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## A Single Item Measure of Self-Control – Validation and Location in a Nomological Network of Self-Control, Boredom, and If-Then Planning

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**Supplementary Materials:** Data, Materials [see [Index of Supplementary Materials](#)]



### Abstract

Self-control is a highly adaptive human capacity and research on self-control is booming. To further facilitate self-control research, especially in conditions where time-constraints might render the use of multi-item measures of self-control problematic, a validated time-efficient single item measure would be an asset. However, such a measure has not yet been developed and tested. Here, we address this gap by reporting the psychometric properties of a single item measure of self-control and by assessing its localization within a larger theorized psychometric network consisting of self-control, boredom and if-then planning. In a high-powered ( $N = 1553$ ) study with paid online workers from the US (gender: 47.3% female, 51.7% male, 1% other; age:  $40.36 \pm 12.65$  years), we found evidence for the convergent validity (Brief Self-Control Scale), divergent validity (Short Boredom Proneness Scale and If-Then Planning Scale), and criterion validity (objective and subjective socio-economic status) of the single item measure of self-control (“How much self-control do you have?”). Network psychometrics further revealed that the single item was part of the self-control subnetwork and clearly distinguishable from boredom and if-then planning, which together with self-control form a larger psychometric network of psychological dispositions that



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are relevant for orienting goal directed behavior. Thus, the present findings indicate that self-control can be adequately captured with the single item measure presented here, thereby extending the methodological toolbox of self-control researchers by a highly-time efficient measure.

## Keywords

self-control, boredom, if-then planning, psychometric networks, validation

### Highlights

- Self-control can be adequately and efficiently captured with a single item measure.
- People respond to different monikers for self-control (self-control, willpower, self-discipline) in a similar fashion.
- Network psychometrics reveal the localization of the single item in the self-control subnetwork.
- While being negatively correlated with each other, self-control (positive) and boredom proneness (negative) correlated with objective and subjective socioeconomic status.

Self-control refers to the “efforts people exert to stimulate desirable responses and inhibit undesirable responses” (de Ridder et al., 2012, p. 77). Attesting to its importance in everyday life, self-control is one of the most researched concepts in psychological science (Duckworth, 2011), and high self-control is positively related to a host of positive outcomes in life, such as academic achievement (Duckworth et al., 2019), professional success (Converse et al., 2014), physical exercise (Wolff, Bieleke, Stähler, & Schüler, 2021b), and health-related behaviors (Hagger et al., 2019), among others (Tangney et al., 2004). While several measures for the assessment of self-control have been developed and validated (Duckworth & Kern, 2011), it has not yet been evaluated if self-control can be adequately assessed with a single item measure. However, such a measure would potentially be of great practical relevance for researchers and practitioners alike. Indeed, recent years have seen increased interest in short and valid single item measures for assessing various psychological constructs, such as risk taking (Dohmen et al., 2011), self-esteem (Robins et al., 2001), relationship satisfaction (Fülöp et al., 2022), empathy (Konrath et al., 2018), or performance-related self-concept (Gogol et al., 2014). Further emphasizing the demand for single item measures, a 2022 Editorial in the *European Journal of Psychological Assessment* has even issued a “call to action” to encourage validation efforts for single item measures in psychological science (Allen et al., 2022). In turn, the aim of the present research is to address this gap in the self-control methods toolbox, and to develop and validate a single item measure for self-control, and to use network psychometrics to establish its localization and connections within a larger nomological network.

To this end, we take an established approach and first validate the newly developed single item measure against the most frequently used multiple-item measure of self-control, the Brief Self-Control Scale (BSCS; Tangney et al., 2004). The validity and reliability of the BSCS has been shown in numerous studies (de Ridder et al., 2012) and, attesting to its popularity, it has been translated into various languages (e.g., French [Breviers et al., 2017], Japanese [Ozaki et al., 2016], German [Bertrams & Dickhäuser, 2009], and Chinese [Fung et al., 2020]). Although some evidence suggests that the BSCS comprises two self-control factors (Maloney et al., 2012), the BSCS conceptualizes self-control as a unidimensional construct and the vast majority of studies using the BSCS adopt this one-factorial conceptualization and report one BSCS score (de Ridder et al., 2012). In line with this, we will model the BSCS score unidimensionally, and analyze the correlation between the single item measure and the BSCS score as a measure of *convergent validity*. As researchers and lay people sometimes use the terms *willpower* or *self-discipline* as monikers for self-control (Duckworth, 2011), we evaluated three alternative variants of the single item measure that reflect these differences in (lay) terminology. While in the scientific community, it is debated whether these terms refer to the same underlying construct (e.g., Hagger et al., 2021), for the present purpose it is most critical to assess if participants respond differently to these items and if they display differential associations with the BSCS.

