Consideration of future consequences, ego-depletion, and self-control: Support for distinguishing between CFC-Immediate and CFC-Future sub-scales

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Abstract

We examine how individual differences in the consideration of future consequences (Strathman et al., 1994) impact trait self-control, and temporal discounting under conditions of ego-depletion. Study 1 ($N = 986$) reveals that the CFC scale contains two underlying factors, which can be labeled the CFC-Immediate (CFC-I) and CFC-Future (CFC-F) sub-scales. Supporting the distinction between the two sub-scales, Study 2 ($N = 147$) shows that lower levels of trait self-control are best predicted by higher levels of CFC-I (not CFC-F), while Study 3 ($N = 104$) reveals that ego-depletion leads to more temporal discounting only among those high in CFC-I. Future use of the two sub-scales is encouraged.
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1. Introduction

By definition, most acts of self-control involve sacrificing short-term happiness (e.g., directing money one might spend today into a retirement fund) to achieve long-term well-being (e.g., retiring with enough money to live comfortably) (Rachlin, 2000). As a result, personality psychologists interested in understanding self-control have long been interested in traits related to an individual's concern with immediate vs. future consequences. One construct that has received a fair amount of attention in this regard is known as the *consideration of future consequences* (Strathman et al., 1994; cf. Zimbardo & Boyd, 1999). Individual differences in CFC reflect "the extent to which people consider the potential distant outcomes of their current behaviors and the extent to which they are influenced by these potential outcomes" (Strathman et al., 1994; p. 743). Individuals low in CFC attach a high degree of importance to the immediate consequences of behavior, while individuals high in CFC attach a high degree of importance to the future consequences of behavior.

A growing body of research indicates that individual differences in CFC predict a range of behaviors reflective of self-control (for a review, see Joireman, Strathman, & Balliet, 2006). For example, relative to those scoring low in CFC, individuals scoring high in CFC report less use of tobacco and alcohol (Strathman et al., 1994), less aggression (Joireman, Anderson, & Strathman, 2003), more fiscally responsible behavior (Joireman, Sprott, & Spangenberg, 2005), and more frequent exercise (Ouellette, Hessling, Gibbons, Reis-Bergan, & Gerrard, 2005). High levels of CFC are also positively correlated with personality traits related to self-control including conscientiousness

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and delay of gratification (Strathman et al., 1994) and negatively correlated with impulsivity (Joireman et al., 2003).

Despite this impressive body of evidence, questions remain about the underlying nature of the CFC construct, and these questions have important implications for how best to interpret past research linking CFC to various measures of self-control. In particular, while the CFC construct is conceptualized as "the extent to which people consider the potential distant outcomes of their current behaviors" the actual items in the scale reflect a concern with distant, as well as immediate, consequences of one's actions. In their original paper, Strathman et al. (1994) reported exploratory and confirmatory factor analyses that supported the presence of one underlying factor, and past research has without exception found that the 12-item CFC scale possesses a high level of internal reliability (alphas typically range from .80 to .85). However, in a more recent study, Petrocelli (2003) reported a series of factor analyses that support the presence of two underlying factors, including an immediate and a future sub-factor. Petrocelli did not, however, examine the implications of the two factors, so it is unclear whether it is useful to distinguish between what we will label "CFC-Immediate" and "CFC-Future" sub-scales.

Accordingly, the purposes of the present paper are threefold. First, we report a large sample confirmatory factor analysis that attempts to replicate Petrocelli's finding that the CFC scale contains two underlying sub-factors, focusing on immediate and future consequences, respectively (Petrocelli, 2003). Second, we explore the validity of a two-factor solution by examining whether the two sub-factors are differentially predictive of trait self-control. Finally, we offer a second test of the validity of a two-factor solution by examining whether the two sub-factors differentially interact with ego-depletion to predict a decision process closely related to self-control (i.e., temporal discounting).

