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Consideration of Future Consequences and Future Time Perspective Perform Poorly with Respect to Deliberate Practice and Talent Development in Sport

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Abstract

The study of how people associate current behaviors with long-term outcomes, or how they consider future consequences, provides insight into future time perspectives and intertemporal choice (Daugherty & Brase, 2010). The consideration of future consequences (CFC) is one construct that has been pre-eminently researched (Strathman et al., 1994). CFC typically pertains to how individuals link their present behaviors to the avoidance of future negative consequences, though it has been less examined through an approach-oriented lens and never in elite sport development. The question of how athletes delay gratification by engaging in difficult deliberate practice that serves delayed and uncertain long-term results is essential to the domain of sport expertise. In two survey studies, we tested whether CFC-F (Future) and CFC-I (Immediate) (Joireman et al., 2012) conferred an expert advantage according to two criteria: whether CFC (1) distinguished performance-level groups and (2) associated with sport-specific practice amounts. In Study 1, responses from 266 North American athletes (M_{age} = 22.48, range = 18-35) showed no group differences and a small, anomalous association between CFC-I and practice, r = .13. CFC did not moderate the relationship between athletes' use of self-regulatory practice strategies and practice. In Study 2, analyses on 70 Canadian athletes (M_{age} = 15.47, range = 13-18 years) were non-significant on the analytic criteria. Additionally, CFC-F correlated with athletes' projections to a future sport self (r = .41) and CFC-I correlated with years they were willing to train to reach their peak (r = -.25). Study 3 examined a different construct, future time perspective (Husman & Shell, 2008), specifically surveying value and connectedness facets, among 461 Canadian athletes (M_{age} = 25.46, range = 13-38). Again, results were non-significant for the two analytic criteria among senior athletes. Overall, neither CFC nor facets of FTP conferred an expert advantage. In light of this, our discussion focused on interrogating self-report methods and locating our achievement-oriented findings within an increasingly equivocal CFC landscape.

Keywords

future time perspective, future conceptions, deliberate practice, sport expertise development, self-regulated learning

Introduction

In many ways, sport is a perfect domain for examining human capabilities to strive for achievement. Sport reveals what is possible when highly motivated individuals are placed in resource-rich training environments and allows for their learning and performance trajectories to be tracked objectively. Yet the regimented and demanding environments necessary for long-term skill development required to reach the highest performance levels are likely ones in which few of us would choose to spend extended time. What is it about exceptional athletes that allows them to invest in a lot of taxing training, repeatedly over months and years, to become experts in their sport? This has perplexed researchers interested in the motivation and behavioral regulation of experts, particularly in the sport domain. Prevailing views of talent development (Baker et al., 2020; Côté et al., 2014; Young et al., 2021) hold that making one's national team or an Olympics depends on a very long period of development over the course of many years, often surpassing a decade of dedicated practice (Baker & Young, 2014). The most elite generally accrue more arduous practice at earlier ages, and at each point in their career development, than do athletes who fall short of their status (Baker & Young, 2014). The framework of deliberate practice (Ericsson et al., 1993) has often been implicated to frame understandings of the arduous, practice-intensive developmental trajectory necessary to become an expert.

Such deliberate practice (Ericsson et al., 1993) was initially referred to as being "not inherently enjoyable" (p. 371) and more recently was found, using *in situ* assessment, to be lower on enjoyment and not immediately rewarding (Coughlan et al., 2013). Although questionnaire-based research shows that some deliberate practice can be enjoyable, examples in the literature show that these activities are often inconsistently enjoyable (Hodges et al., 2004) or less inherently enjoyable than play (Côté et al., 2003) and other sport-related activities (Young et al., 2021). Deliberate practice is often cognitively effortful (Coughlan et al., 2013). Heavy volumes can be mundane, and completing deliberate practice requires inhibitory control (Tedesqui & Young, 2015). Deliberate practice is often so exhausting that athletes must engage in sophisticated rest and regeneration activities to be able to repeat practice activities at subsequent sessions (Eccles & Kazmier, 2019). So how do exceptional athletes discount these uncomfortable practice circumstances? Is it because these athletes "telescope" the here-and-now difficult training to distal outcomes of greatness? Barone et al. (1997) specifically advocated that delayed gratification, as embodied by a variable called *consideration of future consequences* (CFC; Strathman et al., 1994), was a plausible mechanism supporting such striving towards the achievement of expertise. They commented:

> Effective self-regulation depends on the ability and willingness to endure discomfort or deprivation here and now for some future and greater gain . . . Sometimes, these short-term discomforts or sacrifices must be endured over a long period of time, such as in the training programs of Olympians . . . Most of us would not view swimming laps, running endless laps as fun and those who engage in these activities may also not view them as fun; yet research on hope, flow, and life tasks suggests we may see these activities as rewarding and even enjoyable if we see them linked to important goals. Clearly some people are better at this than others…the disciplined practicers and rehearsers, whether they are Olympic athletes or concert pianists (p. 301).

In non-sporting domains, CFC has been shown to be a correlate of a psychological intertemporal phenomenon known as *delayed gratification* (Strathman et al., 1994), or the ability to endure/discount immediate discomfort for avoidance or gain at some much later point. Researchers have explicitly referred to CFC as assessing delayed gratification (e.g., Mohsin & Ayub, 2014). In sport, Côté et al. (2003) defined deliberate practice as requiring delayed gratification, and this psychological characteristic was one of several dimensions that distinguished deliberate practice from deliberate play. Despite this notable

operationalization, we know of no work that has explored delayed gratification and deliberate practice in sport. Such an examination may be essential to understanding differences in developing athletes' attributes on their road to expertise. In the absence of any specific theoretical framework that addresses delayed gratification and achievement striving, we elected to explore CFC as a variable that could offer empirical insight into whether more-expert athletes consider the future consequences of their practice differently than less-expert peers.

Consideration of Future Consequences (CFC)

CFC is a stable individual difference variable in the extent to which people consider distant versus immediate outcomes of their behavior (Strathman et al., 1994: Joireman et al., 2006), which has implications on current behavioral choices, attitudes, and affective responses. Initially, CFC was presented as a unidimensional construct: One end of a continuum pertained to people who consider the future outcomes of current behaviors, whereas the other end pertained to people who do not consider possible future consequences, who are interested in immediate convenience and/or benefits of their actions, and who tend not to sacrifice immediate comfort for long-term benefits. Strathman et al. (1994), for example, manipulated the presentation of messages about the pros and cons of offshore oil drilling to college students. Students' responses depended on CFC: Those low in CFC were less critical of the message, especially when advantages of drilling (rather than disadvantages) were portrayed as rather immediate; those high in CFC were very critical, but they could be manipulated to be less critical when portrayals of advantages from drilling were distant and disadvantages were portrayed as immediate.

Strathman et al. (1994) saw CFC as key in how people reconcile the "intrapersonal struggle between present behavior with a set of immediate outcomes and a set of future outcomes" (p. 743). In achievement domains, immediate behavioral circumstances may be inconvenient (e.g., giving up free time to study) or unpleasant (e.g., feeling mentally tired, missing out on other things because of studying), and in contrast to the attractiveness of future outcomes (e.g., performing well on a final exam, achieving honor roll). How people resolve contrasting orientations may depend on self-control and self-regulated cognitive processing (Joireman et al., 2006). Higher CFC levels correlate with indicators of effective self-control, including conscientiousness and delay of gratification (Strathman et al.) and negatively with impulsivity (Joireman et al., 2003).

There is a substantial body of literature showing the effects of CFC for avoiding long-term negative outcomes; for example, engaging in "green" behaviors to prevent future environmental contamination, or engaging in health behaviors to avoid future health concerns and morbidities (Joireman et al., 2006). However, CFC has been less considered in achievement domains, where the focus is on the link between inconvenient current behaviors and long-term gains. Achievement domains (e.g., academic studying, exercising, sport training) offer a unique lens on considering future consequences because they mimic health-promoting behaviors such as getting a vaccine shot (a one-time, inconvenient act with prospective future benefits). Yet, the intertemporal considerations in achievement domains are different because the practice behaviors are high-effort acts and require repeated efforts to reach high performance levels in a distant future. In the academic achievement realm, higher CFC has been associated with more adaptive outcomes, including college students' grade point average, exam performance, and goal attainment (Joireman, 1999). In the exercise domain, people higher in CFC reported exercising more (van Beek et al., 2013). Woodgate (2005) found CFC moderated the relationship between various indices of self-regulatory efficacy and exercise attendance. Higher CFC was associated with greater reports of efficacy for cognitive facets commonly seen as facilitating (i.e., an approach-orientation) exercise habits, such as scheduling, goal setting, and dealing with anticipatory barriers. Although sport epitomizes

achievement-striving and approach-orientations towards long-term training habits, research has yet to examine CFC in this domain.