To further assess if the single item measure of self-control captures the same concept as the BSCS, we assess correlations with distinct but related psychological constructs. Building on recent theoretical (Bieleke & Wolff, 2021; Martarelli & Wolff, 2020; Wolff, Bieleke, Martarelli, & Danckert, 2021a; Wolff & Martarelli, 2020) and empirical (Bieleke, Barton, & Wolff, 2021a; Boylan et al., 2021; Wolff et al., 2020; Wolff, Bieleke, Stähler, & Schüler, 2021b) work, we chose if-then planning and boredom proneness as constructs for evaluating *divergent validity*. Below, we explicate the reasons for choosing these constructs, the characteristics of the employed questionnaires, and the expected strength of relations with the single item self-control measure. To gauge *criterion validity* of the single item measure, its association with socio-economic status will be assessed. This choice was informed by previous research that has revealed a positive association between high self-control and markers of professional success, such as income (Converse et al., 2014). Lastly, we will employ network psychometrics to assess where the single item measure for self-control is positioned in a theorized nomological network of self-control, if-then planning, and boredom proneness as psychological dispositions that are crucial for goal-directed behavior.

## Self-Control and If-Then Planning

Per definition, self-control is linked to the notion of effort (de Ridder et al., 2012): When one is faced with a temptation (e.g., eating a tasty dessert), one has to apply self-control in order to stick to one's long-term goals (e.g., losing weight). Not giving in

to such an immediate gratification requires effort (Mischel et al., 1989) and feels aversive (Inzlicht et al., 2015). This has been vividly demonstrated in the famous marshmallow studies (Mischel et al., 1989). As we have outlined above, a large body of research shows that the tendency to routinely apply such effortful control over one's own impulses is conducive to a plethora of positive outcomes (Shenhav et al., 2017; Tangney et al., 2004). Indeed, children who resisted their temptations for longer in the marshmallow studies went on to have greater success later in their life (Mischel et al., 1989; but see also Watts et al., 2018). Thus, in addition to its intrinsic link with effort, self-control is also tightly coupled with impulse control (Gillebaart, 2018), and some conceptualizations have even equated self-control and impulse control (Ainslie, 1975). However, it has also been argued that behavioral regulation that hinges less on the use of effortful control is a potentially more adaptive form of self-control (Ainslie, 2021; Duckworth et al., 2016; Werner & Ford, 2021), one that is more characteristic of people who achieve success in life (Inzlicht & Friese, 2021). This differentiation has been referred to as self-control with versus without effort (Ainslie, 2021). Thus, one form of self-control operates with effort that is primarily deployed towards the control of unwanted impulses. The BSCS and various behavioral inhibition measures (such as the Stroop task or the N-back task) are typically used to capture inter- and intra-individual variations in this effort-reliant type of self-control (Wolff, Baumann, & Englert, 2018a). In contrast, self-control without effort refers to active modulations of one's environment (Duckworth et al., 2016) or the goal-directed use of self-control strategies (Bieleke, Keller, & Gollwitzer, 2021b) in order to make goal striving less reliant on effortful inhibition. One of the most prominent self-control strategies to make goal striving less effortful is if-then planning (Gollwitzer, 2014). Here, people link a critical situation (e.g., being faced with a tasty dessert) with an adaptive behavioral response (e.g., looking for salad) in an "if (situation), then (behavior)" format. This link makes behavior more automatic and therefore less reliant on effortful control (e.g., Janczyk et al., 2015; Thürmer et al., 2020). A large body of research shows that if-then planning facilitates goal striving in various domains (for a recent review, see Bieleke, Keller, & Gollwitzer, 2021b), and neuroscientific research has provided support for the proposed reduced involvement of brain areas that are relevant for effortful control processes (Wolff, Bieleke, et al., 2018b). While if-then planning is most prototypically used in intervention studies, very recent work shows that people differ in their inclination to make if-then plans in their everyday lives. In turn, if-then planning propensity can be conceived of as a trait, and it can be measured by the If-Then Planning Scale (ITPS), a recently developed 8-item scale that is a reliable and valid measure of individual differences in if-then planning propensity (Bieleke & Keller, 2021). In contrast to self-control, if-then planning propensity should therefore represent a disposition that aids goal pursuit not by making people effective in applying effortful control over themselves, but rather by making such effortful control less necessary. Thus, self-control and if-then planning propensity both represent self-regulatory dispositions