2. CFC predicts self-control, but why? Susceptibility vs. buffering hypotheses

As noted, individual differences in CFC predict a range of behaviors related to self-control. To date, however, no studies have reported a relationship between CFC and trait self-control. At one level, establishing a relationship between CFC and self-control might appear unnecessary in light of past research. However, it is important to recognize that past research has never explored which aspect of CFC is most closely related to self-control. For example, past studies have shown that high scores on the CFC scale predict a weaker tendency to engage in impulse buying (Joireman et al., 2005). But, because the CFC scale contains questions tapping concern with immediate and concern with future consequences, at least three interpretations can be offered to explain this result. First, it is possible that those who have a high concern with immediate consequences are more likely to engage in impulse buying. Second, it is possible that those who have a high concern with future consequences are less likely to engage

in impulse buying. Finally, it is possible that impulse buying is predicted by a combination of concern with immediate and concern with future consequences. By separating out concern with immediate and concern with future consequences, it is possible to gain more insight into the possible mechanisms contributing to impulse buying, or any other behavior requiring self-control. More specifically, according to a *susceptibility hypothesis*, concern with immediate consequences should be the best predictor of (low) self-control (i.e., people concerned with immediate consequences are susceptible to self-control failure). On the other hand, according to a *buffering hypothesis*, concern with future consequences should be the best predictor of self-control (i.e., a concern with future consequences buffers a person against self-control failure).

3. CFC and temporal discounting

Establishing that the two CFC sub-scales differentially predict trait self-control would provide initial evidence for the validity of that distinction. To provide additional evidence for that distinction, we also explored whether the two sub-scales might differentially predict a decision process closely related to the notion of low self-control, namely the tendency to discount the value of future outcomes. In the typical temporal discounting paradigm, participants are given a choice between a smaller, more immediate reward ($5 in two days) and a larger delayed reward ($10 in 7 days) (e.g., Kirby, Petry, & Bickel, 1999). Not surprisingly, past research has shown an inverse relationship between scores on the CFC scale and temporal discounting (Joireman et al., 2005). Here again, however, no attempt was made to examine whether the two sub-scales differentially predicted temporal discounting. Following our earlier logic, a *susceptibility hypothesis* would predict that concern with immediate consequences should best predict temporal discounting, while a *buffering hypothesis* would predict that concern with future consequences should be the best predictor of temporal discounting.

4. Ego-depletion and temporal discounting

As a final test of the validity of distinction between the CFC-Immediate and CFC-Future sub-scales, we also explore whether these two sub-scales differentially interact with features of the situation (ego-depletion) to predict temporal discounting. According to the depletion model of self-regulation, self-regulation operates like a muscle, such that regulating behavior in one domain can reduce an individual's ability to regulate their behavior in a subsequent domain (Baumeister & Heatherton, 1996; Muraven, Tice, & Baumeister, 1998). Many studies using various manipulations intended to deplete self-regulatory resources (e.g., emotion suppression, attention regulation) have shown that when people are required to regulate their behavior in one domain, their ability to regulate in another domain dimin-

ishes (e.g., Muraven & Baumeister, 2000; Muraven et al., 1998; Schmeichel, Vohs, & Baumeister, 2003).

One explanation for these findings is that successful self-regulation requires an individual to engage in complex thought (e.g., understanding the contingencies between current actions and future outcomes) and taxes the capacity of the central executive function (working memory) so crucial to resolving these complex problems. Thus, over time, the capacity of the individual to self-regulate diminishes or becomes depleted. In line with this reasoning, research indicates that manipulations intended to deplete self-regulatory resources lead to reduced intellectual performance (Schmeichel et al., 2003) and that taxing the central executive, for example through a divided attention task, increases temporal discounting (Hinson, Whitney, & Jameson, under review). In sum, ego-depleting tasks are likely to reduce an individual's subsequent ability to self-regulate because these activities tax the central executive function, which in turn increases temporal discounting. Based on this reasoning, we expected that, relative to those in a control group, individuals who had just completed an ego-depleting task (emotion suppression) would show higher levels of temporal discounting. Indeed, several studies have shown that ego-depletion leads people to pursue more immediate gratification (e.g., Muraven, Collins, & Neinhaus, 2002; Vohs & Heatherton, 2000).

5. CFC × ego-depletion interactions

While the impact of ego-depletion on temporal discounting is interesting, more important for our purposes is to establish that the two CFC sub-scales might differentially interact with ego-depletion to predict temporal discounting. In general, assuming that ego-depleting tasks tax the central executive function, and serve to enhance the attractiveness of short-term gains, individuals high in concern with immediate consequences should more easily fall prey to the effects of ego-depletion (i.e., the *susceptibility hypothesis*). By contrast, those high in concern with future consequences may be less severely impacted by ego-depleting tasks (i.e., the *buffering hypothesis*): while ego-depleting tasks are likely to make short-term outcomes more attractive, individuals high in concern with future consequences are, in theory, not interested in short-term consequences. In sum, examining the nature of the interaction between ego-depletion and the two CFC sub-scales provides an additional test of the validity of distinguishing between the two sub-scales, and may yield valuable insights into the nature of the relationship between CFC and self-control.