Two-dimensional CFC

Whereas early research relied on a unidimensional survey scale for CFC, the research has evolved to support a two-dimensional model including CFC-Future (CFC-F) and CFC-Immediate (CFC-I) (Arnocky et al., 2014; Murphy et al., 2020). CFC-I refers to the extent that people consider the immediate consequences of their behaviors whereas CFC-F is the degree to which they consider the future consequences of their behaviors. By separating future and immediate, one can tease apart differences to understand better the relationship between CFC and outcomes of interest (Joireman et al., 2012). For example, van Beek et al. (2013) found that exercise behaviors were predicted by CFC-F, not CFC-I, and CFC-F related to healthier behaviors whereas CFC-I related to unhealthier behaviors. Joireman et al. (2012) found a promotion orientation (i.e., focusing on achieving ideal goals) mediated the relationship between CFC-F and exercise attitudes and intentions, but not for CFC-I. Altogether, the literature suggests that those high in CFC-F believe that, because of long-term gains, certain behaviors, even if associated with unpleasant immediate outcomes/circumstances or immediate sacrifice of convenience/benefits, are worthy of self-regulating to ensure completion. Although research has begun to consider how CFC is applied to different domains (van Beek et al., 2017), there remains no empirical examination of it within sport. This is surprising given both popular storylines and empirical research that herald the extended developmental journeys, replete with short-term sacrifices towards longer-term goals, that elite competitors undergo to reach top levels in their field.

Establishing Evidence for an Expert Advantage

In sport research, a common strategy for preliminarily establishing a construct as conferring an expert advantage is to submit it to tests of (a) *skill group discrimination* and (b) *associations with some measure of rigorous practice* (e.g., Ericsson & Smith, 1991; Tedesqui et al., 2018). Thus, CFC is expected to significantly differ between multiple, escalating performance groups, conveying an increasing advantage to more elite groups. Respecting the centrality of practice to talent development, one should expect significant positive associations between CFC and indices of sport-specific practice or deliberate practice (Baker et al., 2020). This is often the analytic starting point before testing whether the construct is a direct, mediating, or moderating influence, with respect to further phenomena. Thus, we applied these two criteria—testing for between-group differences for mean levels of CFC variables, and correlations that these variables had with intensive sport practice, in three consecutive studies. Study 1 was with competitive North American athletes and Studies 2 and 3 were with two independent Canadian athletic samples. We were guided by the proposition that elite athletes can push through difficult, unenjoyable/uncomfortable hard work during deliberate practice because they tend to orient such practice behaviors towards long-term gains (i.e., because they have higher levels of CFC-F). Relatedly, less elite athletes may not tie immediate discomfort to long-term gain and thus may be more deterred by the relatively unavoidable and immediate taxing conditions of deliberate practice, thereby completing less of these integral development activities because they have lower CFC-F.

Study 1

We recruited competitive athletes from mixed sports (but predominantly individual-type sports) from North America. They included a range of performance levels and ranged from 18 to 35 years-old, which approximates the adult developmental trajectory in high-performance sport. We wished to test first the two facets of an expert advantage (i.e., between-group differences; associations with practice). In accordance with our explanation that the capability to consider the long-term consequences of one's practice activities may enable individuals to partake in immediate activities, even if they are relatively unpleasant,

we predicted that more elite groups would score higher on CFC-F. In keeping with the notion that CFC-F predisposes people to more likely choose difficult but rewarding courses of action (Joireman et al., 2006), we also posited a positive association between CFC-F and deliberate practice.

Joireman et al. (2006) described how people higher in CFC are more likely to put their intentions into action, following through with cognitive processing towards goals and persevering through difficulties. They suggested people higher in CFC-F are more likely to engage in various forms of self-regulation. Thus, as justified in the next section, we also wished to test how CFC related to self-regulation of learning activities affiliated with deliberate practice.

Consideration of Future Consequences and the Self-Regulation of Deliberate Practice

This investigation was piqued by our interest in how athletes' psychology allows them to accrue deliberate practice. Deliberate practice for the purposes of skill improvement is often not enjoyable, is taxing, and requires conscious attention to error detection and correction processes repeatedly in a practice session (Ericsson, 2020). During deliberate practice, athletes consciously control their efforts and activities using self-regulated learning (SRL) processes (Bartulovic et al., 2017). SRL involves several metacognitive processes including planning, monitoring, evaluating, and reflecting on progress and outcomes, and making adaptive inferences. All the while, athletes need to recruit personal resources to sustain effort and attention and to remain motivated during challenges and goal frustration. Young et al. (2021) contended that these SRL processes represent the correlates of quality deliberate practice in sport.

It is challenging to sustain attention on SRL processes for lengthy practice durations. There is the temptation to quit/lapse at self-regulated deliberate practice (Tedesqui & Young, 2015), and optimal training may require executive control or episodic foresight to link sustained efforts at self-regulated deliberate practice to longer-term benefits. Indeed, from a physiological perspective, the benefits of hard training are delayed and manifest only weeks or months later (Bompa & Haff, 2009). Therefore, we further tested associations between athletes' SRL and their amounts of deliberate practice, with CFC variables as moderators. Our exploratory hypothesis was that athletes with the greatest CFC-F (indicative of an orientation for episodic foresight to link uncomfortable practice to long-term aspirations) would show the strongest associations between SRL and deliberate practice. Athletes higher in CFC-F may be able to connect long term outcomes (e.g., achieving more elite status) to their current striving via better planning, monitoring, evaluating, reflecting upon, giving effort, and maintaining efficacy on their current deliberate practice. That is, higher CFC-F athletes would be more inclined to stay engaged in and persist at their more immediate practice. We proposed that during practice CFC-F should moderate the risk of failing to sustain self-regulated processes (Joireman et al., 2008; Murphy et al., 2020), meaning we would expect the association between SRL and deliberate practice to be strongest for athletes high in CFC-F. Athletes lower in CFC-F might be more prone to give up or lapse from SRL when practice conditions become difficult, because they cannot rely on the resiliency that comes with being able to connect their current efforts to the rewards that will come at a much later time. No other hypotheses were specified.

Method

Participants

Participants included 266 North American athletes (196 male, 70 female; 43% Canadian, 57% American; M_{age} = 22.48, *SD* = 3.95, range = 18-35) from athletics (i.e., cross-country, track and field, road running; 87%) and swimming (8%), with the remainder from various individual-type sports (e.g., Nordic ski, cycling). We recruited at events, by email to clubs and teams, and via social media. On average, athletes reported 13.55 hours/week (*SD* = 7.57; range = 1-44) of sport involvement

during the season and had been regularly training and competing for 7.15 years (*SD* = 3.90). The University of Ottawa Research Ethics Board (Health Sciences and Science; #H09-15-126) approved all procedures.

Measures

Participants completed a self-report online questionnaire in four segments: (a) demographics (e.g., age, gender, city of residence, primary sport, number of years in sport), (b) performance level, and (c) weekly sport-specific practice activity (Hopwood, 2013), and (d) the Consideration of Future Consequences 14-Scale (CFC-14; Joireman et al., 2012).

Performance level. Participants reported their highest level of competition in their primary sport (see Hopwood, 2013), identifying whether they had reached a local level (i.e., competing against athletes from neighbourhoods across one's city), city level (i.e., against athletes from cities across one's region), regional, provincial/state, national level (i.e., against athletes who represent different states/provinces), or international level (i.e., versus athletes representing countries).

To validate skill groups, we asked athletes in sports (e.g., track and field) with objective, standardized performance measures to report their best competitive mark ever. For those who provided best competitive marks (58% of the sample), we conducted analyses (see Tedesqui et al., 2018 for procedures) to ensure valid discrimination of performance groups. Specifically, we derived scores from normalized tables of performance and then conducted ANOVAs to affirm three groups that were distinguishable. Based on the subset analysis, we identified three escalating groups for our ultimate analyses: (1) *recreationally competitive* (n = 46), comprising local and city athletes; (2) *sub-elite* (n = 88), comprising regional and provincial athletes; and (c) *elite* (n =132), comprising national and international athletes.