that seem to be adaptive via different mechanisms. In line with this, recent work has shown that if-then planning propensity and self-control are both linked to adaptive behaviors, such as physical exercise (Wolff, Bieleke, Stähler, & Schüler, 2021b), academic achievement (Bieleke & Keller, 2021), and adherence to social distancing guidelines during the COVID-19 pandemic (Bieleke, Martarelli, & Wolff, 2021c), while being moderately positively correlated with each other (e.g.,  $r = .38$  reported by Bieleke, Martarelli, & Wolff, 2021c; see also Wolff, Bieleke, Stähler, & Schüler, 2021b). Thus, in the context of the present study, we expect a moderate positive correlation between the single item measure and if-then planning propensity as an indicator of the single item's validity.

## Self-Control and Boredom

An emerging body of theoretical (Agrawal et al., 2021; Bieleke & Wolff, 2021; Martarelli & Wolff, 2020; Wolff, Bieleke, Martarelli, & Danckert, 2021a; Wolff & Martarelli, 2020) and empirical (Boylan et al., 2021; Mugon et al., 2018; Wolff et al., 2020; Wolff, Bieleke, Stähler, & Schüler, 2021b) work has linked low self-control with high boredom proneness. This link is evident already at the definitional level, as boredom refers to the “aversive state that occurs when we are not able to successfully engage attention” and an “awareness of a high degree of mental effort expended in an attempt to engage with the task” (Eastwood et al., 2012, p. 481). Thus, when bored, one fails to effectively engage with the (internal or external) world and trying to do so requires effort. This implies that staying engaged with an activity that is perceived as being boring (e.g., repetitive gym work) necessitates the application of self-control (Wolff, Bieleke, Martarelli, & Danckert, 2021a). An explanation for why boredom necessitates self-control application can be found in emerging research on boredom's proposed function as a driver for exploration (Bieleke & Wolff, 2021; Danckert, 2019). According to this research, bored individuals become more sensitive to behavioral alternatives that are potentially more rewarding (Milyavskaya et al., 2019), and this can be at odds with sticking to an ongoing action. As a transient state, boredom can lead to positive (Gasper & Middlewood, 2014) as well as to negative actions (Wilson et al., 2014). However, experiencing boredom often and intensely is “unambiguously linked with various psychological issues and mental health outcomes” (Tam et al., 2021, p. 13). Importantly, people differ in this *boredom proneness* (Farmer & Sundberg, 1986). Interestingly, and in line with theorizing on the function of both constructs (Wolff & Martarelli, 2020), self-control and boredom proneness seem to affect behavior via different mechanisms. For example, difficulties of individuals high in boredom proneness in sticking with adaptive behavioral choices (e.g., adhere to COVID-19 social distancing guidelines) are mediated by an increased perceived difficulty to display this behavior, while individuals low in self-control are less adept at effectively dealing with these perceived difficulties (Wolff et al., 2020). Thus, high boredom proneness can make goal striving more challenging and low self-control can impair one's ability to deal with these challenges. Attesting to both concepts' shared

function in orienting goal-directed behavior, a robust and strong negative correlation between boredom proneness and self-control has been reported in an emerging body of literature (Boylan et al., 2021; Isacescu et al., 2017; Isacescu & Danckert, 2018; Wolff, Bieleke, Stähler, & Schüler, 2021b; e.g.,  $r = -.62$  in Boylan et al., 2021 or  $r = -.53$  in Isacescu & Danckert, 2018). The most prominent tool to assess boredom proneness is the Short Boredom Proneness Scale (SBPS), a reliable and valid 8-item self-report measure (Martarelli et al., 2021a; Struk et al., 2017). Thus, in the context of the present study, we expect a strong negative correlation between the single item measure for self-control and the SBPS.