6. Study 1

6.1. Confirmatory factor analysis of the CFC scale

6.1.1. Method

Participants. Seven data sets, collected over a series of past studies, were compiled into a single database of respondents ($N = 986$) to Strathman et al.'s (1994) CFC scale. Gender was roughly balanced (53% women) and age was typical of a college sample ($M = 21.7$, SD $= 2.31$).

Consideration of future consequences. The CFC scale contains 12 general statements reflecting an individual's tendency to consider the immediate vs. future consequences of his/her behavior. Five statements reflect a concern with future consequences (e.g., I consider how things might be in the future, and try to influence those things with my day to day behavior) while the remaining 7 statements reflect a concern with immediate consequences (My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions). Respondents rated how characteristic each statement was of their own behavior on a scale from 1 (*extremely uncharacteristic*) to 7 (*extremely characteristic*).

6.1.2. Results and discussion

The one-factor model showed a relatively poor fit with the data, SBχ^2 (54) = 524.6, $p < .001$, CFI = .887, RMSEA = .094, LL = .087, UL = .101, SRMR = .063. By contrast, the two-factor model (Fig. 1) provided an adequate fit to the data, SBχ^2 (53) = 294, $p < .001$, CFI = .942, RMSEA = .068, LL = .06, UL = .076, SRMR = .042, and
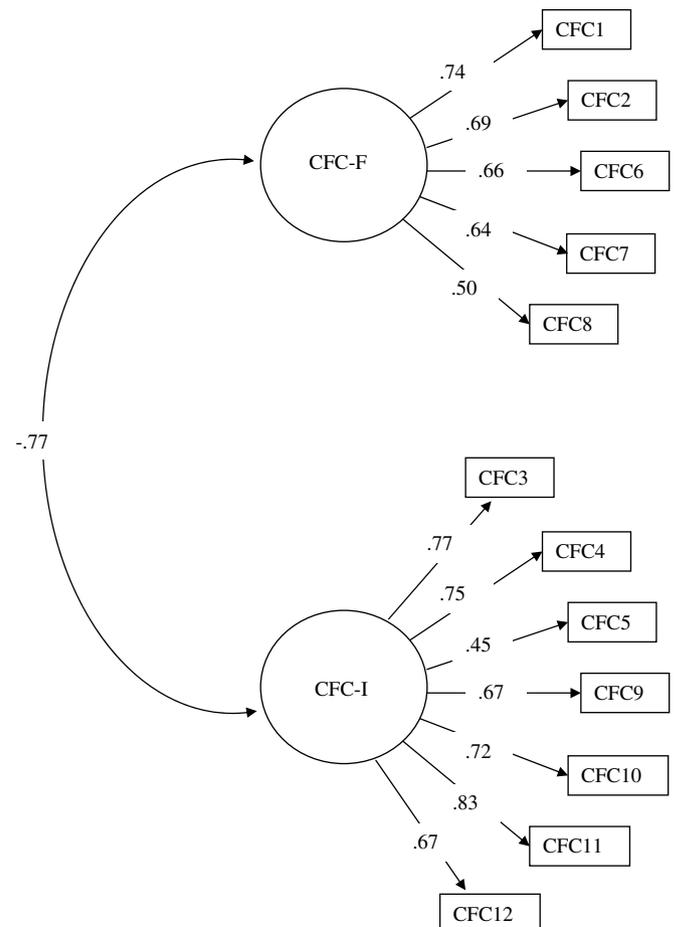

Fig. 1. Standardized loadings for a two-factor confirmatory factor analysis of the CFC scale (Study 1). All loadings significant at $p < .001$.

the two-factor model provided a statistically better fit to the data than a one factor model, $\chi^2 (1) = 76.36$, $p < .001$ (Satorra, 2000). Reliabilities for the CFC-Immediate and CFC-Future sub-scales were .87 and .78, respectively.

The current study suggests the CFC scale contains two factors, including a future concern sub-factor (CFC-Future) and an immediate concern sub-factor (CFC-Immediate). Given these results, in our remaining studies we examined the impact of the future and immediate sub-scales.