Weekly sport-specific practice. Participants reported sport-specific practice amounts for a "typical week" 10 weeks prior to their major/peak competition. Based on Hopwood (2013), sport-specific practice was defined as activities directly resembling the technical and/or tactical demands of your sport, that require physical effort as well as concentration, and that are aimed directly at improving performance. The athletes reported weekly hours in four conditions: (a) a coach is present providing supervision to you and others; (b) a coach is present providing only you with one-on-one supervision; (c) no coach is present to provide supervision, but you are practicing with others; and (d) you are practicing on your own. Estimates for each condition were summed to yield amounts of *sport-specific practice* per week. In terms of reliability, 70% of respondents noted they consulted external sources while reporting data, including a personal training log (53% used this), online archived resources (45%), or videos/GPS electronics (3%).

CFC-14. Athletes completed the CFC-14 scale (Joireman et al., 2012), comprising two subscales of 7 items each: (a) *future* (CFC-F; e.g., "When I make a decision, I think about how it might affect me in the future"; α = .81) and (b) *immediate* (CFC-I; e.g., "I only act to satisfy immediate concerns, figuring the future will take care of itself"; α = .85). Responses were on a Likert scale anchored at 1 (not at all like me) and 7 (very much like me). See Table 2 for the full list of items according to each subscale.

Self-regulated learning in sport practice. Athletes completed Bartulovic et al.'s (2017) Self-Regulated Learning – Self-Report Scale for Sport Practice. This 31-item survey asks respondents to judge the ways they approach tasks in their sport training on six subscales: *planning* (8 items; e.g., 'Before practice tasks, I figure out my goals and what I need to do to accomplish them'; α = .87); *self-monitoring* (4 items; e.g., 'I check aspects of my workout while doing it'; α = .69); *evaluation* (4 items; e.g., 'After finishing, I look back on the practice task to evaluate my performance'; α = .81); *effort* (8 items; e.g., 'I don't give up at practice even if a task is hard'; α = .69); *self-efficacy* (5

items; e.g., 'I know how to handle unforeseen situations during practice, because I am resourceful'; α = .82); *reflection* (2 items; e.g., 'I often think about my past experiences at practice to gain new insights'; α = .62). Likert responses were anchored at 1- 'almost never', 4- 'sometimes', and 7- 'almost always'; reflection and self-efficacy items were anchored at 1- 'strongly disagree', 4- 'neither agree/disagree', and 7- 'strongly agree'. We averaged scores on pertinent items to create subscale scores. By averaging the scores of the six subscales, we derived a *composite* (overall) SRL score. Factor analyses showed good fit indices (Hair et al., 2010) for this survey in our sample: CFI = .904, SRMR = .078, IFI = .905, RMSEA = .052 (90% CI = .045 – .058), χ^2/df = 1.724.

Analyses

Preliminary. No more than 1.2% of data were missing for any variable, thus, we addressed missing values using multiple imputation (Tabachnick & Fidell, 2013). No outliers were found in the distributions of any variables and skewness and kurtosis values were acceptable. See Table 1 for descriptive statistics. Confirmatory factor analysis (CFA) on a two-factor model for the CFC-14 showed adequate fit (Hair et al., 2010): CFI = .940, SRMR = .060, RMSEA = .061 (90% CI = .045 - .074), χ^2/df = 1.964. Loadings for individual items on latent factors are shown in Table 2). CFC-F and CFC-I correlated at r = -.37, p < .001. As the correlation between age and CFC-F was significant (r = .13, p = .028), age was a covariate in subsequent analyses. A chi-square test indicated more females in the elite group than the other groups, p = .02 (Table 1).

Table 1. Descriptive Statistics and Mean Levels for Age, Sport-Specific Practice, CFC-F and CFC-I According to Skill Group and for the Collapsed Sample.

	Recreationally Competitive	Sub-elite	Elite	Three groups collapsed
Age (years)	26.15 (5.16)	20.37 (3.48)	22.11 (2.87)	22.48 (3.95)
Gender (m / f)	35 m / 11 f	73 m / 15 f	88 m / 44 f	196 m / 70 f
Sport-specific practice (hours/week)	9.33 (4.50)	13.11 (6.89)	14.11 (6.36)	12.95 (6.47)
CFC-F	5.26 (1.03)	5.24 (0.93)	5.44 (0.88)	5.35 (0.93)
CFC-I	3.19 (1.28)	3.25 (1.18)	3.24 (1.09)	3.23 (1.15)

Note. Standard deviations are shown in parentheses. CFC was measured on a 1-7 Likert scale.

Table 2. Standardized Regression Weights for Measurement Model of CFC-F (Future) and CFC-I (Immediate) in Study 1 and 2.

	Study 1 CFC-14 Joireman et al. (2012)		**Study 2** Modified CFC-12 Rappange et al. (2009)	
	F	I	F	I
I consider how things might be in the future and try to influence those things with my day-to-day behavior.	.71		.80	
My behavior is generally influenced by future consequences.	.73			
When I make a decision, I think about how it might affect me in the future.	.72			
I think it is important to take warnings about negative outcomes seriously even if negative outcomes will not occur for many years.	.60			
I seriously consider the negative consequences of actions even if these negative consequences will only occur many years later.			.55	
I often do things to avoid negative consequences even if these negative consequences may not occur for many years. (S)			.73	
I think it is more important to perform a behavior with important distant consequences than a behavior with less important immediate consequences.	.40			
I seriously consider the positive consequences of actions even if these positive consequences will only appear many years later. (S)			.69	
I think doing something that is very important for the future is better than doing something that has only a bit of importance right now.			.72	
Often I engage in a particular behavior in order to achieve outcomes that may not result for many years.	.52			
I often do things in pursuit of achievements that may not occur for many years.			.54	
I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes.	.54			
I am willing to do things that are not much fun if they pay off at a later date.			.70	
I only act to satisfy immediate concerns, figuring the future will take care of itself.		.80		
I only act on things that concern me right now because the future will take care of itself.				.60
My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions.		.74		
My convenience is a big factor in the decisions I make or the actions I take.		.54		
I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis level.		.63		
Some actions could have negative consequences in the long run, but I do not think about these future problems too much because they will be resolved before things get too bad.				.59
Some actions could have very positive consequences in the long run, but I do not seriously consider these future possibilities because they can be pursued at a later time. (S)				.58
I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time.		.66		
I think that making sacrifices right now is unnecessary because future consequences can be dealt with at a later time				.78
I think that making sacrifices right now is unnecessary because future achievements can be pursued at a later date. (S)				.76
I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date.		.83		
I only act on things that concern me right now because I will deal with future concerns as they appear at a later date.				.67
Since my day-to-day work has specific outcomes, it is more important to me than behavior that has distant outcomes.		.49		
I only do things when my behaviors have immediate consequences.				.57
I place more value on the short-term rather than the long-term outcomes of my daily behaviors/work.				.78
Mean	5.35	3.23	3.85	2.21
SD	.93	1.15	.72	.69
Cronbach α	.81	.85	.85	.86

Note. (S) = Identifies supplemental items we added in Study 2 to the 12 items of Rappange et al. (2009) to accommodate approach-oriented items.

Planned. We tested whether skill groups differed on CFC-F and CFC-I levels with a one-way multivariate analysis of covariance (MANCOVA) with age and gender as covariates. *A priori* power analysis using G*Power (Faul et al., 2007), using $\alpha = 0.05$ to detect a medium effect size ($f^2 = 0.0625$), indicated our MANOVA required 182 participants to achieve 80% power, which we surpassed. Pearson correlations examined the associations between each of CFC-F and CFC-I, and sport-specific practice. For a small-to-medium correlation ($r = .17$), G*Power determined we needed 266 bivariate cases at $\alpha = 0.05$ to achieve 80% power, which we met.

