Does the Brief Self-Control Scale Assess Relatively Stable Individual Differences in Self-Control Among Endurance Athletes?

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Abstract

Endurance athletes are a population where self-control in the form of following training plans, race plans, and pacing schedules is key to performing successfully. A valid and stable measure of self-control has theoretical and applied value through the ability to identify athletes who might be susceptible to poor self-control. The present study reports the test-retest stability of the Brief Self-Control Scale (BSCS). 132 endurance athletes (18-65 years) completed the 13-item BSCS on two occasions, separated by two weeks. Stability was measured by calculating the test-retest differences for each questionnaire item, with a stable item showing 90% of respondents' test-retest differences within a reference value of ±1. Analyses revealed seven items to be stable with the question, Q11 = "I am able to work effectively toward long-term goals", demonstrating greatest stability (96.3%). In contrast, six items showed relatively poor stability with test-retest difference scores ranging from 83.4-89.4%. Chi-square tests of independence revealed no associations with categorical levels of age, gender, sport, and training habits. In the context of the current findings, we argue that the six unstable items do not represent dispositional self-control behaviours among endurance athletes. Future researchers are encouraged to assess the stability of individual items rather than favoring a summary statistic, particularly when developing trait measures.

Keywords: ego depletion, measurement, self-regulation, test-retest reliability, trait self-control

Working from an individual-differences perspective, self-control has been shown to predict behavioral outcomes in contexts such as health (Imhoff, Schmidt, & Gerstenberg, 2014; Schroder, Ollis, & Davies, 2013), education (Tangney, Baumeister, & Boone, 2004), and crime (Moffitt et al., 2011), as well as performance in dual-task experiments (Schmeichel & Zell, 2007). Thus, assessment of a valid and reliable measure of trait self-control (TSC) could be considered a worthwhile endeavour for researchers and practitioners through the ability to identify those individuals who might be susceptible to poor self-control, as well as drawing attention to actions and behaviors that require self-control. Following this proposal, assessment of TSC would be particularly useful for endurance athletes in predicting behavior related to explicit behavioral intentions.

The ability to select an appropriate pacing strategy (Renfree, Martin, Micklewright, & St Clair Gibson, 2014), adhere to a training regime (Hagger, Wood, Stiff, & Chatzisarantis, 2010), and maintain a functional mood profile (Lane, Terry, Stevens, Barney, & Dinsdale, 2004) all constitute prime examples of self-regulatory behaviors that require endurance athletes to exert self-control. The significance of maintaining self-control is that it should facilitate achievement of a specific goal.

Self-report represents a useful and practical method for athletes and practitioners who want to identify key self-control behaviors that are vulnerable to lapses in self-control. Moreover, self-reports of self-control can be used to inform intervention design and evaluation. Given the abstract nature of psychological constructs, and the possibility that they may be influenced under different situational contexts, researchers are encouraged to demonstrate stability if they are to emphasize that dispositional trait measures are valid (Lane, Nevill, Bowes, & Fox, 2005; Nevill, Lane, & Duncan, 2015; Nevill, Lane, Kilgour, Bowes, & Whyte, 2001).

Stability refers to the concept that constructs retain a degree of resistance to change over time (Nevill et al., 2001). An aspect of stability is the extent to which test-retest scores are reproducible, regardless of situational changes. For example, sufficient empirical evidence confirms that self-control ability is susceptible to situational influences, including previous attempts at self-control (Baumeister et al., 1998; Muraven & Baumeister, 2000), mood (Fishbach & Labroo, 2007; Tice, Baumeister, Shmueli, & Muraven, 2007), working memory capacity (Hofmann, Gschwendner, Friese, Wiers, & Schmitt, 2008; Schmeichel, 2007), and motivation (Muraven & Baumeister, 2000; Muraven & Slessareva, 2003).