7. Study 2

7.1. CFC and trait self-control

Our primary focus in the present paper is to evaluate the interactive effects of CFC and ego-depletion on temporal discounting. Prior to addressing that question, we sought to establish that CFC was related to trait self-control (Tangney, Baumeister, & Boone, 2004), which has heretofore been linked with behavioral measures of self-control (Schmeichel & Zell, 2007). Though straightforward, a positive relationship between CFC and trait self-control would serve as necessary evidence for exploring the impact of CFC (and ego-depletion) on temporal discounting, and would provide initial evidence in support of distinguishing between the two CFC sub-scales.

7.1.1. Method

Participants and procedure. Introductory psychology students ($N = 147$) from a small northwestern college participated for extra credit. As part of a larger study, participants completed a single packet of questionnaires including Tangney et al.'s (2004) trait self-control scale and Strathman et al.'s (1994) CFC scale.

Tangney et al.'s (2004) self-control scale contains 36 statements. One third of the items reflect an individual's tendency to regulate behavior, while the remaining items reflect a lack of impulse control. One sample item reads "I am good at resisting temptation." In the current study, participants responded to these questions using a 5-point Likert scale ranging from 1 (*not at all like me*) to 5 (*very much like me*). After reverse scoring, high scores indicate a higher level of trait self-control ($\alpha = .86$).

Participants also completed Strathman et al.'s (1994) 12-item CFC scale on a 5-point scale (1 = extremely uncharacteristic to 5 = extremely characteristic). The internal reliability for the CFC-I sub-scale ($\alpha = .84$) was quite high, whereas the internal reliability for the CFC-F sub-scale ($\alpha = .62$) was somewhat low. Further analysis indicated the CFC-F sub-scale's reliability could not be improved by dropping any items. As such, we retained the 5-item sub-scale for analysis.

7.1.2. Results and discussion

Each CFC sub-scale scale was significantly correlated with self-control in the predicted direction: CFC-F

($r = .27$, $p < .001$) and CFC-I, respectively ($r = -.40$, $p < .0001$), and the CFC-F and CFC-I sub-scales were negatively correlated ($r = -.59$, $p < .0001$). Given the overlap between the two CFC sub-scales, we examined the unique contribution of the CFC-F and CFC-I sub-scales in predicting self-control. When entered as a set, the only unique predictor of self-control was the CFC-I sub-scale ($\beta = -.36$, $t(144) = -3.85$, $p < .001$); CFC-F ($p = .58$).[2] These results complement our findings from Study 1 by providing support for distinguishing between the two CFC sub-factors. Building on these results, in Study 3, we expected that those scoring high on CFC-I, and those placed in an ego-depletion condition, would be more likely to discount delayed rewards, and that CFC-I and ego-depletion would interact to predict temporal discounting, such that ego-depletion would have a larger impact on temporal discounting among those high in CFC-I.

8. Study 3

8.1. CFC, ego-depletion, and temporal discounting

8.1.1. Method

Participants and procedure. Introductory psychology students ($N = 104$) from a large state university participated in fulfillment of a course requirement. Participants, run individually, signed an informed consent form, completed the CFC scale, were randomly assigned to either an ego-depletion or control condition, and completed a temporal discounting measure.

Assessing individual differences in CFC. Participants first completed the 12-item CFC scale. Based on the results from Study 1, we formed a CFC-Immediate ($\alpha = .84$) and CFC-Future sub-scales ($\alpha = .69$).

Ego-depletion manipulation. After completing the CFC scale, participants watched a short comedy clip (Vohs & Schmeichel, 2003) while their facial expressions were recorded. After starting the video recorder, the experimenter handed the participant the instructions, showed them how to start the comedy clip and left the room.

Participants in the *ego-depletion condition* read the following instructions:

This part of today's study is aimed at understanding facial expression of emotions. As you watch the video, we'd like you to remain completely neutral on the inside and out. Please try your best not to let any feelings or responses you may have show on your face, and to the best of your ability, try to keep all of your internal reactions suppressed.

Participants in the *control condition* received the following instructions:

This part of today's study is aimed at understanding facial expression of emotions. As you watch the video, we'd like you to be as natural as possible, both on the

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[2] The CFC-F × CFC-I interaction was not significant ($p = .60$).

inside and out. If you have any feelings or reactions to the video, let them flow naturally.

To ensure that the experimenter remained blind to the treatment, instructions were provided on a folded slip of paper that the experimenter could not read. To check participants' comprehension, participants wrote down what they were instructed to do during the video. In addition participants rated the perceived difficulty of the video viewing task (1 = *not at all difficult* to 7 = *very difficult*).

