsantas et al., 2017). For these reasons, the models of SRL and SRS were used to guide the current study of Canadian athletes' smartphone usage.

The study aimed to answer the following research question: What self-regulatory processes, conditions, and outcomes are related to the smartphone usage of a sample of Canadian athletes, based on the SRL and SRS models? A secondary aim was to put forth a model that could inform research and applied practice pertaining to athletes' use of smartphones. Given that so few studies have explicitly focused on the use of smartphones in sport and no framework exists to guide empirical work in this area, this study fills an important gap in the literature. This work offers the first model of smartphone usage among athletes. It also provides sport leaders with foundational information to support more competent and confident consideration of smartphone usage in the sport context through tailored skill training and purposeful reflection and conversation.

Methods

This study is the fourth study within a larger mixed-methods research project. The previous three independent studies (i.e., Study 1, DesClouds & Durand-Bush, 2021; Study 2, DesClouds et al., 2018; Study 3, DesClouds et al., 2022) explored the experiences, prevalence, patterns, and outcomes of smartphone usage among different cohorts of athletes. Findings provided the rationale and context for this study and informed typologies used to guide the analysis and interpretation of results. The current study aims to continue advancing knowledge by specifically focusing on the interplay between self-regulation and smartphone usage.

Paradigm

A critical realist paradigm, which promotes the use of dialogic methods such as interviewing (Fletcher, 2017), guided the larger mixed-methods project including the current study. Critical realists assume that reality is partially accessible through the perceptions and interpretations of researchers and participants. Multiple perspectives are negotiated and consolidated with existing theory and empirical work to achieve a deeper understanding of reality (Fletcher, 2017). Considering the research question, theories (e.g., SRL and SRS), and existing data used to guide the research process, a critical realist approach was deemed appropriate for this study.

Context and Participants

In order to examine a range of perspectives and experiences, athletes from competitive (i.e., provincial and varsity) and high-performance (i.e., national, Olympic, and professional) sport were recruited. These categorizations are based on definitions from the Canadian High Performance Sport Strategy (2019). The sample represented diverse and inclusive demographics (e.g., age, sex, sport, and competitive level), psychosocial profiles, and smartphone usage dynamics. This allowed the researchers to parse similarities and differences and find a framework to inform smartphone usage within the larger competitive sport context.

Participants were recruited from across Canada through social media and informational emails, using a purposive sampling technique (Patton, 2002). Snowball sampling also occurred through word of mouth from participants and other community members who were aware of the larger research project. Participants had to be 13 years of age or older; this age limit was implemented to represent entry into high school and the "train to train" stage of the long-term athlete development framework, when increased commitment to sport performance, sport specialization, and heightened competition intensity begin (Sport for Life, 2019). Also, at this age, participants could independently consent to study participation. Ethics approval was granted from the ethics board of the research institution (University of Ottawa), and all study participants signed a consent form prior to data collection.

A total of 24 athletes (nine males, 15 females) from 10 different sports (i.e., sailing, curling, track and field, hockey,

football, ultimate Frisbee, volleyball, alpine skiing, soccer, and snowboard) took part in an individual interview. Participants ranged from 13 to 39 years of age ($M = 23$) and competed at competitive ($n = 12$) and high-performance ($n = 12$) levels. Participants estimated that on average, they were using their smartphone 19 hr per week (approximately 2–3 hr per day). Please see Table 1 for an overview of all 24 participants.

Interviews

Each of the 24 individual interviews were conducted by the first author either in-person at a mutually convenient location, or over video/telephone. Interviews were held throughout the recruitment year and ranged from 37 to 92 min ($M = 62.1$ min). Recruitment occurred until the researchers could make a strong case that a diverse sample of athletes had been included and an acceptable level of saturation had been reached. Saturation was reached by the final two interviews whereby the researchers could suitably answer the research question and identify repetition and familiarity in the topics being discussed. It was deemed that further inquiry would be counterproductive to the research objectives and efficiency (Mason, 2010).

Congruent with the critical realist approach, a multisection, theory-driven interview guide was used to direct the in-depth, semistructured interviews (Smith & Elger, 2014). The guide targeted the models of SRL and SRS but was flexible and prompted active, collaborative interviewing, whereby a critical dialogue was undertaken between the first author and the participant. Furthermore, the researcher aimed to draw on participants' experiences and critically evaluate their accounts against existing empirical knowledge (Smith & Elger, 2014).

The first section of the interview guide included a screening question, where participants self-identified as a heavy or light smartphone user based on provided definitions of heavy (i.e., you feel pressure to have your phone on you, feel that you have to check/respond all the time, and use your phone all/most of the day) and light usage (i.e., you rarely/never feel pressure to have your phone on you, you often/always feel that you can ignore your phone, and you seldom/sometimes use it throughout the day). The second section pertained to demographic questions such as age, sport, competitive level, academic and work status, and basic perceptions of time spent studying, training, competing, working, and using the smartphone.