Tangney et al. (2004) developed The Self-Control Scale (SCS) and Brief Self-Control Scale (BSCS) to assess trait-like individual differences in general self-control ability, that is, the ability to break habits, resist temptation and maintain good self-discipline. The authors also used the scale to investigate whether individual differences in self-control could predict positive outcomes across a variety of life domains. They reported that people with high self-control a) achieved better grade point averages, corroborating the view that high self-control fosters strong academic performance; b) reported fewer impulse control problems such as binge eating and alcohol abuse; c) reported better psychological adjustment including higher self-esteem; and d) enjoyed more satisfying interpersonal relationships.

Tangney et al. (2004) reported good construct validity for the SCS and BSCS during their two studies (*rs* = .93 and .92, respectively). In addition, they claimed they had established good test-retest reliability for their measures by reporting alphas of .89 for the SCS and .87 for the BSCS. However, researchers have questioned using correlational methods such as internal consistency scores (e.g., Cronbach's alpha) to assess test-retest stability or agreement, as correlation is a measure of a relationship rather than agreement (Nevill, 1996; Nevill et al., 2001; Wilson & Batterham, 1999). Furthermore, transient errors

may produce correlated errors and inflated alphas. For example, the Pearson product-moment correlation coefficient (PPMCC) detects linear association between two (possibly different) measures. Using this method for a dataset where 3 participants report 1, 2, and 3 on one week and then 4, 5, and 6 two weeks later (a perfect linear relationship) will produce a perfect correlation ($r = 1$) when the measures are indeed unstable. If test-retest differences are calculated then it shows that each item has increased by 3 points (for example, 4-1). Where researchers are interested in the stability of the measure, test-retest differences should be zero. Nevill et al. (2001) pointed out that self-report measures rely on perception which introduces the likelihood that these reports will contain some variance. Therefore, Nevill et al. (2001) suggested that the majority of participants (90%) should record differences within a ± 1 referent value for 5-item scales. Finally, as Tangney et al. (2004) used factor scores it is not possible to determine if one item has a greater degree of stability than others. To overcome this problem, Nevill et al. (2001) suggest that researchers conduct an item-by-item analysis rather than using a summary statistic (e.g., coefficient alpha).

The aim of the present study was to assess the stability of the Brief Self-Control Scale (BSCS; Tangney et al., 2004) among a sample of endurance athletes. Stability of the scale was assessed by examining the test-retest reliability of data over a two-week period. In line with previous studies, we hypothesized that the BSCS is relatively stable.

Method

Participants

The survey inclusion criteria specified that participants had been involved in endurance training for at least two years, engaged in a least three sessions per week, and were aged 18-65 years of age. Following ethics approval and informed consent, 132 endurance athletes (105 males and 27 females; aged 18-65 years) voluntarily participated in the study. Of the 132, there were 33 aged 18-30 years, 37 aged 31-40 years and 62 aged 41-65 years. Participants were distance runners (n = 61), cyclists (n = 37) and triathletes (n = 34) and were in regular training (on average, 5 days per week) for competition. Participants were affiliated to a club (n = 90), either regularly trained with others (n = 64) or alone (n = 68), received coaching (n = 36), or self-prescribed training (n = 96). The sample size used in this study is commensurate with the sample size recommended (minimum n = 100) for assessing the reliability of psychometric questionnaires (Nevill et al., 2001).

Materials and Procedure

The Brief Self-Control Scale. The Brief Self-Control Scale (BSCS; Tangney et al., 2004) is a 13-item abbreviated version of the Self-Control Scale (SCS; Tangney et al., 2004). The scale is designed to assess domain general self-control across four major spheres of self-control: thoughts, emotions, impulses, and performance. Participants are asked to indicate: "...how much each of the following statements reflects how you typically are." Questions include "I am good at resisting temptation" and "I am able to work effectively toward long-term goals". Items are rated on a 5-point Likert-type scale anchored from 1 (*not at all like me*) to 5 (v*ery much like me*).

Procedure

After providing informed consent, participants completed an electronic version (via surveymonkey.com) of the BSCS questionnaire from home on two occasions separated by two weeks. Consistent with previous work by Lane et al. (2005) and Nevill et al. (2015), a two-week test-retest period was favored to eliminate any significant changes in training and competition.