For the moderating analyses, we examined whether each of CFC-F and CFC-I moderated the relationship between (a) composite SRL and sport-specific practice, and between (b) specific SRL processes and sport-specific practice. We followed guidelines for interaction analyses for moderators (Cohen et al., 2003), employing the PROCESS macro (Hayes, 2012) for SPSS. First, the CFC variables were subjected to median splits and recoded as new moderating (low, high) variables. In separate hierarchical regression analyses, sport-specific practice was regressed on age, gender, and composite SRL, with the pertinent CFC moderating variable added in the final block. In two more analyses, amounts of sport-specific practice were similarly regressed on all six SRL subscale scores with the pertinent CFC moderator added in the final step. In these latter regression analyses, only one SRL subscale was examined for both conditional and interaction effects, while the remaining five SRL processes were inserted simultaneously and examined for conditional effects. The macro provides results for the final block of the hierarchical regression analyses in a traditional moderating analysis, which is the block containing the potential interaction effects above any main/conditional effects in earlier blocks in the hierarchy (Cohen et al., 2003). Based on the output, to identify moderation, we inspected for a significant change in the total R^2 evidence in a final block. For any significant increase that was accompanied by a significant beta weight for the interaction term (the moderating variable), we planned to follow up with a test of simple slopes (Cohen et al., 2003).

Transparency and Openness

In this Study, and in Studies 2 and 3, sample sizes were determined based on effect size precedent from research in sport expertise and *a priori* calculations of requisite sample size in G*Power (Faul et al., 2007). All data exclusions and missing data imputations have been reported and all justifications for covariates reported in preliminary analyses. All data and research materials are available in the APA Repository on the Open Science Framework at https://osf.io/7xf8d/?view_only=70949f1dfefc45d987f40eb742f7f6fc. Analysis syntax is available from the first author upon request. Data were analyzed using SPSS, version 27 (in Studies 1 and 2) and *R*, version 4.0.0 (Study 3).

Results

The MANCOVA was non-significant, Pillai's trace = 0.018, $F(4, 522) = 1.20$, $p = .30$. Recreationally competitive, sub-elite, and elite athletes reported similar levels of CFC-F and CFC-I (Table 1). Collapsed across groups, partial Pearson correlations (controlling for age) indicated a significant but weak association between CFC-I and sport-specific practice, $r\ (263) = .135$, $p = .02$, which was unexpected. The hypothesized association between CFC-F and sport-specific practice was non-significant, $r\ (263) = -.058$, $p = .34$. Table 3 displays a summary of the output for the last block of the hierarchical regression models in a manner that allows inspection across all the moderating analyses. For composite SRL, adding the interactive final block did not statistically increase the total R^2 (p for $\Delta R^2 = .18$ for CFC-F; p for $\Delta R^2 = .32$ for CFC-I). Similarly, none of the final blocks of the hierarchical regression analyses intended to identify interaction effects for each of the SRL subscales added significant variance to the total R^2 for CFC-F (all ps for $\Delta R^2 > .14$) or for CFC-I (all ps for $\Delta R^2 > .17$). Thus, we concluded there were no moderating effects.

Table 3. Summary of Each of the Moderating Analyses for How CFC-F and CFC-I Interacted with Self-Regulated Learning Variables to Predict Sport-Specific Practice.

	CFC-F				CFC-I			
	Model R^2	Model Δ R^2	B	p ΔR^2	Model R^2	Model Δ R^2	B	p ΔR^2
Composite SRL*CFC	.08	.006	-.25	.18	.08	.003	.18	.32
Specific SRL processes								
Planning *CFC	.12	.007	.17	.14	.11	.002	.10	.35
Self-monitoring*CFC	.11	.003	.14	.31	.12	.006	-.20	.17
Evaluation *CFC	.11	.004	.12	.28	.11	.003	-.10	.35
Reflection *CFC	.11	.001	.06	.59	.11	.000	-.04	.69
Effort *CFC	.11	.001	.11	.47	.11	.002	-.13	.40
Self-efficacy *CFC	.11	.001	.09	.50	.11	.001	-.10	.46

Note. All moderating analyses controlled for age and gender. In each of the regression analyses for the specific SRL processes, only one SRL process was examined for both conditional and interaction effects, while the remaining five SRL processes were inserted simultaneously and examined for conditional effects only.

Discussion

The results revealed null support for our hypotheses related to practice and performance level discrimination. We considered whether the null group differences could have related to something about our sample. For example, sport expertise researchers who have lauded testing skill group differences, with multiple groups, have also pointed out that there are often sample-to-sample inconsistencies in obtaining group results because there is lack of certainty in whether different skill groups really represent gradients of elite-ness (e.g., Swann et al., 2015). Despite our efforts to establish valid groups and verifying their levels, we needed to be open to this possibility and thus saw advantages in testing CFC with further sport samples. The developmental psychology literature notes that future time perspectives and capabilities for episodic foresight develop throughout pre-adolescence and into adolescence, with great variability expected in the adolescent years (Suddendorf & Redshaw, 2013). Thus, it is possible that in Study 1 our older sample (comprising emerging adults and adults) had been socialized into sport for many years, and normative beliefs associated with such experiences may have constricted effects. Finally, we reflected on the entire inventory of CFC survey items and on the balance wondered whether there was an overly avoidance-focused tone regarding future outcomes that did not sufficiently consider approach aspects. That is, we wondered whether there was a need to address the terms of *how* athletes consider current inconvenient/uncomfortable conditions in deliberate practice with long-term *success* in mind. We wondered if this could be addressed, would we see stronger effects in a new sporting sample?

Our logic for the moderating analyses was that athletes with higher CFC-F may have a more resilient orientation; i.e., the tendency to project to future successes may allow them to be more likely to engage effective SRL strategies in current practice efforts. Accordingly, we expected that athletes lower on CFC-F, because they do not telescope to long-term successes, would show less robust associations between SRL engagement and practice behaviors. Our results revealed a null finding. Furthermore, CFC-I was also not implicated in moderating the relationship between SRL and practice. This is unfortunate, considering that research in both sport expertise domain (e.g., Tedesqui & Young, 2018) and on SRL (Barone, 1997) has recommended inquiry into the moderators of practice striving.

Study 2

Study 2 had three objectives. We first aimed to test the two facets of an expert advantage with a younger, adolescent sample. It was plausible that temporal discounting, an individual's tendency to perceive a desired result in the future as less valuable than one in the present, could be more variable in this younger cohort, especially because the ability to overcome conflict between current and future desires has adaptive significance in late childhood (Suddendorf & Redshaw, 2013). Thus, with such increased adolescent variability, we anticipated seeing mean differences between skill groups for CFC-F and positive associations between CFC-F and sport-specific practice.

Second, we sought to integrate more approach-oriented items into the CFC survey. The vast literature on CFC emphasizes avoiding problems and negative long-term consequences (e.g., Joireman et al., 2006). For example, it addresses how convenient/pleasant behaviors, such as smoking, are considered with respect to long-term hazardous conditions. Survey findings are essential for understanding the benefit of future orientations in understanding adolescents' decisions not to discard garbage on the ground but to hunt for a garbage (i.e., avoiding the immediately convenient action because they telescope to thoughts of a polluted future); however, we would contend that achievement domains like sport are different because they require consideration of more positively oriented consequences. Many items are not aligned with a sporting narrative, where doing the unpleasant/inconvenient in immediate conditions must be considered with respect to long-term successes. For example, the item "I generally ignore *warnings* about possible future *problems* because I think the *problems* will be resolved before they reach *crisis* level" does not seem to capture the reality of sport [emphasis added]. We also contend that even a focus on immediate behaviors needs to account for the possibility that athletes consider many other near-future instances in which they can act. CFC-I items such as "I only act on things that concern me right now because the future will take care of itself" or "I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time" refer abstractly to the future and fail to recognize an athlete's agency in further actions in the current time horizon (e.g., training again tomorrow, and the day after, etc.). We contend that some athletes could be highly focused on immediate actions, discounted from long-term consequences, because they will have many occasions to act again in future. Thus, we added items to better account for approach-oriented considerations and the idea that an athlete could adopt a CFC-I orientation whereby they discount long-term outcomes because they expect many near-future occasions to approach critical behaviors again. Attention to sport-specific refinements while protecting the integrity of a two-factor model was important, considering behavior-specific versions of the CFC scale had been developed for eating and exercising (van Beek et al. 2013), and that these had performed better with respect to criterion validity (van Beek et al., 2017; Murphy et al., 2020).

Third, we aimed to test whether CFC variables would relate differently to highly technical sport-specific practice, compared to sport play. Forms of highly structured, deliberate practice require delayed gratification and focus on delayed outcomes, whereas play embodies elements of enjoyment, inherent and immediate gratification (Côté et al., 2003). We thus predicted that CFC-F would associate positively with sport-specific practice, and CFC-I would positively correlate with sport play. Finally, we wished to explore additional criterion variables to supplement weekly practice and performance level. We posited that athletes high in CFC-F would provide extended responses for the years they would be willing to continue to practice in order to reach their career peak, and would score highly for future aspirational sport selves, and such associations would not relate to CFC-I.