The third section of the guide was informed by the models of SRL and SRS. Participants were asked general questions pertaining to their smartphone usage for self-regulation purposes (e.g., Does using your smartphone help you to function on a daily basis and if so, how? Overall, does using your smartphone lead you to have more or less control over your life? Please explain and give examples). Following this, participants were asked questions pertaining to specific phases of SRL (e.g., Forethought: How does using your smartphone help you to prepare or get ready to learn and perform? Does using it ever prevent you from preparing to perform? Self-reflection: Does using your smartphone ever help you to reflect on or evaluate your learning or performance? Explain) and elements of SRS (e.g., Has using your smartphone ever led you to become emotional to the point where you felt

Table 1 Participant Characteristics

Sport	Level	Age	Sport gender	Usage category
Snowboard	High performance	24	Female	Heavy
Volleyball	Competitive	16	Female	Heavy
Soccer	Competitive	17	Male	Light
Hockey	Competitive	16	Female	Heavy
Hockey/ultimate Frisbee	Competitive	25	Female	Light
Basketball	Competitive	16	Female	Heavy
Swimming	Competitive	18	Female	Light
Volleyball	Competitive	23	Female	Light
Track and field	High performance	25	Male	Heavy
Sailing	High performance	20	Male	Heavy
Sailing	High performance	26	Male	Light
Curling	High performance	21	Female	Light
Football	Competitive	22	Male	Heavy
Ultimate Frisbee	High performance	39	Female	Light
Ultimate Frisbee	High performance	26	Female	Heavy
Hockey	Competitive	20	Male	Heavy
Ultimate Frisbee	Competitive	34	Female	Heavy
Football	Competitive	13	Male	Heavy
Hockey	High performance	24	Female	Heavy
Track and field	High performance	28	Male	Heavy
Curling	High performance	33	Female	Heavy
Curling	High performance	30	Female	Light
Track and field	Competitive	23	Female	Light
Alpine skiing	High performance	30	Male	Heavy

energized or on the contrary, depleted? How does this impact your learning and performance?).

The fourth section of the guide pertained to smartphone usage for social media purposes, and the relationship between social media, self-regulation, and image management (e.g., What do your social media profiles say or reveal about you? Do you spend a lot of time building and managing this identity? Explain). The fifth section prompted participants to reflect on their use of smartphones to optimize self-regulation, with a particular emphasis on the impact of their environment (e.g., Are there ways in which you could start or stop using your smartphone to optimize your performance and well-being as an athlete? Does your coach model acceptable smartphone usage at training and competition? Explain). The sixth and final section of the guide provided space for the researcher and participant to collectively summarize the interview, reflect on the discussion and share additional experiences, questions, or comments.

Data Analysis

A qualitative directed content analysis was performed as it is well suited to the critical realist stance to bring to light both supporting and countering evidence for a theory, using various levels of codes (i.e., respondent-driven, researcher-driven, and theory-driven; Hsieh & Shannon, 2005). Moreover, this approach allows researchers to systematically identify trends and patterns in the data (i.e., demi-regularities; Fletcher, 2017). The goal was to search for both supporting and nonsupporting evidence of the theories guiding the study. Hsieh and Shannon's (2005) systematic process allowed for continuous, iterative processes of deduction and induction so that participant accounts could be emphasized first and then compared with existing data, consolidated, and critically examined (Fletcher, 2017).

To begin, the interview recordings were transcribed verbatim and the raw data (i.e., 650 pages of single-spaced transcribed text) were reviewed for familiarization. Using NVivo software (version 12), the first author deductively coded the transcripts into meaning units informed by the models of SRL and SRS as well as typologies identified from the previous three studies within the broader research project. Data that could not be categorized according to theory nor prior typologies were assigned a novel in vivo code. Each meaning unit was then reexamined for specific examples of self-regulation processes, conditions, and outcomes. A synthesis of high-order themes was then performed in order to draw together a single set of conclusions and derive a model of best fit to describe the phenomenon. The researcher cyclically reflected on the thematic structure several times to best represent the data as it related to participants' accounts, the core research question, and the two models informing the study. The thematic structure and generated model were shared and checked with "critical friends" (Smith & McGannon, 2018) through a series of formal meetings with the second author and research peers. The first author's PhD supervisor and academic peers critically examined several iterations of the interview guides, coding tree, high-order themes, Self-regulation and Smartphone Usage Model (SSUM), and quote selections. This group of peers was at arm's length from the interviews and raw research data, and provided critical feedback from the perspective of experts in research, self-regulation, mindfulness, applied sport psychology, and athlete mental health. This process helped with interpretation of the data and consideration of alternative perspectives and feedback. The coding tree was revised seven times and the model of self-regulation and smartphone usage more than five times as a result of reflection and critical feedback sessions.

Results

Results are presented in six sections. The first section introduces the SSUM (Figure 1). The subsequent five sections (i.e., Self-Regulation Capacity, Self-Regulation Tasks, Conditions of Usage, Outcomes, and Self-Regulation Competencies) pertain to the processes, conditions, and outcomes outlined in the SSUM. Results are presented according to the model from left to right. A definition of each component—based on existing literature, previous study typologies, and participants' accounts—is provided at the beginning of each section. Participant identification codes are provided with each citation (VB = volleyball, SN = snowboard, SO = soccer, H = hockey, U = ultimate Frisbee, B = basketball, SW = swimming, T = track and field, F = football, SA = sailing, C = curling, SK = skiing; M = competitor in a male designated sport, F = competitor in a female designated sport). For example, an athlete competing in men's soccer was coded as (SOM1).

The Self-Regulation and Smartphone Usage Model

Neither the model of SRL or SRS on its own accounted for the full range of processes, conditions, and outcomes discussed by participants, which provided the rationale for developing the SSUM (see Figure 1). The SSUM depicts 12 processes, five conditions, and seven competencies that are interrelated. While some existing components of the SRL and SRS models have remained intact in the SSUM (e.g., self-observation, attentional control, self-control practice), other components were shifted and/or renamed to (a) account for the different types of experiences reported by athletes, (b) align with typologies established in previous studies, and (c) use accessible language for applied sport settings. The SSUM also includes new subcomponents derived from the data (e.g., support seeking, conditions of usage). The SSUM represents both conceptualizations of self-regulation, that is forethought, self-control, and self-reflection (SRL; Zimmerman, 2000), as well as finite self-regulation capacity, which can be depleted and restored (SRS; Baumeister et al., 2007). The cyclical flow of the SSUM mirrors that of the model of SRL and is meant to demonstrate continuity between one self-regulation task and the next.