## A Nomological Network of Self-Control, If-Then Planning, and Boredom Proneness

Following from the above, self-control, if-then planning, and boredom proneness all reflect different dispositions that are highly relevant to the effective regulation of behavior, and they play a key role in regulating effort towards goal-directed behavior. Thus, items pertaining to each construct should form subnetworks within a larger theorized nomological network. To validate this claim and to assess if the single item measure for self-control is positioned within the correct subnetwork (i.e., the one pertaining to self-control), we turn to network psychometrics.

Network psychometrics is an emerging and promising approach in personality research (Christensen et al., 2020). The most widely used algorithm for determining networks is the Extended Bayesian Information Criterion Graphical Least Absolute Shrinkage and Selection Operator (EBICglasso) algorithm (Epskamp & Fried, 2018), which estimates a regularized Gaussian graphical model (GGM), based on a correlation matrix, combining the glasso algorithm (Friedman et al., 2008) with the EBIC (Chen & Chen, 2008). This method estimates a network structure of items represented by nodes and linked by edges, which are regularized partial correlations between nodes after conditioning on all the nodes in the network. In other words, network models estimate unique associations between nodes that remain after controlling for all other nodes in the network (Christensen et al., 2020; Fried & Cramer, 2017). In the context of our study, this approach can reveal where the single item is located in the self-control subnetwork (and thus serve a common cause), as well as the strength and direction of relations with neighboring nodes, and whether it remains located in the self-control subnetwork when placed in a multidimensional context of related constructs. This approach to validate trait questionnaires has recently been proposed by Christensen et al. (2020). In the context of the present validation study, we analyze three subnetworks that constitute the BSCS, the ITPS, and the SBPS items, respectively. Crucially, we expect the single item measure for self-control to be located within the BSCS subnetwork.

## Method

### Participants

1566 participants were recruited from Amazon's website Mechanical Turk (MTurk; requirements:  $\geq 50$  HITS, approval rate  $\geq 90\%$ , US citizenship). With respect to sample size determination, we followed the recommendation by Funder and Ozer (2019) to aim for a sample as large as project resources permit in order to obtain the most stable estimates. Importantly, the achieved sample size substantially exceeds the required threshold for visual network alignment (i.e., how well the estimated network aligns with true network; Isvoranu & Epskamp, 2021). 13 participants (0.8%) did not respond to the instructional manipulation check item correctly and were thus removed from further analyses. The remaining sample consisted of 1553 participants (47.3% female, 51.7% male, 1% other) with an average age of 40.36 years ( $SD = 12.65$ ). The majority of participants reported 13 years or more of education (86.09%) and was either working full-time (56.15%) or self-employed (13.46%). The data were collected in the context of a larger study, the results thereof are reported elsewhere (Martarelli et al., 2021b). The local ethics committee approved the study, which was conducted in accordance with the Declaration of Helsinki. All participants gave their written informed consent prior to their inclusion in the study.

### Development of Single Items

Several options for creating and choosing single item measures exist. One option would be to select an item from an existing multi-item scale that represents the construct best. For the BSCS, however, there is no item that explicitly uses the descriptor "self-control", and that can be seen as pure single item representation of the self-control construct as a whole. Hence, we decided to generate a tailored single item measure that explicitly captures the construct. Thus, we focused on developing an item that has a straightforward formulation and whose content solely and unambiguously targets the construct of interest: "How much self-control do you have?". As the terms *willpower* and *self-discipline* are sometimes used as synonyms for self-control (Englert, 2021), we decided to test analogue variants with these oft-used synonyms (i.e., "How much willpower do you have?" and "How much self-discipline do you have?"). Having these three candidate items allowed us to assess if these differences in wording matter with respect to any markers of criterion, convergent, and divergent validity that were collected in the study.