Statistical Analyses

To assess test-retest reliability we calculated the proportion of differences, within the $\pm$1 reference value as recommended by Nevill et al. (2001), between responses for each item from both testing sessions. We also tested for associations with categorical levels of age (18-30; 31-40; 41-65 years), gender (male vs. female), sport (running, cycling, triathlon), and training habits (How many days per week do you train? Do you regularly train with others? Do you have a coach?), using chi-square tests of independence. All statistical tests were performed using SPSS version 20.0 (SPSS Inc., Chicago, IL).

Results

Descriptive statistics (mean and standard deviations) are reported for Test 1 and Test 2 (see Table 1), with mean total scores being the same across the two time points, suggesting stability. However, test-retest reliability was calculated to examine whether the items used in the BSCS measure relatively stable trait-like measures of self-control. The frequency distributions and reliabilities of two items, Q2 (“I have a hard time breaking bad habits”) and Q12 (“Sometimes I can’t stop myself from doing something, even if I know it is wrong”), are given in Table 2 to illustrate the recommended method of assessment.

Insert Table 1 about here

Insert Table 2 about here

The number of participants with test–retest differences within (±1) for the 13 items are given in Table 3. Note that items Q1 = “I am good at resisting temptation”, Q2 = “I have a hard time breaking bad habits”, Q4 = “I say inappropriate things”, Q9 = “Pleasure and fun sometimes keep me from getting work done” and Q12 = “Sometimes I can’t stop myself from doing something, even if I know it is wrong” appear to demonstrate poor stability (less than 90% of participants differences from test to retest were ≤±1, see Nevill et al., 2001). In contrast, the items Q5 “I do certain things that are bad for me, if they are fun” and Q11 “I am able to effectively work toward long-term goals”, which tap into the tendencies to be impulsive and disciplined, respectively, were identified as showing greatest stability.

Insert Table 3 about here

We explored possible reasons for inconsistent findings via examining the association between the test–retest differences, dichotomised as stable ≤±1 vs. unstable >±1, and the following variables of gender, age group, sport, and training habits. Chi-square tests of independence (categoric data) revealed no associations between the dichotomised test–retest differences for any of the 13 questions with these demographics.

Discussion

The aim of this study was to test the hypothesis that the BSCS (Tangney et al., 2004) is a stable measure of self-control. As the BSCS is proposed to reflect trait-like self-control behaviors—providing situational and behavioral factors remain constant—it should show evidence of stability. The test-retest differences for seven of the 13 items appear to reflect relatively stable self-control behaviors (i.e. >90% of participants reported test-retest differences within ±1). Of these items, greatest stability was found for Q11 "I am able to work effectively towards long-term goals" (96.3%), which represents disciplined behavior. It could be argued that such items represent attributes inherent of athletes and as such are unlikely to fluctuate as much (Jones, Hanton, & Connaughton, 2007). In contrast, poor stability was demonstrated for six items, although Q6 (89.4%) was only marginally unstable. It is worth noting that three of these items related to the ability to resist temptation (Q1, Q9 and Q12). The presence of unstable items in the BSCS therefore warrants discussion.

Previous meta-analytic findings suggest the strongest effects of trait differences are in connection to automatic behaviors such as breaking and forming habits (de Ridder et al., 2012). The findings in this study indicate that items representing discipline (Q3, Q7, Q8, Q10, Q11) show evidence of stable [trait-like] behavior. This suggests that discipline, rather than impulsivity, is a more valid measure of stable self-control behavior.

In the present study, the mean total score (38.89) remained the same across both Test 1 and Test 2. Yet the results for Q1 "I am good at resisting temptation" showed the same mean scores (3.33) on both testing sessions, but with 87.9% of respondents within the ±1 reference value. Similarly, Q9 "Pleasure and fun sometimes keep me from getting work done" demonstrated poor stability with 84.9 % of respondents within the ±1 reference value despite mean scores of 3.15 and 3.16. A comparison of these mean scores would suggest the item is stable and consequently overlook any disagreement between scores. Yet test-retest differences reveal it is because some respondents show increases whereas others show decreases.