Self-Regulation Capacity

The first component of the SSUM is self-regulation capacity, which is defined as *athletes' self-regulatory strength (available self-regulatory resource) when facing a new self-regulation cycle involving the use of their smartphone.* Athletes gave examples of how self-regulation capacity could be preserved, enhanced, or depleted as they faced a new task, depending on the preceding cycle and their personal self-regulation competencies. They described preserved and enhanced self-regulation capacity as a feeling of being ready, alert, focused, energized, and/or motivated. For example, one athlete shared how using her smartphone prior to a performance task helped her to enhance her capacity to complete the task, "It'll really motivate me. The playlist just puts me into a zone. It will get me ready for what's about to happen" (BBF1). On the other hand, depleted self-regulation capacity was associated with a feeling of being fatigued, distracted, stressed, overwhelmed, trapped, or disengaged. This reduced capacity occurred when one (or multiple) preceding self-regulation cycle (i.e., task completion) led to depletion rather than rejuvenation. One athlete said, "I'd say, [my phone] has never made me energized, more really, really depleted" (VBF1) and another explained that when their

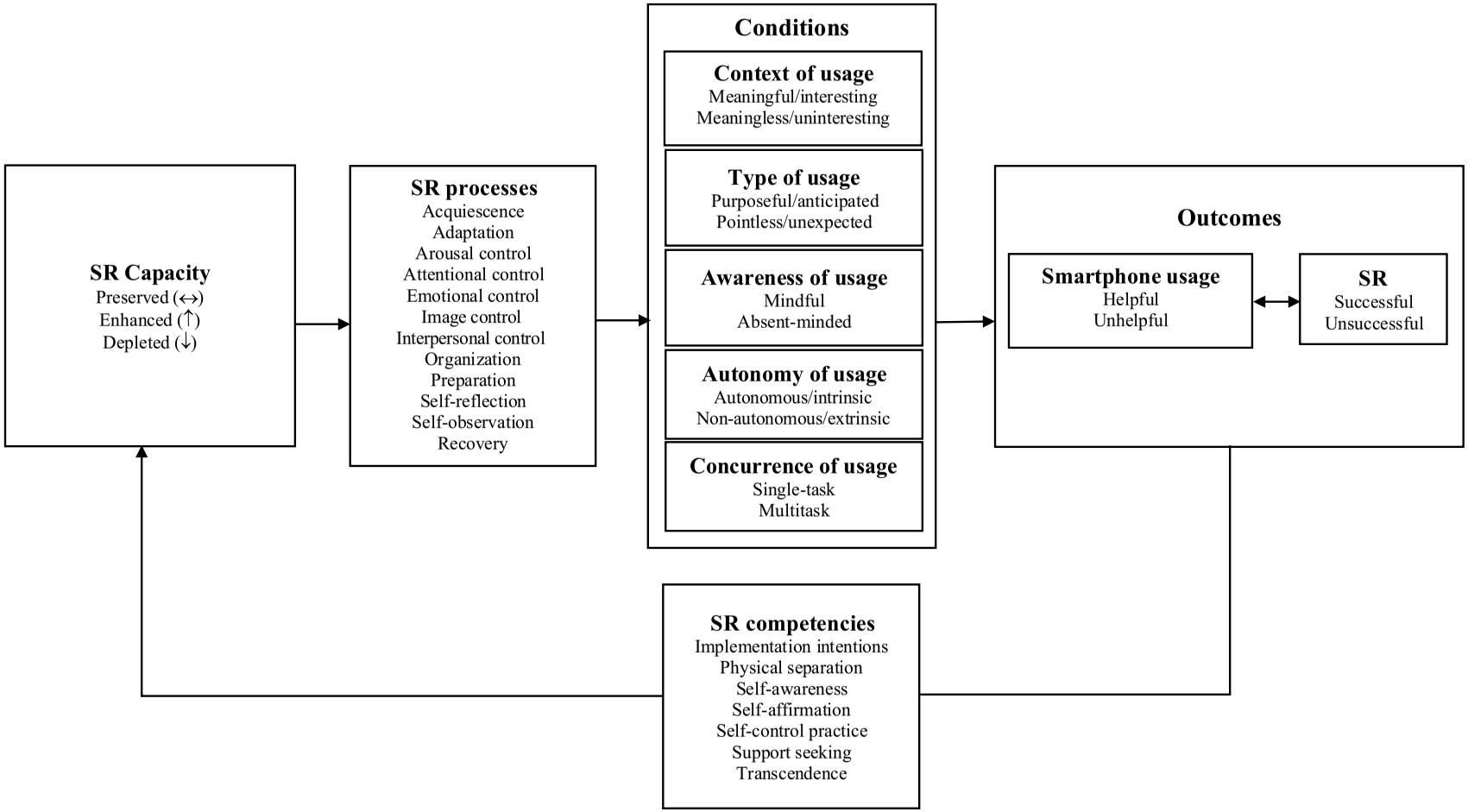

Figure 1 — The self-regulation and smartphone usage model.

self-regulation capacity was already diminished by the end of the day, exerting self-control to sleep was further inhibited by smartphone usage: "I would pull [my phone] out right before bed and just get sucked into the vortex, and then it'd be hard to sleep" (SAM1). Athletes reported that when facing a new cycle in a depleted state, it was more difficult to successfully complete a task.