### Procedure and Materials

Participants completed the study online, using the Qualtrics Survey Software (<https://www.qualtrics.com>). The full study is available on OSF (<https://osf.io/qg6fz/>). After giving informed consent, participants confirmed that they were at least 21 years of age and completed an instructional manipulation check. Next, participants worked on the

three personality questionnaires, which asked participants to indicate to which degree the respective items typically apply to them. The questionnaires were the 13-item *Brief Self-Control Scale* (BSCS, e.g., “I am good at resisting temptation”; Tangney et al., 2004), the 8-item *Short Boredom Proneness Scale* (SBPS, e.g., “I often find myself at loose ends, not knowing what to do”; Struk et al., 2017), and the 8-item *If-Then Planning Scale* (ITPS, e.g., “I plan ways in which I can deal with difficulties”; Bieleke & Keller, 2021). All scales were answered on 5-point Likert-type scales (1 = strongly disagree, 5 = strongly agree). Reverse coded items were recoded and the scores of each scale were averaged. Afterwards, participants worked on the *three single items*, which were presented in random order and had to be answered on 11-point Likert-type scales (1 = none at all, 11 = very much). We chose this answering format to be coherent with other single item measures frequently used in the literature (Dohmen et al., 2011). Participants finally provided their demographic information (employment, gender, age, professional success). For assessing *professional success*, we used items pertaining to *Subjective Socioeconomic Status* (*subjective SES*; Adler et al., 2000) and *Objective Socioeconomic Status* (*objective SES*). The *subjective SES* item asked participants to indicate their position on a hypothetical ladder: “Imagine that the following ladder represented where people stand in the US, with those at the top being best-off (in terms of money, education, and jobs) and those at the bottom being worst off. Please indicate your position on the ladder” on a 7-point Likert-type scale (1 = least money, education, and respected jobs, 7 = most money, education, and respected jobs). And the *objective SES* item asked participants to indicate their current annual income. Here, they were asked to specify their “income (before taxes) all wages, salaries, pensions and other incomes that come in”. This was answered by choosing among: No income – < \$ 5,000 – \$5,000 to \$11,999 – \$12,000 to \$19,999 – \$20,000 to \$39,999 – \$40,000 to \$59,999 – \$60,000 to \$79,999 – > \$80,000.

## Results

To assess the validity of the single items, we used a standard approach, including correlational analyses. These analyses were computed with *jamovi* (<https://www.jamovi.org>) and *R* (<https://www.r-project.org/>). For internal consistency of the scales, we computed Cronbach’s alpha and MacDonald’s omega. Furthermore, we estimated GGMs with the EBICglasso algorithm (Chen & Chen, 2008; Epskamp & Fried, 2018; Foygel & Drton, 2010; Friedman et al., 2008). This part of the analysis was conducted in *R* using the *qgraph* package (Epskamp et al., 2012; Epskamp et al., 2018). The data and code for the main analyses are available in the [Supplementary Materials](#).

## Convergent, Divergent and Criterion Validity of a Single Item Measure for Self-Control

The internal consistency of the scales and descriptive statistics are reported in Table 1. The scales showed high internal consistency; skewness and kurtosis were low. The distributions of the single items are reported in Figure 1.