Method

Participants

Seventy Canadian adolescent athletes (34 males, 36 females, M_{age} = 15.47, *SD* = 1.14, range =

13-18 years) were recruited from sport clubs in the province of Ontario, with 81.4% competing in individual-type sports such as swimming and track and field. The remainder were in dual or team sports. The participants reported a mean of 11.33 (*SD* = 6.97) hours per week of sport involvement. The host university's research ethics board approved all procedures. Parental consent and participant assent were obtained for athletes under 18.

Measures

Athletes completed an online survey in five segments: (a) demographics, (b) performance level, (c) sport-specific practice, (d) a scale assessing CFC, and (e) motivation for future sport achievement.

Performance level. Through an open-ended question, athletes reported their highest level of representation ever achieved in their sport. They were asked to describe information that supports their highest level, including performance best marks in sport events (if possible), and to indicate the names of competitive events for which they had qualified, and/or the names of representative/traveling teams to which they had been selected. To create skill groups for our analyses, two researchers independently coded athletes' open-ended responses to highest skill level (Cohen's κ = .94 for inter-coder reliability) into different performance levels. Athletes were reliably designated as either *non-elite* (*n* = 39), representing local, city, regional, and provincial competitive levels or *elite* (*n* = 26), representing junior national and junior international levels.

Weekly sport-specific practice and play. Athletes reported amounts for an average week based on the last four weeks of training. (All participants were in-season.) Athletes reported how many hours they spent on *sport-specific practice* (Hopwood, 2013; see Study 1). They also reported hours in *sport-specific play*, defined by Hopwood (2013, p. 561) as "unsupervised play, including any unstructured playful activities resembling your main sport that you engaged in either alone or as part of a group, during which the emphasis was on *enjoyment* rather than performance improvement" [emphasis added].

Consideration of future consequences. There existed neither an English version of the CFC-14 that had been validated for adolescents, nor a version for competitive adolescent athletes. There existed a Dutch version of the CFC-12 by Rappange et al. (2009), which had been validated with adolescent students in the Netherlands and included 5 and 7 items loading on CFC-F and CFC-I, respectively. They made a strong case that the wording of certain items on the adult scale may be problematic for teens, and thus required some adaptation. Their items had been submitted to back translation procedures for Dutch respondents; we employed the English equivalent of their items and further ensured the readability of these items in English, resulting in minor edits to phrasing.

In an effort to better integrate achievement orientation with avoidance items, we created five new items. For CFC-F, we added "I am willing to do things that are not particularly good for me right now if they pay off at a later time" and "I seriously consider the positive consequences of actions even if these positive consequences will only appear many years later". The initial item was intended to follow Strathman et al.'s (1994) precedent that individuals judge whether they sacrifice wellbeing *and* happiness (fun) towards the long-term; it offered a new survey item to complement Rappange et al.'s (2009) CFC-F statement where adolescents solely judged "doing things that are not much fun if they pay off at a later date." With respect to the latter item, we developed the statement "I often do things to avoid negative consequences even if these negative consequences may not occur for many years" to provide another item (albeit avoidance-oriented) with similar long-term phrasing to try to ensure that they would both coalesce on the subscale. On CFC-I, we added "Some actions could have very positive consequences in the long run, but I do not seriously consider these possibilities because they can be pursued at a later time" and "I think that making sacrifices right now is unnecessary

because future achievements can be pursued at a later date." In total, there were 8 items for CFC-F, 9 for CFC-I, on a Likert scale ranging from 1 "not at all true for me" to 5 "very true for me."

Motivation for future sport achievement. Athletes rated their willingness to engage in long-term practice to reach their peak, i.e., *years to peak*, in response to "how much longer (in years) are you willing to be involved to reach your peak?" They judged their drive to reach the upper echelon of sport in the long-term, i.e., *aspirational future sport self* on five Likert items (e.g., "I want to be known as the 'best around' in my sport"; "When I see the very best older athletes in my sport, I realize that I want to be like them someday"; I have the personal drive to reach elite levels in my sport"; "I dream a lot about making a national team in my sport"; "It is likely that I could reach the highest levels of performance in my sport") from 1 "not at all true" to 7 "completely true." Exploratory factor analysis (principal axis factoring) for aspirational future sport self showed that all items loaded above .74 and α = .88. We designed years to peak and future sport self questions because they relate to future orientation in sport, and thus could be used to cross-validate the CFC measures.

Analyses

Preliminary. Only 2.4% of values were missing from all data and only 0.3% of values were missing from CFC responses. Missing data were imputed using Expectation-Maximization estimation. A CFA was performed on a two-factor CFC model. The initial fit indices were acceptable: CFI = .916; SRMR = .087; RMSEA = .066 [90% CI = .030 - .093], however we were concerned about low standardized regression weights, especially considering we had added items. We deleted items with the lowest weights, trimming "I am willing to do things that are not particularly good for me right now if they pay off at a later time" (.39 on CFC-F) and "My convenience is a big factor in the decision I make or the actions I take" (.19 on CFC-I), then re-estimated the model. With the remaining 15 items (see Table 2, right hand column), the resultant fit indices, CFI = .926; SRMR = .081; RMSEA = .070 [90% CI = .030 - .101], were within acceptable range (Hair et al., 2010) (see right side of Table 2 for 15 final items and respective regression weights). CFC-F and CFC-I correlated at $r = -.50$, $p < .001$.

Skewness and kurtosis were within acceptable ranges for CFC-F and CFC-I, years to peak, and aspirational future sport self, though sport-specific practice data were kurtotic ($K = 8.20$) and positively skewed ($S = 2.08$).

Planned. We tested whether elite and non-elite groups differed on CFC-F and CFC-I separately with one-way ANCOVAs, controlling for age. *A priori* power analysis using G*Power (Faul et al., 2007), using $\alpha = 0.05$ to detect a medium-to-large effect size (based on the omnibus partial eta $^2 = 0.13$ distinguishing skill groups in Tedesqui & Young, 2017), indicated each ANCOVA needed 77 participants to achieve 80% power. We assessed associations between each of the CFC scales, and sport-specific practice, sport-specific play, years to peak and aspirational future sport self, with partial correlations (controlling for age). For a medium size correlation ($r = .30$), G*Power determined we needed 64 bivariate cases at $\alpha = 0.05$ to achieve 80% power, which we surpassed.

Results

There was no difference on CFC-F scores between elite ($M = 3.79$, $SD = .65$) and non-elite groups ($M = 3.89$, $SD = .69$), $F(1, 63) = 0.66$, $p = .42$, partial eta $^2 = .011$. There was no difference in CFC-I between elite ($M = 2.25$, $SD = .70$) and non-elite ($M = 2.17$, $SD = .73$) groups, $F(1, 63) = 0.19$, $p = .67$, partial eta $^2 = .003$. Correlations were non-significant between CFC-F and weekly sport-specific practice, $r = .07$, $p = .57$, CFC-F and weekly sport-specific play, $r = -.05$, $p = .69$, CFC-I and sport-specific practice, $r = -.05$, $p = .66$, and between CFC-I and sport-specific play, $r = .11$, $p = .38$. CFC-F was correlated with future sport self, $r = .41$, $p = .001$, but CFC-I was not, $r = -.07$, $p = .61$. There was no association between CFC-F and years to peak, $r = -.13$, $p = .32$; CFC-I correlated with years to peak in the inverse direction, $r = -.25$, $p = .05$.

Discussion

In general, the findings did not meet our expectations, despite our use of a CFC survey that integrated aspects of approach-motivation suitable for the sport domain. We expected CFC-F to discriminate among skilled groups, with more elite groups manifesting higher levels. This was not the case, nor did we find significant trends suggesting the inverse, that less skilled groups would be more fixated on immediate orientations. We failed to replicate the weak, significant relationship between CFC-I and sport-specific practice from Study 1 in this adolescent sample, and like Study 1, the association between CFC-F and weekly sport-specific practice was non-significant.