Self-Regulation Processes

The next component of the SSUM pertains to self-regulation processes, which are defined as *the actions that athletes take with their smartphones to achieve a specific outcome when completing a task.* Self-regulation processes are therefore actions related to or supplemented by smartphone usage, wherein usage refers to using the smartphone or restricting its usage. The athletes described a total of 12 processes related to smartphone usage in and around the sport context. Ten of these processes could be linked to the models of SRS and SRL (i.e., adaptation, acquiescence, arousal control, attentional control, emotional control, image control, interpersonal control, preparation, self-observation, and self-evaluation). The other two were novel processes (i.e., recovery and organization). The 12 self-regulation processes are defined, with examples, in Table 2 and an example is provided for each process.

Interestingly, all athletes shared an example of using social media in relation to these 12 self-regulation processes. Image control stood out as a particularly cumbersome process for athletes, especially high-performance female athletes and those working with sponsors:

> As females, I think there's a big pressure to post on social media in order to advertise our events. If you play in the NHL, you don't need to go on social media before the Stanley Cup first round and let people know that playoffs are coming. Whereas in female sports, you do. People don't know where to watch you or where to see you so we are told to go on social media and let people know. That's added pressure. (HF2)

Conditions of Usage

The third component of the SSUM pertains to conditions of smartphone usage during a self-regulation cycle. Conditions of usage are defined as *circumstances that mediate smartphone usage and outcomes.* Athletes discussed five conditions of usage (i.e., context of usage, type of usage, awareness of usage, autonomy of usage, and concurrence of usage), which were perceived as either positive/helpful or negative/unhelpful in their self-regulation efforts.

Context of Usage

Context of usage refers to *situations in which athletes use their smartphone, which can be meaningful/interesting or meaningless/uninteresting.* Athletes discussed different sport-related situations

Table 2 Self-Regulation and Smartphone Usage Model SR Processes

SR process	Definition of SR process in the context of athlete smartphone usage	Contextual example
Acquiescence	Actions taken to reluctantly accept or perform a task	An athlete reluctantly posts on social media about their competition, conveying inauthentic feelings about their experience, to please a sponsor.
Adaptation	Actions taken to modify thoughts, emotions, or behaviors	A team's competition venue is moved at the last minute so the team captain uses the team's social media chat to alert all team members of the change in real time.
Arousal control	Actions taken to manage activation or intensity	An athlete uses a pump-up playlist to help them build intensity and activate their body.
Attentional control	Actions taken to manage focus and distractions	An athlete puts their phone on "airplane mode" an hour prior to competition to enhance task-specific focus.
Emotional control	Actions taken to manage emotions	An athlete tempers low mood and frustration from a text message conversation in order to stay present and productive at a competition.
Image control	Actions taken to manage the way self-image is conveyed and perceived by others (i.e., self-presentation, impression management, identity management)	An athlete selects and edits photographs and carefully composes a caption to portray a desired athletic image over social media.
Interpersonal control	Actions taken to manage interactions with others (e.g., teammates, coaches, fans)	An athlete responds to a fan belittling their performance on social media.
Organization	Actions taken to manage daily tasks and obligations	An athlete sets reminders for tasks throughout the day using their "reminders" application.
Preparation	Actions taken to analyze upcoming tasks and establish goals, strategic plans, and outcome expectations	An athlete uses their "notes" application to establish a mental preparation routine prior to performance including goals, self-talk phrases, and a debrief plan.
Self-reflection	Actions taken to evaluate performance including seeking feedback, analyzing performance data to explain outcomes, and reviewing reactions	An athlete turns off their phone for a period of time following performance to focus on debriefing the event.
Self-observation	Actions taken to pay attention to performance by collecting and experimenting with personal data	An athlete uses their phone camera to video record their performance to then review this with their coach.
Recovery	Actions taken to return to a normal or desired physical, psychological, and/or emotional state	An athlete silences all notifications on their phone to take a break.

Note. SR = self-regulation.

(i.e., training and competition) that were engaging and important to them in which they used their smartphone, as illustrated in the following example: "As track athletes, most people are in the zone to the point where they would not even talk to their best friend. Phone usage—at that time, at our level—you do not see it much, because the competition is fierce" (TM2). Conversely, there were situations related to school, work, team meetings, and family that were perceived as less important than training and competitive situations: "What's happening on Instagram is a lot more interesting than what's happening in my anatomy notes!" (VB2). In general, situations that were perceived as meaningful/interesting were associated with heightened self-regulation in comparison with those perceived as meaningless/uninteresting.

Type of Usage

Type of usage refers to *the nature of athletes' smartphone usage, which can be purposeful/anticipated or pointless/unexpected.* Athletes described purposeful/anticipated smartphone usage as usage that they planned for, relied on, and integrated in their routines: "The morning of a game day, I'll go on the notes in my phone and write out my three goals for that game coming up—three quick hits I want to focus on. It grounds me" (HF2). Athletes also reported pointless usage and mentioned that it occurred mostly when they were already depleted (e.g., following performance): "When I'm lazy or tired, I'll just go on my phone for half an hour and then start my work. Then, half an hour passes, then 10 more minutes pass; it just keeps going until it's eight o'clock" (VBF1). Unexpected usage was often a result of not having a smartphone regulation plan in place: "We were going to a tournament and an [unexpected] situation came up over text. [The conversation] threw me off and the whole ride I was upset. The whole night I was down. The next morning, I did not perform how I should have" (BF1). In sum, purposeful/anticipated smartphone usage was linked to more positive experiences and outcomes than pointless/unexpected usage.