**Table 1**

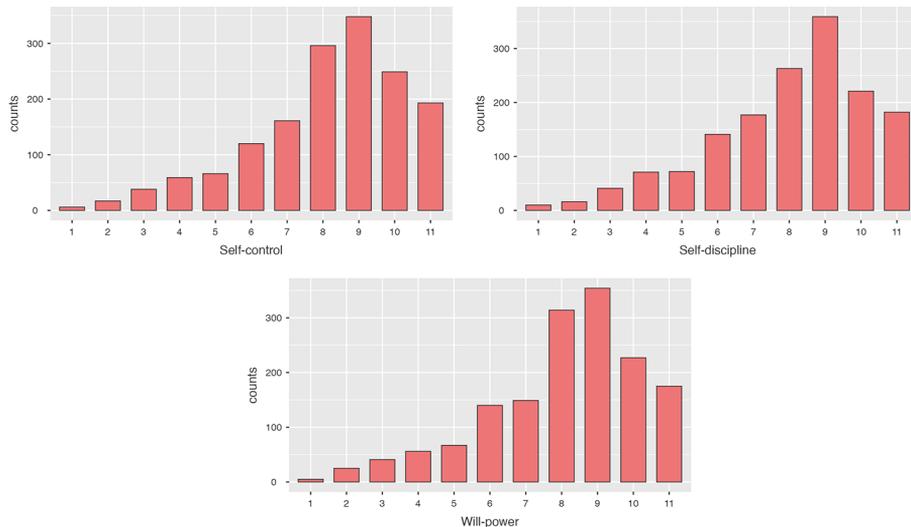
*Descriptive Summary of Measures*

Measure	<i>M</i> ( <i>SD</i> )	Skewness	Kurtosis	Alpha	Omega
<b>Single item measures of self-control</b>					
Self-control	8.16 (2.13)	-0.87	0.42		
Willpower	8.06 (2.16)	-0.85	0.39		
Self-discipline	8.01 (2.20)	-0.79	0.21		
<b>Multi-item measures of self-control, boredom, and planning</b>					
BSCS	3.51 (0.82)	-0.19	-0.65	0.90	0.90
SBPS	2.23 (0.93)	0.63	-0.37	0.91	0.91
ITPS	3.90 (0.62)	-0.65	1.05	0.82	0.84
<b>Socioeconomic status (SES)</b>					
Subjective	3.89 (1.07)	-0.25	-0.10		
Objective	5.72 (1.71)	-0.50	-0.22		

*Note.*  $N = 1553$ . Single items were measured on 11-point Likert-type scales, the questionnaires (BSCS, SBPS, and ITPS) on 5-point Likert-type scales, the measures of professional success (subjective and objective SES) on a 7-point Likert-type scale and an 8-point scale respectively.

**Figure 1**

Bar Plots of the Three Single Items ( $N = 1553$ ), Which Were Measured on 11-Point Likert-Type Scales



To assess the convergent, divergent and criterion validity of the single items, correlation analyses were performed (Table 2). Importantly, the magnitude of the correlations observed between the single items and the respective validation measures did not vary meaningfully as a function of the chosen terminology for the single item (i.e., self-control, willpower, self-discipline). We found strong relations between the single items and the BSCS ranging from 0.689 to 0.734 and thus providing support for the convergent validity of the single item measures. Furthermore, the relations between the single items and the SBPS were negative (ranging from -0.397 to -0.420) but smaller than the correlation between the BSCS and the SBPS ( $r = -0.616$ ). The correlations between the single items and the ITPS ranged from 0.299 to 0.307 and were in a similar range to the correlation between the BSCS and the ITPS ( $r = 0.294$ ). There were small relations between the single items and professional success (associations between the single items and subjective SES ranged from 0.240 to 0.265 and associations between the single items and objective SES ranged from 0.147 to 0.198) corresponding well to the small associations observed between the BSCS and professional success ( $r = 0.231$  and  $r = 0.199$  respectively). Finally, there were small positive associations between the single items and age (ranging from  $r = 0.084$  to  $r = 0.143$ ) as well as the BSCS and age ( $r = 0.234$ ). The three versions of the single item were very highly correlated with each other (ranging from  $r = 0.851$  to  $r = 0.872$ ) and displayed similar correlations to the other constructs. Therefore, the subsequent analyses are reported only for the single item that

explicitly asks for “self-control” as it is the most descriptive verbal expression of our target construct (Respective analyses for the other variants of the single item can be found in the [Supplementary Materials](#)).

**Table 2***Correlation Matrix*

Variable	1	2	3	4	5	6	7	8	9	10
1. Self-control	—									
2. Willpower	0.851***	—								
3. Self-discipline	0.872***	0.851***	—							
4. BSCS	0.715***	0.689***	0.734***	—						
5. SBPS	-0.397***	-0.404***	-0.420***	-0.616***	—					
6. ITPS	0.299***	0.326***	0.307***	0.294***	-0.231***	—				
7. Subjective SES	0.240***	0.250***	0.265***	0.231***	-0.169***	0.117***	—			
8. Objective SES	0.147***	0.185***	0.198***	0.199***	-0.188***	0.115***	0.542***	—		
9. Age	0.132***	0.084***	0.143***	0.234***	-0.315***	0.076**	0.042	0.061*	—	
10. Gender	0.057*	0.066**	0.055*	-0.006	0.012	0.002	0.050	0.057*	-0.091***	—

Note.  $N = 1538$  for Gender. Otherwise  $N = 1553$ .