It should be noted that there are some limitations to the present study. First, sample size and training habits varied among the demographic groups. Thus, the current findings and conclusions should be interpreted with some caution before making generalizations about self-control behavior among endurance athletes. A second limitation is that situational factors were not adequately controlled for. Whilst athletes were not asked to consider item responses in relation to a particular competition or event, it is possible that contextual factors relating to training and competition periods could have altered the way participants responded to each item. For example, in a previous study investigating the stability of psychometric measures, Nevill et al. (2015) suggested that situational and behavioral factors could explain instability for body image measures. They noted that, as the questionnaire Multidimensional Body Self-Relations Questionnaire-Appearance Scales (MBSRQ-AS; Cash, 2000) was administered midway through the first semester and then two weeks later (toward the end of the first semester), behavioral patterns were likely to have changed as students would have been revising for exams. They cited previous research that found students to work long hours and neglect diet and appearance as well as experience greater anxiety and depression during

revision periods (Andrews & Wilding, 2004). Similarly, Tice et al. (2001) found that negative affect made it difficult to follow through with goals or delaying gratification. Taken together, we suggest researchers pay close attention to situational factors and how they influence behavior. Specifically, athletes who engage in frequent periods of heavy training and then reduce their training load in the lead up to competition are likely to experience changes in goal-related behavior. Such factors are likely to influence how athletes self-report.

The inability to resist temptation and break habits, as evidenced by Q1 and Q2 retest difference scores, does not appear to detract from long-term striving (Q11). If athletes are able to break habits or resist temptation one week, and then fail two weeks later, then it is likely these self-control behaviors are influenced by contextual factors *or* that the habits were not strong in the first place. Given that these aspects of self-control do not appear to affect the stability of subscales tapping into persistence, we suggest that the enactment of self-control, particularly among athletes, is influenced by motivational factors. Previous research examining the interaction between depletion and motivation has found that depleted individuals may perform extremely poorly on self-control tasks when they feel exerting self-control is unlikely to make a difference (Muraven & Slessarava, 2003).

In the present study, it is possible that the poor item stability may be the result of athletes appraising items in the differing contexts; thus, the ability to maintain good self-control fluctuates but is not deemed to be detrimental to overall goal-striving. As an example, an athlete might contextualize Q1 “I am good at resisting temptations” based on his/ her socialising with friends and/or family and subsequently respond “Disagree”, having previously responded “Agree” based on recent [good] attendance at training sessions. As socialising is part of a balanced lifestyle, the athlete may view the decision as not being detrimental toward his/ her overall performance goals and therefore respond “Strongly

Agree" to Q11 "I am able to work effectively toward long-term goals" on both occasions. Items tapping into the ability to self-regulate behavior toward goals and standards, namely the ability to maintain self-discipline (Q8) and work towards long-term goals (Q11) appear to be stable, suggesting these characteristics are more trait-like among athletes. It is not altogether surprising that athletes are stable in these spheres as the inherent nature of sport fosters goal-setting, adherence and striving over a prolonged period of time. Therefore, we suggest that future research needs to assess situational factors when examining self-control behaviors among endurance athletes, paying particular attention to changes in health-status, training and competition schedules. Research has shown that, under such conditions, athletes experience considerable changes in emotions (Jones, Lane, Bray, Uphill, & Catlin, 2005), which are proposed to influence behavior (Baumeister, Vohs, DeWall, & Zhang, 2007).