Awareness of Usage

Awareness of usage refers to *athletes' level of consciousness of their smartphone usage*, *which can be either mindful or absent-minded.* Athletes described mindful smartphone usage as being fully engaged with and attentive to the purpose of their usage as it related to the task they were performing: "I'm very mindful, because in a game, I would never have my cell phone on the ice. I want to practice how I play and that's why in practice I do not have my phone on the ice" (CF3). Mindful usage was also associated with attentional and arousal control, as one athlete described: "Sometimes, if I'm waiting around on game day, I'll go use my phone for Sudoku or something, to just stimulate my mind in a way that's not social media, but still not letting me focus on the game" (HF2). Conversely, absent-minded usage—particularly unplanned social media scrolling—was associated with loss of time and distraction from the task at hand: "I pick up the phone and do something, and then I've totally forgotten what I was going to do. I get pulled down the rabbit hole of this and that, and 20 minutes later I go, 'What am I doing!'" (VF1). In general, mindful usage was more favorably perceived by the athletes in comparison with mindless usage, which was typically associated with unfavorable outcomes (e.g., depletion).

Autonomy of Usage

Autonomy of usage refers to *athletes' level of self-determined smartphone usage, which can be either autonomous/intrinsic (stemming from personally meaningful motives) or non-autonomous/extrinsic (stemming from external motives such as rules or rewards).* Athletes described instances when they felt a high level of autonomy when using their phone. One athlete described a time when she was able to make strong personal choices about her phone usage.

> When we went to [the Olympics] we had a different phone number, so I didn't give that phone number to anyone back home. The only people who could contact me were the people I gave that number to. I even let my family know that the group chat goes off, so I wasn't constantly getting messages. I was proud of the way I handled it! (HF2)

Athletes also shared feeling obligated by coaches, administration, or sponsors to sometimes use their phones in a way that did not resonate with their personal values or goals: "I think [mandatory usage] entices players to rebel. It makes me think my coach does not trust me. I think it takes away a lot of accountability and trust. . . . It's overwhelming" (HM1). Another athlete described how restricted usage imposed by others is counterproductive to resilience: "It feels like an invasion of privacy. If you do not ever expose yourself to anything [that's on your phone], then when something [bad] does happen, it's going to hit you that much harder" (CF3). Overall, autonomous usage was perceived to lead to more helpful and successful outcomes while extrinsically motivated usage was associated with resentment, frustration, and depletion.

Concurrence of Usage

Concurrence of usage refers to *the number of self-regulation processes occurring at the time of athletes' smartphone usage, which can be characterized as single-tasking or multi-tasking.* Athletes described several examples of engaging in self-regulation processes to accomplish a single or specific task while using their smartphone. The following is an illustration of using the phone to facilitate focus on a single task during training: "I'm pretty much tied to my phone for my workouts because they have the progressions, the reps, and the sets right there—demo videos and everything" (UF4). However, sometimes athletes activated multiple self-regulation processes while using their phone, which led to multitasking. An example is provided by the same aforementioned athlete: "Sometimes, when I'm doing a heavy lifting set and the program asks for a 3-minute break, I end up texting with friends or checking email, and I'm like, 'I just cannot leave this alone! Just focus!' (UF4). Overall, multitasking was perceived as more likely to deplete athletes and cause misregulation than single tasking.

Outcomes

The fourth component of the SSUM pertains to outcomes—*the result of self-regulation and smartphone usage, which can be characterized by different dimensions (i.e., cognitive, behavioral, social, emotional).* Athletes discussed positive and negative outcomes of self-regulation (i.e., successful or unsuccessful) and smartphone usage (i.e., helpful or unhelpful), which could impact one another. On the one hand, helpful smartphone usage was generally associated with successful self-regulation and favorable outcomes, as described by one athlete who purposefully used their smartphone to engage in self-observation during recovery, leading to validation and support: "During my rehab recovery, I kept track of where I was at relative to other people. There are tons of people

posting their own rehab journeys. Validation from other people and the support from other people is nice!" (UF1). On the other hand, unhelpful smartphone usage was typically associated with unsuccessful self-regulation and unfavorable outcomes. For example, one athlete described how a lack of interpersonal control via the smartphone led to poor social comparisons and reduced self-confidence: "I see things on my phone, and it's like, 'Why can I not have that? Why can I not do this? If she's doing that, I cannot do it'. It's not motivation that it really impacts, it's self-confidence" (BF1). Another athlete described the interplay between the lack of arousal and attentional control and negative cognitive outcomes: "My mental energy was not spent 100% on the game. There was some mental energy that was wasted thinking about what these random people were saying [on social media]" (CF3). The outcome of a self-regulation cycle ultimately impacted the self-regulation competencies that athletes had to implement to replenish their self-regulation capacity for the subsequent cycle.

Self-Regulation Competencies

The final component of the SSUM pertains to self-regulation competencies, which are *the personal characteristics, knowledge, skills, abilities, behaviors, and attitudes that athletes have learned and developed to preserve or enhance self-regulation capacity*. Competencies derived from the models of SRS and SRL included self-awareness, self-affirmation, self-control practice, implementation intentions, and transcendence. Athletes also reported novel competencies pertaining to support seeking and physical separation from the smartphone. Self-regulation competencies contributed to the availability of self-regulation capacity for a subsequent cycle (e.g., new task). In particular, self-regulation capacity could remain in a state of depletion based on inadequate availability or use of competencies. One athlete, who used her phone to debrief and reflect on performances, described how she favorably used self-awareness to enhance her recovery and her ability to exert emotional control and self-reflection after a hard performance: "If I have a really bad game and I'm not ready to look at the stats yet, or I'm not ready to re-watch game film, I give myself some time to digest what happened. I know that if I engage with it too early, I'm just going to beat myself up about it" (VBF2).