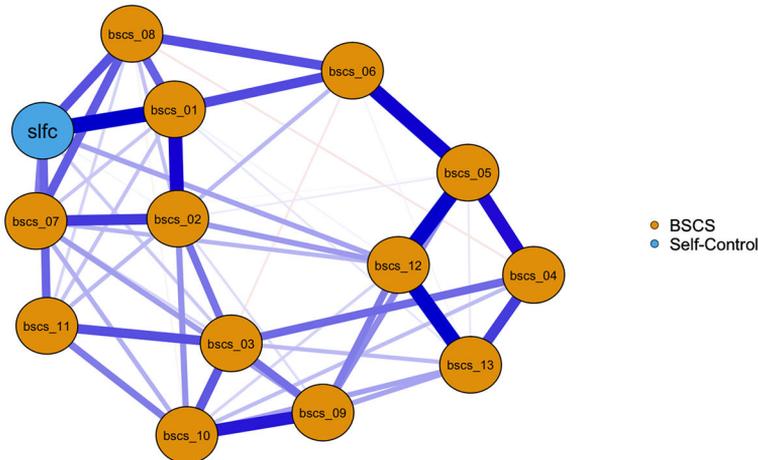
\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

## Psychometric Network Analyses

First, we estimated self-control networks for the single item combined with the 13 items of the BSCS. [Figure 2](#) represents the identified psychometric network and shows how the single item measure of self-control and the 13 items of the BSCS are interconnected in the whole sample. The network has 14 nodes and 55 non-zero edges out of 91. The structure is parsimonious (see network of correlations and network of partial correlations in the [Supplementary Materials](#)) due to the EBICglasso, which estimates partial correlations between all variables and shrinks the absolute weights to zero (Epskamp et al., 2012; Friedman et al., 2008). The edge colors connecting the nodes indicate the direction of the relationship (blue representing positive and red representing negative relationships) and the thickness of an edge reflects the strength of relationship.

**Figure 2**

Network Analysis (Using EBIClasso) Displaying the Relationships Between the 13 Items of the BSCS and the Self-Control Single Item

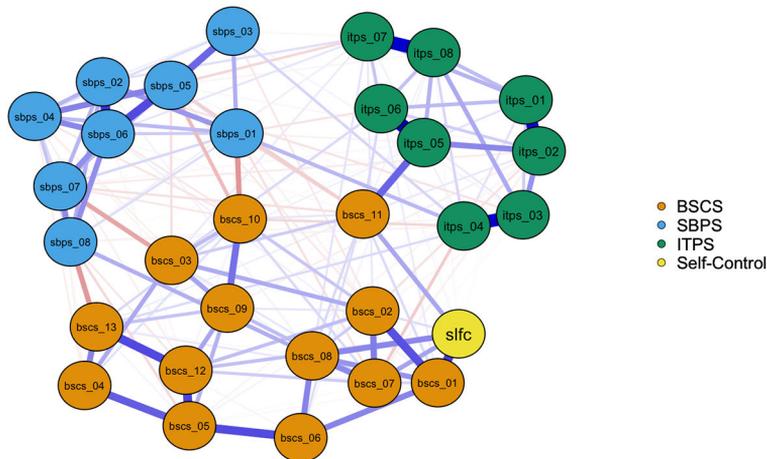


*Note.* For all items, higher values reflect higher self-control as reverse coded items were recoded prior to analysis. slfc = Item "How much self-control do you have?"; bscs\_1 = Item "I am good at resisting temptation"; bscs\_2 = Item "I have a hard time breaking bad habits"; bscs\_3 = Item "I am lazy"; bscs\_4 = Item "I say inappropriate things"; bscs\_5 = Item "I do certain things that are bad for me, if they are fun"; bscs\_6 = Item "I refuse things that are bad for me"; bscs\_7 = Item "I wish I had more self-discipline"; bscs\_8 = Item "People would say that I have iron self-discipline"; bscs\_9 = Item "Pleasure and fun sometimes keep me from getting work done"; bscs\_10 = Item "I have trouble concentrating"; bscs\_11 = Item "I am able to work effectively toward long-term goals"; bscs\_12 = Item "Sometimes I can't stop myself from doing something, even if I know it is wrong"; bscs\_13 = Item "I often act without thinking through all the alternatives".