Ironically, individuals who describe themselves as high in TSC might be susceptible to greater situational depletion. Imhoff et al. (2014) suggest that individuals with high TSC avoid tempting situations and therefore rarely engage in active inhibition. Consequently, they potentially have a weaker ability to resist temptation once they are forcibly confronted with it. From an applied perspective, regardless of whether athletes are good self-controllers or not, they should regularly seek to exercise self-control. To borrow the muscle analogy (Muraven & Baumeister, 2000), actively suppressing one's desires will strengthen self-control and augment the likelihood that temptation can be actively resisted in the future (Baumeister et al., 1998; Muraven, Baumeister, & Tice, 1999; Oaten & Cheng, 2006). Future researchers should investigate under which conditions trait self-control has protective versus detrimental effects on self-control. For example, athletes who over-control aspects of their behavior, such as regulating eating habits to the extent that energy expenditure chronically exceeds energy intake, are likely to compromise performance and health.

In conclusion, the present study identified six items on the BSCS as unstable and seven items as showing satisfactory stability. In the context of the current findings, we recommend that the reasons as to why endurance athletes report large variations in their perceived self-control ability require further investigation. Given the importance of maintaining self-control for endurance performance, it is argued that a reliable measure of [trait] self-control could help facilitate changes in desired performance behaviors. As such researchers are encouraged to demonstrate item stability, particularly in the early stages of instrument development, if their measures are to be used to inform applied practice. From a practical perspective, the finding that items relating to goals and standards displayed good stability, suggests that working towards goals on a regular basis could be beneficial for improving self-control in endurance athletes.

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Table 1

Descriptive Statistics and Reliabilities of BSCS

		# of items	Possible Range	Observed Range	Mean	SD
Brief Self-Control Scale	Test 1	13	13-65	24-48	38.89	4.71
	Test 2			26-48	38.89	4.86

Table 2

The Frequency Distribution of the Test–Retest Differences (Within-Subjects) for Items 2 and 12 of BSCS

Q2 I have a hard time breaking bad habits			Q12 Sometimes I can't stop myself from doing something, even if I know it is wrong		
Difference	Frequency	%	Difference	Frequency	%
-3	1	0.8	-3	2	1.5
-2	13	9.8	-2	3	2.3
-1	15	11.4	-1	13	9.8
0	76	57.6	0	83	62.9
1	19	14.4	1	17	12.9
2	8	6.1	2	14	10.6
Total	132	100.0	Total	132	100.0

Note. Difference = Test 1 – Test 2

Table 3

The Minimum and Maximum Test-Retest Differences, and the Percentage of Participants with Test–Retest Differences (Test 1 – Test 2) Within (±1), for all 13 Items

	Min	*Max*	Test 1		Test 2		*% (±1)*	*>1*	*0 diff*	*<1*
			M	*SD*	*M*	*SD*				
1. I am good at resisting temptation	-2	2	3.33	0.99	3.33	1.00	87.9	16	86	30
2. I have a hard time breaking bad habits	-3	2	2.99	1.03	2.92	1.08	83.4	22	76	34
3. I am lazy	-2	3	2.28	1.10	2.30	1.10	90.9	12	94	26
4. I say inappropriate things	-2	3	2.54	1.17	2.62	1.17	87.2	17	81	34
5. I do certain things that are bad for me, if they are fun	-2	2	3.14	1.04	3.29	0.98	94.0	8	78	46
6. I refuse things that are bad for me	-2	2	3.28	1.04	3.14	1.00	89.4	14	76	42
7. I wish I had more self-discipline	-3	2	3.12	1.14	3.02	1.12	91.6	31	90	11
8. People would say that I have iron self-discipline	-2	2	3.16	0.98	3.05	1.04	90.2	13	81	38
9. Pleasure and fun sometimes keep me from getting work done	-3	3	3.15	1.06	3.16	1.05	84.9	20	74	38
10. I have trouble concentrating	-3	2	2.86	1.06	2.77	1.02	92.4	10	79	43
11. I am able to work effectively toward long-term goals	-2	1	3.83	0.86	3.80	0.88	96.3	5	93	34
12. Sometimes I can’t stop myself from doing something, even if I know it is wrong	-3	2	2.70	1.13	2.86	1.12	85.6	19	83	30
13. I often act without thinking through all the alternatives	-2	2	2.50	0.97	2.57	0.95	91.7	11	78	43