Athletes described that self-regulation competencies often began as deliberate self-regulatory processes such as putting their phone away as part of a readiness routine, or managing social media expectations through exposure and practice. However, through routine practice over time, these processes became automated skills. Some competencies developed in the sport setting were also transferrable to other areas. For example, one athlete attributed his task-switching ability with his phone to his self-control practice in ski training, "[In] skiing, so many things happen like delays and bad weather; you have to learn to be on, then off, then on, then off, all the time. It's something I'm just really used to at this point" (SKM1). Other athletes discussed their experience developing self-regulation competencies with the help of a mental performance consultant, who facilitated smartphone and social media practice in the form of exposure, physical separation, disconnection, forethought, and awareness, as illustrated in this example:

> I had a mental training plan to tackle not caring as much about social media and what people say. The harder work—the exposures—I tried to do right after the season was done, so I had time to digest it. By the time the season was starting, it was about maintaining and self-reflection. Now it's just not as much of a weight on my shoulders as it used to be. I can balance how much I'm on my phone. If something bad happens, I have the tools to be able to fight off the feelings from that. (CF3)

Discussion

The purpose of this study was to examine self-regulation processes, conditions, and outcomes related to athletes' smartphone usage, and put forth a model to optimize the use of mobile devices in the sport context. Results supported a paradoxical twofold relationship between smartphone usage and self-regulation. On the one hand, athletes face increased self-regulation demands because of their use of smartphones, which could lead to depletion. On the other hand, athletes used their smartphones to facilitate the execution of tasks and master self-regulation competencies. The self-regulation processes, conditions, and competencies included in the SSUM are addressed in light of existing theory and literature.

Self-Regulation Processes

Athletes in this study engaged in numerous self-regulation processes that involved the use or the restriction of use of their smartphone, which led to a variety of outcomes. Several processes were linked to the SRL model (e.g., preparation, self-monitoring, self-observation; Zimmerman, 2000) and the SRS model (e.g., attentional control, image control, acquiescence; Bauer & Baumeister, 2010). It was evident that smartphone usage could contribute to both self-regulation success and failure in various situations in and out of the sport context. Multiple processes also paralleled those identified by DesClouds and Durand-Bush (2021) in their study of varsity athletes' smartphone usage experiences (e.g., organization, planning, self-observation, attentional control), which suggests these are important elements to address with this population. Smartphone usage seemed to exist along a continuum of helpful to unhelpful usage, illustrating the potential for each self-regulation process to be aided or disrupted by the use of phones in and out of the sport context. As such, self-regulation processes should not be regarded as being inherently positive or negative, but instead considered in relation to conditions of usage to produce specific outcomes.

Self-regulation processes represented actions that required SRS or self-regulation capacity. This substantiates Baumeister et al.'s (2007) view that any self-regulatory action—successful or unsuccessful—can have a depleting effect, except for actions or processes that have become innate or automatic. While athletes could work with smartphones to manage performance and daily tasks, they required self-regulation capacity to do this and this capacity had to be replenished. Failure to replenish self-regulation capacity could impact athletes' performance including their focus and decision-making ability (Englert, 2016; Furley et al., 2013).

Athletes' accounts corroborated that social media can disrupt attention (David et al., 2018; Encel et al., 2017) and increase cognitive load (Fortes et al., 2019; Greco et al., 2017) through depleted self-regulation capacity. However, a number of self-regulation processes can be supported by social media and positively impact performance, learning, and well-being depending on the conditions of usage (e.g., use social media to focus attention on motivational content, vicariously learn from elite athletes, serve as a role model for younger athletes, seek support from family and friends). Effective self-regulation processes may, therefore, buffer negative implications of smartphone usage and facilitate more positive, functional uses of these

devices (DesClouds & Durand-Bush, 2021; Carrier et al., 2015; Hofmann et al., 2017; Khang et al., 2013).

Athletes' discussion of image management demands incurred by social media usage was significant. These demands were costly to their time and energy, and on occasion, their emotions and self-control. Rahikainen and Toffoletti (2021) examined the concept of "digital labor" shouldered by female climbers in order to yield and maintain sponsorship opportunities. A key component of this labor was image management, which was equally reported by athletes in this study along with its depletion effects, particularly female athletes performing at a professional or Olympic level. It appears that digital presence is a necessary part of being an athlete in today's society, particularly for vocational success (David et al., 2018; Rahikainen & Toffoletti, 2021; Sanderson & Hull, 2015). However, the burden imposed by this new set of media demands has been largely overlooked. Given that self-regulation capacity can be depleted by image management demands (Baumeister et al., 2007), more attention must be paid to this in the future.

Conditions of Usage

The interplay between self-regulation processes and conditions of usage may lead to a variety of outcomes, as depicted in the SSUM. Such findings are in line with previous work highlighting that usage outcomes are driven more by context and purpose of usage, rather than amount (DesClouds et al., 2022; Ellis, 2019; Odgers & Jensen, 2020). Findings also suggest that disconnecting from smartphones entirely is not the only (and often not the best) strategy for mitigating negative effects of smartphone usage (Durand-Bush & DesClouds, 2018). Instead, awareness and management of usage conditions may dictate whether or not smartphones are helpful or unhelpful and whether or not they facilitate or hinder athletes' self-regulation.