The results indicated a strong significant association between CFC-F and thoughts of a future sport self among adolescents. Additionally, teens who reported higher levels of an immediate orientation also reported being less willing to train for a lengthy time to reach their peak. These results might suggest teen athletes who consider the future consequences of their current behaviors also have a higher drive to pursue long-term goals related to sport achievement, and those who are more fixated on the immediate consequences of their behavior are only willing to continue practicing for a shorter time to reach their peak. If one considers hierarchical models of motivations (e.g., Guay et al., 2003), the results tepidly support criterion validity for CFC at a domain level (sport), or perhaps even more at a global personality level, though the lack of associations with sport practice insinuates that CFC plays less of a role with respect to behavioral strivings at a situational level. Within the field of sport expertise, Young and Baker (2017) discussed the hierarchical scaffolding of individual difference variables related to talent development. They outlined three levels: higher-order dispositions responsible for the *direction of athletes' efforts*, including their decisions to deepen involvement in a sport rather than exploring alternative activities (e.g., grit – consistency of interests; Tedesqui & Young, 2017); middle-level variables responsible for the *duration of athletes' efforts* described by their decisions to accumulate more hours of practice (e.g., self-control – achievement striving; Tedesqui & Young, 2018); and situational proficiencies/processes described by athletes' decisions to improve the *quality of their practice activities* and responses to situational challenges (e.g., SRL). Study 2 findings suggest some tepid support, albeit preliminary because of the cross-sectional design, for CFC and its relationship with variables at the highest level: CFC-F may direct hard work towards an aspirational future sport self over time, and CFC-I may constrain the direction of effort towards a sport over the years. The findings do not, however, suggest a role for CFC with respect to the duration of practice efforts, accumulation of such efforts, or the quality of engaged practice. After Study 2, we wondered whether a different conceptualization of intertemporal choice and future perspectives might show better construct validity for explaining deliberate practice and talent development.

Study 3

Future time perspective (FTP; Husman & Shell, 2008) shares many conceptual similarities with CFC (McKay et al., 2017). Whereas CFC is specifically about how individuals care about the future consequences of their behaviors, FTP is more generally the extent to which people are oriented towards the future (van Beek et al., 2017). Both CFC and FTP relate to temporal discounting, or the degree to which people devalue long term outcomes in favor of shorter-term ones (Daugherty & Brase, 2010). FTP is broader in future-focused cognition than CFC and more multifaceted. For example, some FTP scholars consider aspects such as the length of one's time horizon, the importance of approaching deadlines to behavioral drive, and the valuing of long-term future goals (Husman & Shell, 2008), whereas others accentuate how FTP relates positive/negative aspects of the past, and hedonistic/fatalistic aspects of the present, to the future (Zimbardo & Boyd, 1999). In the educational literature, FTP has been linked to investment in learning (Peetsma & van der

Veen, 2011), delay of gratification and SRL (Bembenutty & Karabenick, 2004).

Husman and Shell (2008) advocated for four aspects of FTP, including speed (i.e., perceptions of the rate that time passes), extension (i.e., range of future time to which one projects), value and connectedness, characterizing how individuals consider the future when making decisions in the present. In particular, value and connectedness aspects are associated with achievement striving and pursuit motivation in post-secondary education.[1] Thus, we identified these scales as pertinent to achievement striving in sport.

Future Time Perspective: Value and Connectedness

Value is the extent to which people hold long-term future goals to be personally important (Husman & Shell, 2008). People holding greater FTP-value have long-term goals that are not discounted by the projected time frame, meaning they retain their personal value, compared to individuals with lower FTP-value. Considering their long-term developmental trajectories, athletes who persevere to eventually achieve elite levels may benefit from higher FTP-value, which would protect the incentive value of their anticipated rewards, irrespective of the lengthy duration of future projections. Those with low FTP-value may perceive depreciating incentive in similar anticipated rewards because of lengthy durations required to achieve them. We appreciated how Husman and Shell's (2008) value items share the same tone as Strathman et al.'s (1994) conceptualization of CFC, in that they ask respondents to weigh choosing something successful in the future versus something pleasant, or something they want, now.

Connectedness is the degree to which individuals make a cognitive connection between their present activities and their future goals (Husman & Shell, 2008). Those with stronger FTP-connectedness are more likely to telescope their current actions to future outcomes. We appreciated how Husman and Shell's (2008) 12 items for connectedness, like CFC-F, ask respondents to judge the extent to which one's future is an important consideration in driving present actions. Of these, five items notably also interpolate planning, cognitive steps, and goal-setting for where one wants to be in the future, implicating self-regulatory strategies. In academic achievement studies, connectedness has been linked with a "strategic self-regulation" learning profile describing learners with high metacognition and engagement (Shell & Soh, 2013) and is therefore aligned with our interest in how FTP aligns with self-regulated sport practice.

In sum, we determined Husman and Shell's (2008) value and connectedness subscales were relevant to sport training and striving for long-term goals through both deliberate practice and SRL. We wished to examine whether FTP performed well in terms of criterion validity indicators for sport expertise. Thus, as we did previously for CFC, we tested athletes' scores on the two subscales with respect to (a) group discrimination criteria and (b) associations with practice across time.

Method

Participants

We recruited 461 competitive athletes, aged 13-38 (M = 25.46, SD = 10.63; 236 females, 222 males; 3 non-binary gender), via Canadian organizations. They competed as individual (65%) or team athletes (35%) in powerlifting (n = 120), volleyball (73), athletics (51), speed skating (36), swimming (33), Olympic weightlifting (28), basketball (20), curling (13), rugby (13), and 29 other sports (< 11 each). They had trained on average for 6.17 years (SD = 5.10).

Procedure

We contacted sport organization representatives who forwarded an online survey link by email to senior athletes (> 17 years) or parents of juniors (13-17 years-old). Once parents provided informed consent, junior athletes provided informed assent. Senior athletes provided informed consent. Online survey data were collected using a safe and secure *FluidSurveys* platform early in the season (time 1), and for those who agreed to follow-up surveys, at a mid-

point (time 2), and at a point later in their season, two weeks before their peak race or championship (time 3). Time 1 measures included demographics, sport history information, highest performance level, and two subscales of the FTP Scale (Husman & Shell, 2008). Weekly structured practice time was collected at times 1, 2, and 3. Of the 461 athletes who completed time 1 surveys, 362 agreed to follow-up. Of these, 188 completed time 2 surveys, and 174 completed time 3. The research ethics board of the host institution approved all procedures.

Online Survey Measures

Highest performance level. Participants reported their highest performance level ever, as a junior or senior, from five options (Hopwood, 2013) representing city, regional, provincial, national, or international competitive levels in their primary sport. Athletes reporting city and regional level were collapsed, resulting in four levels submitted to analyses. To enhance reliability, we instructed athletes to complete performance level information using external sources for recall: 86% acknowledged using one or more resources (e.g., personal training log, online archived results) to facilitate their responses.

FTP Scale. Athletes responded to the value and connectedness subscales of the FTP Scale (Husman et al., 2008). Seven *value* items assessed the extent to which individuals consider their future goals to be important. Six *connectedness* items measured the degree to which individuals make a connection between their present activities/actions and their future goals. Items were on a 7-point scale, with each option labeled, from 1 'completely disagree' to 7 'completely agree'. We modified one item for athletes by substituting "career" for "life" in: 'It is better to be considered a success at the end of one's career than to be considered a success today'.

Current weekly structured practice. Athletes reported their time in hours and minutes, each of the past seven days, spent in *structured practice*, defined as "time spent on repeated practice of drills that are designed to work on technical and/or tactical elements of your sport. Structured sport practice is *not* everything you do for your sport. This category does not include playful games, unstructured or unorganized physical preparation (strength and conditioning) or competitions/tournaments." We added daily estimates to get weekly totals in minutes.

Analyses

Preliminary. A CFA with robust maximum likelihood estimation for the two factor-model for the FTP Scale showed model fit that was below acceptable levels (Hair et al., 2010), χ^2 (64) = 220.86, $p < .001$, CFI = .83; TLI = .79; RMSEA = .073 [90% CI = .063 - .084]. We ran exploratory structural equation modeling analyses, which relax the requirements of CFA by allowing items to load on all factors (Marsh et al., 2014). In this case, fit indices were acceptable, though one value item ('Immediate pleasure is more important than what might happen in the future') loaded poorly on its intended factor (standardized factor loading = .19) and more strongly on connectedness (-.34). After removing this item, the fit indices remained acceptable, χ^2 (43) = 115.71, $p < .001$, CFI = .91; TLI = .87; RMSEA = .061 [90% CI = .047 - .074]. We advanced with six items on each subscale (see Table 4). The subscales were correlated, $r = .20$, $p < .001$.