8.1.2. Temporal discounting measure

Participants next completed Kirby et al.'s (1999) temporal discounting measure on a computer, consisting of a series of 27 binary choices between an amount of money a person can have today (the "smaller immediate reward") and a larger amount that the person can have at some date in the future (the "larger delayed reward"). The 27 choices are converted into a discounting parameter (k), with larger values indicating a stronger tendency to discount the value of future financial outcomes (see Kirby et al., pp. 80–81, for the exact payoffs used, and more detail on the computation of the discounting parameter). Providing evidence for the measure's validity, Kirby et al., demonstrated that drug users had higher discount rates than non-drug-using controls. Following the discounting measure, participants were debriefed, thanked for their participation and dismissed.

8.1.3. Results

Manipulation checks. The majority of participants (98%) correctly stated what they were asked to do while watching the video clip. To check on the success of the ego-depletion manipulation, we first analyzed participants' self-reported difficulty of the video viewing task. As expected, participants in the ego-depletion condition found the task more difficult ($M = 3.55$, SD = 1.77) than those in the control condition ($M = 2.21$, SD = 1.35), $t(102) = 4.36$, $p < .001$. As a second check, we analyzed participants' facial expressions during the viewing task. Specifically, facial expressions were coded at four different points in time by a researcher blind to the experimental condition on a scale from 1 (*not at all expressive*) to 7 (*extremely expressive*). The four ratings were averaged into an expression index. In support of the manipulation, participants in the ego-depletion condition ($M = 1.70$, SD = 0.76) were rated as less expressive than those in the control condition ($M = 2.19$, SD = 0.87), $t(75) = -2.58$, $p < .02$.

Temporal discounting. To test our primary hypotheses, we conducted a series of multiple regression analyses.[3] First, we regressed the discounting parameter in a series of two steps on the CFC sub-scale of interest, experimental condition (-1 = control, 1 = suppress emotions), and their interaction (see Table 1). In these analyses, the CFC sub-scale was a continuous mean-deviated variable. As can be

Table 1
Regression analyses predicting temporal discounting from cfc sub-scales and ego-depletion condition

Model/step/predictor	Individual parameters			Overall model		Model change	
	β	t	p	R^2	F	R^2_Δ	F_Δ
Model 1							
Step 1				.11	6.22**		
CFC-Future	-0.32	-3.39	0.01				
Condition	0.09	0.94	0.35				
Step 2				.12	4.48**	.01	1.01
CFC-F × Condition	-0.10	-1.01	0.32				
Model 2							
Step 1				.06	2.86+		
CFC-Immediate	0.22	2.16	0.05				
Condition	0.08	0.76	0.45				
Step 2				.11	3.96**	.05	5.86*
CFC-I x Condition	0.24	2.42	0.02				

Note. Model 1 ($N = 100$); Model 2 ($N = 99$). Condition (-1 = control, 1 = depletion).
+ $p < .10$.
* $p < .05$.
** $p < .01$.

seen (Model 1), results revealed a significant negative relationship between the CFC-F and temporal discounting, but no significant effect for experimental condition, and no interaction between the two variables. Results (Model 2) also revealed a significant positive relationship between the CFC-I and temporal discounting and a significant interaction between CFC-I and condition (see Fig. 1). Following procedures outlined by Judd and McClelland (1989), a set of simple effects follow-up analyses revealed that ego-depletion led to significantly more discounting among those high in CFC-I (at +1 SD above the mean), $\beta = .32$, $t(95) = 2.27$, $p < .05$, but had no impact on temporal discounting among those low in CFC-I (at -1 SD below the mean), $\beta = -.16$, $t(95) = -1.16$, $p = .25$, in line with the susceptibility hypothesis. Fig. 2.

8.1.4. Discussion

The present study demonstrated additional support for the distinction between the two CFC sub-factors by show-
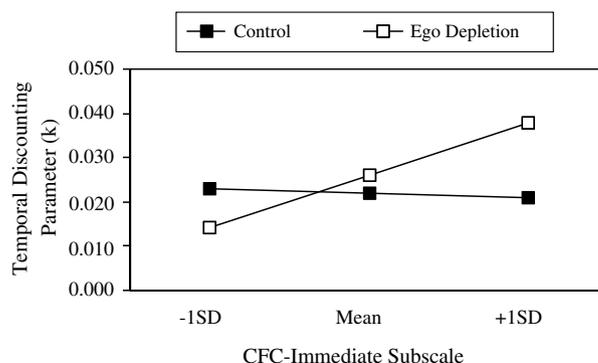

Fig. 2. Temporal discounting as a function of CFC-Immediate sub-factor and ego-depletion condition.