Context of Usage

Athletes described many instances of successful self-regulation in contexts that were meaningful and interesting to them. This finding supports the SRL model's social cognitive approach, which highlights the vital role of the environment in self-regulation (Zimmerman, 2000). Furthermore, in both the SRL and SRS models, boredom, apathy, and disinterest are presented as inhibitors of self-regulation (Baumeister et al., 2007; Zimmerman, 2000). Athletes provided several accounts of unsuccessful self-regulation (e.g., distraction, multitasking, and succumbing to smartphone temptation) in contexts that were uninteresting, boring, or unimportant to them (e.g., class, work, team meetings, and social situations). Zimmerman (2000) suggested that this is because self-regulation processes require effort that is typically only deployed when the outcome or skill is highly valued. Thus, if athletes are disinterested or disengaged in a particular situation or context, they may not be able to or want to invest the effort required to effectively self-regulate the use of their mobile device.

Type of Usage

Participants also addressed various types of smartphone usage (i.e., purposeful/planned; purposeless/reactive). The former type reportedly led to helpful and successful outcomes, which is supported by the models of SRL and SRS. Both models dictate the importance of intent, purpose, planning, and forethought in successful self-regulation (Bauer & Baumeister, 2010; Zimmerman, 2000). In the sport context, planning has been shown to prevent depletion of SRS, as intentions for behavior can activate automatic processes that do not draw on the self-regulatory resource (Englert, 2016). Likewise, Zimmerman (2000) contended that dysfunctional self-regulation is reactive and lacks goal structure, strategic planning, and personal agency. This is supported by athletes who described reactive, unplanned, purposeless, and extrinsically motivated usage as the most significant catalysts of unfavorable outcomes.

Awareness of Usage

This study shows that mindful use of smartphones facilitates other helpful conditions such as purposeful, planned, and task-specific usage. Mindful usage can curtail many negative cognitive, behavioral, and emotional effects of usage, thus preserving self-regulation capacity and lessening the potential for self-regulatory failure. These findings show that metacognition and mindfulness are important to task performance, executive function, and well-being in digital environments (Bauer et al., 2017; Carrier et al., 2015). Interestingly, athletes appeared to have a heighted capacity for mindful usage in the sport context, which is not entirely surprising given that attentional capacity and selectivity are essential to optimally perform (Perry, 2005). Also, athletes were especially mindful of their smartphone usage just prior to performance, and social media usage was not always perceived as debilitative or unproductive. In many instances, purposeful and mindful social media use aided motivation and self-concept—benefits that have been noted in the literature (David et al., 2018; Sanderson & Hull, 2015).

Athletes' absent-minded usage appeared to be the most detrimental to their self-regulation, in general. This parallels findings by Marty-Dugas et al. (2018) who found that absent-minded smartphone usage was consistently related to inattention. Furthermore, athletes' mindless usage occurred more after performance when they gave little attention to the process of reconnecting with their phone and could find themselves depleted and misregulating in postperformance scenarios requiring recovery (Balk & Englert, 2020). "Internal process prioritization" is a concept from the SRS model showing that self-regulation failure can occur despite clear standards and monitoring because one gives into and acts on habitual processes (Heatherton & Baumeister, 1996). This phenomenon may help explain the abundance of absent-minded usage that was reported in situations where athletes had been exerting significant self-control during their sport performance but subsequently failed to effectively control their smartphone usage, self-evaluation, and recovery postperformance.

Autonomy of Usage

According to the athletes, they were more likely to achieve helpful or successful outcomes when they perceived autonomy over their usage, and when their usage was in line with their values and goals. Baumeister et al. (2007) reported that "self-control refers to the capacity for altering one's own responses, especially to bring them into line with standards such as ideals, values, morals, and social expectations, and to support the pursuit of long-term goals" (p. 351). It appears that intrinsically aligning smartphone usage with values and goals is important for successful self-regulation. As Muraven (2008) has shown, perceiving a high level of autonomy over a self-control task may be less depleting than when a task is externally dictated.

Smartphone usage was not solely dependent on individual choice; it was also influenced by the environment including social pressures and norms (i.e., "social expectations"; Baumeister et al., 2007; Zimmerman, 2000). In line with the SRL model (Zimmerman, 2000), findings illustrate interrelated environmental,

social, and self-processes. The influence of the environment was extremely prevalent in the athletes' accounts and was deeply linked to the behaviors and choices of others. As originally proposed by Zimmerman (2000) and by DesClouds and Durand-Bush (2021), the environment may function as a self-regulation resource for athletes, allowing for practiced, purposeful, and meaningful smartphone usage control.

Concurrence of Usage

All athletes provided examples of a myriad of competing self-regulation and smartphone processes and cross-domain demands. Findings underscore the potential for smartphones to elicit depleting multitasking behaviors, which can limit executive function, planning, self-monitoring, and self-control (Carrier et al., 2015; Magen, 2017). Multitasking was generally unhelpful to athletes in this study and led to unsuccessful outcomes, particularly when the smartphone introduced an unplanned interruption and the athlete would rapidly and mindlessly react. In line with the tenets of the SRS model, self-regulation processes in one context could be impacted by *prior* demands from another context (Baumeister et al., 2007; Englert, 2016). While athletes used smartphones to switch between tasks to manage multiple demands (e.g., stay connected with work while training on a high-intensity schedule), this could also be draining (e.g., cause cognitive overload or overwhelming demands) if executive resources were not replenished. Single tasking was generally associated with more practiced, planned, purposeful, and mindful usage in that athletes described taking focus away from or toward their smartphone to deliberately complete a task, even if very quickly (e.g., check work notifications during set breaks in training). Taken together, these results show the athletes' propensity for task switching due to technological distractions, which can be detrimental to the performance of those who rapidly respond to interruptions and do not have metacognitive strategies in place to guide their awareness or ability to stop and refocus on a new task (Carrier et al., 2015).