Planned. Analyses were performed only for senior athletes (M = 30.71; range = 18-38; 170 male, 172 female; 3 non-binary at time 1), as we were underpowered for juniors (n = 124). To discriminate between performance groups, we conducted one-way analyses of variance separately for value and connectedness. *A priori* power analysis using G*Power (Faul et al., 2007), using $\alpha = 0.05$ to detect a medium effect size ($f = 0.25$), indicated each ANOVA required 180 participants to achieve 80% power, which we surpassed. Pearson correlations were conducted between scores for value at time 1 and weekly practice minutes at times 1, 2, and 3, and between connectedness scores at time 1 and weekly practice minutes at times 1, 2, and 3. For a small-to-medium correlation ($r = .15$), G*Power determined we needed 346 bivariate cases at $\alpha = 0.05$ to achieve 80% power, which we met.

Table 5 shows the correlation matrix and group descriptive statistics.

Table 4. Standardized Regression Estimates for the Future Time Perspective Subscales of Value and Connectedness.

Item	Value	Connectedness
Given the choice, it is better to get something you want in the future than something you want today.	1.01	
It is better to be considered a success at the end of one's career than to be considered a success today.	1.01	
It is more important to save for the future than to buy what one wants today.	.83	
What happens in the long run is more important than how one feels right now.	.96	
The most important thing in life is how one feels in the long run.	.74	
Long range goals are more important than short range goals.	.70	
I don't like to plan for the future.[r]		-.96
One shouldn't think too much about the future.[r]		-.97
It is important to have goals for where one wants to be in five or ten years.		-.56
What will happen in the future is an important consideration in deciding what action to take now.		-.53
Planning for the future is a waste of time.[r]		-.65
One should be taking steps today to help realize future goals.		-.43
Mean	4.61	5.74
SD	1.51	1.19
Cronbach α	.73	.75

Note. [r] = reverse-coded items.

Table 5. Correlations and Group Mean Data for Senior Athletes in Study 3.

		Weekly Structured Practice TI	Weekly Structured Practice T2	Weekly Structured Practice T3	Value	Connectedness
Age		-.24**	-.15	-.12	-.01	.06
Weekly SP T1			.42**	.34**	.01	-.02
Weekly SP T2				.31**	-.06	-.00
Weekly SP T3					.14	.12
Value						.22**
Seniors M (*SD*)	c/r (*n* = 41)	302.1 (245.4)	273.8 (142.3)	356.9 (202.9)	4.66 (1.00)	5.86 (0.71)
	prov (*n* = 88)	408.0 (277.2)	359.2 (229.9)	367.8 (198.4)	4.64 (0.97)	5.75 (0.80)
	nat (*n* = 99)	466.7 (343.1)	490.1 (343.9)	411.7 (290.5)	4.64 (1.10)	5.62 (0.82)
	int (*n* = 117)	574.2 (447.3)	428.6 (261.3)	514.8 (362.0)	4.57 (0.95)	5.76 (0.77)

Note. T1 = time 1; T2 = time 2; T3 = time 3; * $p < .025$; ** $p < .01$; c/r = city-regional; prov = provincial; nat = national; int = international.

Results

For senior athletes, there were neither significant performance group differences for value, $F(3,345) = 0.14$, $p = .93$, nor for connectedness, $F(3,350) = 1.25$, $p = .29$. In terms of correlations with weekly practice, value and connectedness did not demonstrate significant relations with practice minutes at time 1, 2, or 3 ($-.12 < r < .14$, ps $> .12$; Table 5).

Discussion

The findings in Study 3 were underwhelming. With a new sample of athletes, the results showed that conceptually relevant facets of FTP were no different between performance groups. There were no correlations between FTP scores and weekly amounts at practice for senior athletes. It is possible that the use of more domain-specific items for FTP in future research, specifically phrased more acutely for sport circumstances, may enhance results for criterion validity (see Shell & Soh, 2013 for this argument in several domains). Our conclusion was that the slightly different measures for FTP value and connectedness performed no better than CFC had in Study 1 and 2.

General Discussion

Despite the promise of future-oriented psychological constructs (CFC, FTP) for explaining aspects of sport talent development, the findings from the three studies did not provide support for our hypotheses. In Studies 1 and 2, we predicted that CFC-F would associate with criterion indices that help to establish proof-of-concept in the sport expertise research domain, specifically (1) between group difference, and (2) associations with deliberate practice activity. In different samples of competitive athletes, we found no evidence that self-report measures for CFC were different among escalating performance groups. The same tests using a psychologically similar measure, FTP, also proved non-significant in Study 3. In terms of skill group differences, the results thus failed to establish an expert athlete advantage associated with CFC-F or FTP (value and connectedness). We did not find support for the second criterion either. In Study 1, there was a very weak but anomalous correlation between an immediate orientation and sport-specific practice investment. In Study 2, CFC variables did not associate with sport-specific practice or sport play. In Study 3, the highest (and statistically non-significant) association was attributed to FTP-value, which shared less than 2% variance with weekly practice. The only exception to these non-significant trends was in Study 2, where CFC-F was more globally related (with small effects) to motivation to pursue future sport selves and CFC-I was associated with curtailing anticipated years pursuing the highest levels.

Our findings in the unique, approach-oriented domain of athlete development add to growing literature describing inconsistencies, negligible and small effects between CFC survey measures and various outcomes. In a meta-analysis, Murphy and Dockray (2018) aggregated the effect sizes of 26 studies that had examined the association of unidimensional CFC with health promotive behaviors. They found that Pearson correlations ranged from -.02 to .24 (aggregate $r = .09$, CI .06 to .13), meaning that higher reports of future considerations explained less than 1% variance on promotive behavioral outcomes. Meta-analyses specifically for a subset of studies examining 'intended' health promotive behaviors showed marginally higher effects (aggregate $r = .14$, CI .09 to .19, meaning about 2% of variance is being explained), indicating small effects (Cohen, 1988). Our findings are consistent with this meta-analysis in that we found non-significance associating CFC-F with reported practice behaviors. Our finding that CFC-F explained almost 17% ($r = .41$) of the variance in adolescent athletes' affinity towards a future elite sport self is not surprising, seeing that a future sport self is an aspirational outcome aligned more with intentional outcomes than current practice behaviors.

In light of these mostly unremarkable results, the remaining discussion will be an introspection and elaboration on limitations (ours and others) in CFC-related research, with recommendations to better assess the construct validity of this genre of intertemporal psychological constructs.

Were the Criterion Validity Measures We Used Appropriate for Eliciting Effects?

One possibility is our non-significant results are attributable to insufficient strategies for establishing criterion validity in the field of sport expertise development. It is possible that establishing performance group differences in concert with associations with practice is lacking, possibly because the presumption that practice differences are the key variable in determining skill groups (Ericsson et al., 1993) may be flawed. Although this view pervades expertise research, it has recently been challenged (McNamara et al., 2016). Thus, it is possible researchers have over-valued the influence of psychological variables related to practice behaviors as differentiators of who ends up in which skill group. That said, we believe this to be unlikely, as the relationship between time spent in training and performance improvement is one of the most robust in the history of psychology (see Newell & Rosenbloom, 1981). Instead, we believe that variables assessing conditions of arduous, deliberate sport practice could be improved, and methods that more reliably prime the discomfort of deliberate practice may be needed to flesh out the orientation pertaining to delayed gratification as represented by CFC-F, and the more immediate orientation of CFC-I. In particular, intertemporal psychological constructs like CFC might be implicated more extensively if there is more fine-grained isolation and identification of highly intense modes of sport-specific practice, throughout different training demands, or if athletes are required to involve action-control when they confront demands and goal frustration during practice (Siekańksa et al., 2023). There has been a practice of using proxy variables in self-report of all types of sport-specific training, which sport scholars have admitted are not the best characterizations of deliberate practice (Young et al., 2021). Still, the variables we used to assess sport-specific practice are widely accepted and have yielded notable effects. For example, there have been significant standardized regression weights when sport-specific practice has been regressed on grit-perseverance (.33; Tedesqui & Young, 2017), conscientiousness (.30), achievement-striving (.16) and dutifulness (-.26)(Tedesqui & Young, 2018), and self-monitoring (.19; Bartulovic et al., 2018). Moreover, when performance levels have been contrasted on psychological constructs of interest in these studies and others, group effects have been in the small-to-medium range (partial eta^2 = .02 to .05 in McCardle et al., 2019, and partial eta^2 = .05 to .06 in Wilson et al., 2020), occasionally approaching large effects (partial eta^2 = .13; Tedesqui & Young, 2017). Thus, although we cannot discount that other criterion variables might show different findings, including robust criteria for qualities of deliberate practice, we believe the criteria we employed were well justified based on empirical precedent. Thus, we cannot conclude that our criterion measures were a reason for the poor performance of CFC and FTP variables. With respect to group discrimination, we note that categorization for between-group testing can lead to a loss of information and suggest that future researchers try to recruit a sufficiently large sample from one sport (instead of a mixed sport sample), one that has inherently continuous metrics for performance, to conduct regression analyses.