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[3] One participant ($k = .25$) was identified as an outlier ($z = 6.38$, $p < .0001$), and was dropped from the analysis.

ing that concern with immediate consequences (but not concern with future consequences) moderated the impact of ego-depletion on temporal discounting, in line with the susceptibility hypothesis.

9. General discussion

The presents studies reveal that the CFC scale has two underlying factors (CFC-Immediate and CFC-Future), that CFC-I is the better predictor of trait self-control, and that CFC-I interacts with ego-depletion in predicting the tendency to discount future outcomes, in line with our susceptibility hypothesis. Taken together, our findings make several contributions to research on individual differences in CFC, ego-depletion, and self-control.

9.1. Consideration of future consequences

Following Strathman et al.'s (1994) original article, individual differences in CFC have been shown to predict a wide range of theoretically-relevant behaviors broadly classified as forms of self-control (Joireman et al., 2006). Despite this impressive body of evidence, surprisingly little work has directly examined the factor structure underlying the CFC construct (for an exception, see Petrocelli, 2003; Strathman et al., 1994) or the impact of CFC on basic decision-making processes related to self-control (for an exception, see Joireman et al., 2005). We addressed these limitations in three ways. First, we replicated Petrocelli's (2003) initial findings that the CFC scale contains two underlying factors (concern with immediate vs. concern with future consequences). Second, we showed that the two sub-scales were differentially predictive of trait self-control and temporal discounting; in both cases, it was a strong concern with immediate consequences (rather than a concern with future consequences) that emerged as the best unique predictor, in line with a susceptibility hypothesis. Finally, we examined how the two sub-scales differentially moderated the impact of ego-depletion on temporal discounting. Specifically, we showed that ego-depletion led to higher levels of temporal discounting only among those who showed a high concern with immediate consequences (high CFC-I), again in line with a susceptibility hypothesis. Future research might profitably explore whether this apparent susceptibility of those high in CFC-I to ego-depletion may play a role in health behavior, aggression, and or impulsive buying. Future research could also profitably explore how individual differences in CFC come to exert a moderating role. Given that individuals high in CFC report more frequent exercise (Ouellette et al., 2005) and that exercise can buffer the impact of ego-depletion (Baumeister, Muraven, & Tice, 2000; Muraven, Baumeister, & Tice, 1999), it is possible that those high in CFC have developed a stronger self-regulatory capacity. Future research exploring this possibility could yield important insights into how to increase self-control.

9.2. Ego-depletion and self-control

In addition to extending work on CFC, our study complements the literature on the strength model of self-regulation (e.g., Baumeister & Heatherton, 1996; Muraven & Baumeister, 2000; Muraven et al., 1998). Previous studies have clearly shown that depleting self-regulatory resources can reduce an individual's ability to regulate their behavior in a subsequent domain. Past research has also shown that depleting regulatory resources increases desire for immediate rewards and that the adverse impact of ego-depleting tasks is stronger among individuals low in trait self-control (Seeley & Gardner, 2003). Our results, utilizing a novel individual difference construct, and a purely mathematical measure of temporal discounting, are very much in line with these past studies.

9.3. Limitations and directions for future research

While we believe the current results extend work on CFC, ego-depletion, and self-control, our studies do raise new questions for future research. To begin, we have focused our attention mainly on the impact of CFC and ego-depletion on self-reported trait self-control and an abstract mathematical temporal discounting measure. As such, future research should more directly evaluate the applied implications of these findings. That said, it is important to note that people's tendency to discount real and hypothetical outcomes are related (Madden, Begotka, Raiff, & Kastern, 2003), and that past research has demonstrated real-world implications of such tendencies. As an example, heroin users display higher rates of temporal discounting using the same measure used in our research (Kirby et al., 1999). Second, the reliability of the five-item CFC-Future sub-scale fell short of an acceptable level in Studies 2 and 3. Accordingly, future research should attempt to improve the measurement properties of this important sub-scale. Finally, future research might profitably build on the present findings by more closely exploring the unique contribution of CFC-Immediate and CFC-Future sub-scales, and further testing the susceptibility and buffering hypotheses in other domains of self-control.

Acknowledgements

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