Self-Regulation Competencies

All athletes described the use and mastery of self-regulation competencies to help optimize their self-regulation and smartphone usage. This shows that self-regulation is not a static but rather a malleable capacity that can be developed through various competencies (Bauer & Baumeister, 2010; Zimmerman, 2000). Both models of SRS and SRL (Bauer & Baumeister, 2010; Zimmerman, 2000) and related research (Englert, 2016) have shown that self-regulation capacity can be fortified through routine practice. Likewise, many of the competencies discussed by the athletes (e.g., implementation intentions, transcendence, practice) have been noted in both the models of SRL and SRS for their ability to enhance self-regulation from either a resource or learning perspective. In the SRL model, these are discussed as task competencies that can facilitate the development of self-regulatory skill (Zimmerman, 2000) and can become engrained in performers' actions through practice. Baumeister et al. (2007) referred to this same phenomenon as forming a resistance to depletion wherein self-control is depleted at a slower rate because self-regulation competencies have been thoroughly practiced to the point of automation.

Athletes mentioned that support seeking (e.g., from a mental performance consultant) to learn to manage smartphones was an important self-regulation competency, which was advocated by Durand-Bush and DesClouds (2018). Participants' competencies were also influenced by the way usage was modeled at home or in the sport environment. Zimmerman (2000) noted that interpersonal relationships can be a resource for self-regulation, and those without exposure to communities where successful self-regulation is taught, modeled, and rewarded may have lower capacity. Athletes' sport community may therefore be an essential resource for motivating and fostering helpful, successful smartphone usage.

Applied Considerations

The SSUM shows that regardless of negative or positive outcomes of self-regulation and smartphone usage, a self-regulation cycle is depleting in and of itself. It takes effort to restrict usage and it also takes effort to use smartphones wisely, thus capacity is required for athletes to flourish, particularly when presented with new, unexpected, or concurrent demands (Englert, 2016). It also takes time and dedication to develop self-regulation capacity and practice is essential to success (Bauer & Baumeister, 2010; Englert, 2016; Zimmerman, 2000). When it comes to smartphone usage, athletes cannot be expected to successfully modify behaviors overnight. Developing usage patterns to supplement self-regulation or implementing new restrictions to lessen demands should be periodized like any other sport skill and modeled in the sport environment (Zimmerman, 2000).

Coaches and mental performance consultants can help athletes by having conversations early and regularly about the role of smartphones and how various elements can impact the management of these devices (e.g., planning, attention, recovery). In these conversations, it is imperative to foster athlete autonomy and intrinsic motivation (Bauer & Baumeister, 2010; Englert, 2016; Zimmerman, 2000) by eliciting and connecting with athletes' experiences, values, and goals, rather than making assumptions and ascribing general rules (Durand-Bush & DesClouds, 2018). Coaches should avoid controlling usage and instead help athletes to understand and make usage decisions for themselves.

Since recovery was identified as a key self-regulation competency (Balk & Englert, 2020), athletes should develop routines for smartphone usage that include opportunities to recover and replenish capacity. This involves paying close attention to phone connection and disconnection periods, as well as readiness signals for social media interaction. Smartphone usage plans should also help athletes remain aware of how contextual factors influence their usage and self-regulation and how they can stay accountable to themselves when capacity is low. This involves helping athletes discuss and monitor their helpful and unhelpful usage patterns across different facets of their life (e.g., school, work, sport; Durand-Bush & DesClouds, 2018). Given the prominent role of social media in athletes' lives, mental performance consultants should help athletes manage their self-image, particularly as it affects marketing, role modeling, and sponsorship situations. All of these activities inevitably place additional demands on athletes, thus costs versus benefits must be taken into consideration when optimizing efforts.

Strengths, Limitations, and Future Directions

This is the first study to propose a model related to athlete self-regulation and smartphone usage. As such, more research on the SSUM should be conducted and include the perspectives of other athletes. A strength of this study was the inclusion of athletes with diverse profiles and experiences. However, the sample was limited to Canadian athletes and included more women than men, so broad generalizations should not be made. Future research should continue aiming for diverse backgrounds and target more sexes and identities across competitive levels. This study also corroborates previous work showing individuals' complex and nuanced

experiences with smartphones. Yet, it specifically demonstrated that smartphones can be used to supplant and support athletes' self-regulation and suggests that there are conditions of usage for effective use of smartphones and self-regulation. While more studies are needed to substantiate this, this research begins to provide a foundation for the development of evidence-based guidelines for smartphone usage in sport. For instance, the SSUM can be used as a tool to help coaches, practitioners, and athletes explore different smartphone usage behaviors and establish effective plans. Context-specific intervention or case studies to test the efficacy of the SSUM in facilitating smartphone usage would be valuable, with specific focus on inter- and intragroup differences (e.g., athlete profile, age, sport, culture, race, sex, and gender). As social media continues to impact all facets of society, researchers should further investigate its impact on athlete self-regulation and what is required for optimal recovery.

Conclusion

The aim of this study was to uncover self-regulation processes, conditions, and outcomes related to athletes' smartphone usage and to create a comprehensive model that may guide research and applied practice in this area. The SSUM depicts 12 processes, five conditions, and seven competencies that help explain why and how smartphone usage can facilitate or hinder athletes' self-regulation. As smartphones are deeply connected to athletes' lives and perceived to be essential to many components of their functioning, acceptance of these devices in the sport domain is important. This study constitutes an important first step in developing a working model to guide leaders and practitioners by integrating the most applicable components of two commonly referenced self-regulation models (i.e., SRL and SRS). It is hoped that the SSUM will be further examined and applied in real-world settings to help optimally train smartphone usage much like any other sport-related skill.

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