Self-Report Methods Are Limited Because They Do Not Assess Risk, Reward and Outcome Expectancies

The absence of significant results may reflect broader limits on self-report as a method for exploring complexities of considering future consequences and delayed gratification. We submit that the poor performance of CFC may be because self-reports to date have not fully considered the concomitant self-report of risk and reward, and outcome expectancies, and that these covarying measures may be necessary to unpack the influence of CFC. In the sphere of elite sport training, reward is associated with achieving better performance markers, or qualifying for teams (e.g., national squads) or events (Olympic Games). Risk is associated with investments in training that might not pay off, meaning that all aspiring athletes undertake personal investments and sacrifices for training

that may be squandered if they do not secure an expected gain in performance. (This is a different conception of risk than in most CFC studies, where risky behaviors, like smoking, are performed for immediate convenience/pleasure with risk to one's long-term health.) Risk and reward co-exist with beliefs related to outcome expectancies, i.e., athletes' expectations for levels of performance gain that they associate with levels of training investment across a range of future time frames. Thus, we suggest that self-report methods that implicate these aspects of behavioral economics (van Beek et al., 2017), may be more helpful in capturing the "weighing" of immediate and future considerations to which Strathman et al. (1994) referred. For instance, cascade question designs borrowed from behavioral economics (see Hardisty et al., 2013) may allow us to determine which athletes are willing to trade off short-term, small gains for longer-term, larger, and riskier rewards, and the timeframes involved. We suppose that CFC parameters could moderate how athletes variably respond to a behavioral economics paradigm affixed to questions about their athletic training. Moreover, we propose that elite athletes may have different mindsets in how they respond compared to less elite skill groups.

There is a Need for More Eloquent Behavioral Designs to Test Delayed Gratification in Sport

We submit that future research should adopt a behavioral paradigm to better understand interactions between time, reward, and future orientation. The time orientation literature shows that people will change the nature of their time-oriented choices depending on whether they are asked to choose an option well in advance, compared to acting on a decision *in situ*. For example, when presented a healthy eating scenario in advance, most participants will choose the healthy option; however, when presented with the same decision scenario immediately, choices drastically change (with drastically fewer choosing the healthy option and instead electing for the immediately satisfying unhealthy choice; Read & van Leeuwen, 1998). Similarly, *in situ* behavioral paradigms may allow for more reliable inferences on CFC or FTP. There are some examples of experimental designs which have revealed how less elite athlete choose easier paths during practice, such as choosing an easier blocked schedule of tasks (rather than random practice; Coughlan et al., 2013), by which temporal discounting is inferred because the more difficult path involves longer and more effortful work for greater reward. On this topic, then, it may be that only experimental designs, with behavioral choices, can solve the aforementioned limits.

Several laboratory studies have implemented eloquent designs to infer age-related trends in the development of future-oriented practice (Davis et al., 2018). For example, Brinums et al. (2018) employed a design involving three motor performance phases. Participants were children (4-7 years of age) who began with a familiarization phase where they played three golf game tasks, at the end of which experimenters informed them that one of those tasks would be targeted for testing and associated with possible rewards later in a final test phase. Next, prior to the final test phase, the children went into a different room for a free practice phase where they could choose to play any of the three tasks, as all were available. Children who were more future-oriented engaged in more deliberate practice during free practice, indicated by choosing the target task first after the experimenter left the room (i.e., intention to practice) and a higher of percentage of play time with the target game, compared to children who were less future-oriented. The authors explained that future-oriented children's choices characterized episodic forethought (i.e., envisioning future scenarios/tests and organizing actions accordingly) and metacognitive capabilities (recognizing the importance of, and/or one's weakness, at a target task and tethering such appraisal to learning strategies in subsequent future practice). This paradigm is amenable to further manipulations around practice time (e.g., the duration and/or challenge conditions within free practice phases) and the weighing of choices

between shorter-term, small rewards versus longer-term, larger awards. This design could be extended across age spans, involving standardized sport tasks, and analysis could consider interactions with skill level.

There is a Need to Consider CFC Profiles in Analyses

Recent research claims it is essential to make an empirical distinction between CFC-F and CFC-I (van Beek et al., 2017). While we also appreciate Joireman et al.'s (2006) suggestion that researchers find new methods to create conflict or manipulate dissonance between immediate and future orientations, we wonder whether profiles of both CFC permutations in parallel may perform better at predicting key criteria. For example, in sport, it is possible that a high-high profile (i.e., high ratings for CFC-F and CFC-I) may be adaptive, allowing an athlete to toggle between a focus on immediate consequences of training actions more immediately (similar to reflecting 'in action', which may be helpful in overcoming immediate challenging factors) *and* a focus on how those behaviors play out with respect to anticipated benefits in the further future (akin to reflecting 'on action', and making adaptive inferences for the future). It may be that individuals who stay engaged in the developmental tract towards expertise in their sport longer may have a mixed profile of high immediate and high future orientations, rather than a high future orientation. It may be that an interaction of immediate and future orientations is associated with the criterion variables. Such a profiling approach may address van Beek et al.'s (2017, p. 424) call "to simultaneously investigate the effects of present and future orientation, in order to unravel the relative importance of both constructs", while allowing for significant and differential effects attributed to both CFC-I and CFC-F.

Conclusion

We were surprised to find little support for our predictions around CFC-F, and then FTP, across our three sport studies. We do not feel replication of this work, with only slight adjustments to self-report, or even alternative criterion measures, will prove better. Although there is conceptual merit for delayed gratification as a key characteristic influencing deliberate practice, our findings can be added to others outside of sport which show the landscape of CFC works to be increasingly equivocal. Outside of sport, there have been inconsistent findings with respect to the same target behavior across different studies, and when findings have been significant, they were associated with small/negligible effect sizes (Murphy & Dockray, 2018; van Beek et al., 2017). Like our work, most of the studies are constrained by cross-sectional design and common methods bias. Thus, to better appreciate how well CFC-related variables perform in achievement domains, based on our poor results, we advocate for more behavioral work with manipulations of rewards across time. We are convinced that such work must complement more rigorous self-report procedures, which could be submitted to CFC profile analyses (i.e., high-high, high-low, low-high, low-low). Such advancements may help us better understand how high achievers in sport think about their future and how such conceptions affect practice. In this manner, we can begin to unravel the complexities and more firmly establish the benefits of individuals' considering future consequences, with implications for the psychology of striving across multiple achievement domains.

Endnotes

1. While there are some relations between the FTP scales for speed and extension with the FTP scales for value and connectedness (Husman & Shell, 2008), the former two scales were not a focus in this study. Survey items for *speed* (e.g., "I always seem to be doing things at the last moment") allow inferences about how fast time passes in respondents' minds. Survey items for *extension* (e.g., "In general, six months seems like a very short period of time") ask about the "habitual time space" (Husman & Shell, 2008, p.168) individuals think about, and thus allow for inferences on how far

ahead a person projects one's thoughts into the future. The research team initially vetted all FTP scales as alternative measures for CFC scales and decided to include only the value and connectedness scales because the wording of these items approximated the content of the CFC, whereas speed and extension seemed more tangentially related to the present investigation.

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Authors' Declarations

The authors declare that there are no personal or financial conflicts of interest regarding the research in this article.

The authors declare that the research reported in this article was conducted in accordance with the Ethical Principles of the *Journal of Expertise.*

The authors declare that all data and survey materials are publicly available at the the APA-Open Science Framewoek repository and can be accessed at https://osf.io/7xf8d/?view_only=70949f1dfefc45d987f40eb742f7f6fc. Analysis syntax is available from the first author upon request.

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