In a next step, we estimated the theorized nomological network, consisting of self-control, boredom proneness, and if-then planning. The network has 30 nodes and 180 non-zero edges out of 435. The network of correlations and the network of partial correlations can be accessed in the [Supplementary Materials](#)). [Figure 3](#) shows the single items position and connection in the self-control subnetwork, when analyzed in the context of this larger nomological network. This result further provides evidence for the validity of the newly developed single item. Importantly, this also provides evidence for the theorized claim that self-control, boredom proneness, and if-then planning are distinct but related self-regulatory dimensions within a larger nomological network.

**Figure 3**

Network Analysis (Using EBICglasso) Displaying the Relationships Between the 13 Items of the BSCS, the 8 Items of the SBPS, the 8 Items of the ITPS, and the Self-Control Single Item



*Note.* Nodes are colored to indicate which questionnaire each item belongs to. For all items, higher values reflect higher values on the construct of interest as reverse coded items were recoded prior to analysis. sifc = Item "How much self-control do you have?"; bscs\_01 = Item "I am good at resisting temptation"; bscs\_02 = Item "I have a hard time breaking bad habits"; bscs\_03 = Item "I am lazy"; bscs\_04 = Item "I say inappropriate things"; bscs\_05 = Item "I do certain things that are bad for me, if they are fun"; bscs\_06 = Item "I refuse things that are bad for me"; bscs\_07 = Item "I wish I had more self-discipline"; bscs\_08 = Item "People would say that I have iron self-discipline"; bscs\_09 = Item "Pleasure and fun sometimes keep me from getting work done"; bscs\_10 = Item "I have trouble concentrating"; bscs\_11 = Item "I am able to work effectively toward long-term goals"; bscs\_12 = Item "Sometimes I can't stop myself from doing something, even if I know it is wrong"; bscs\_13 = Item "I often act without thinking through all the alternatives"; itps\_01 = Item "I think about when and where decisive moments for the achievement of my goals could occur"; itps\_02 = Item "I think about chances and possibilities that I could use"; itps\_03 = Item "I envisage what obstacles could arise"; itps\_04 = Item "I am concerned with what setbacks to expect"; itps\_05 = Item "I plan how best to achieve my goals"; itps\_06 = Item "I plan the concrete actions I will take toward my goal"; itps\_07 = Item "I plan how to protect myself from distractions"; itps\_08 = Item "I plan ways in which I can deal with difficulties"; sbps\_01 = Item "I often find myself at 'loose ends,' not knowing what to do"; sbps\_02 = Item "I find it hard to entertain myself"; sbps\_03 = Item "Many things I have to do are repetitive and monotonous"; sbps\_04 = Item "It takes more stimulation to get me going than most people"; sbps\_05 = Item "I don't feel motivated by most things that I do"; sbps\_06 = Item "In most situations, it is hard for me to find something to do or see to keep me interested"; sbps\_07 = Item "Much of the time, I just sit around doing nothing"; sbps\_08 = Item "Unless I am doing something exciting, even dangerous, I feel half-dead and dull".

## Discussion

Here, we report the development and validation of a single item measure for trait self-control. To account for the heterogeneity in lay people's and scholars' use of terminology with respect to self-control, we tested three single items that used different descriptors of

self-control (self-control, willpower, self-discipline). Importantly, we found no evidence that the chosen terminology mattered with respect to the single items' convergent validity, divergent validity, and criterion validity. Thus, participants seem to reply to these different terms in a very similar fashion that appear to map onto the same underlying construct. Attesting to its convergent validity, the single item measure was strongly correlated with a validated multiple-item measure of self-control, the BSCS. Attesting to its divergent validity, the single item measure was moderately negatively correlated with boredom proneness and moderately positively correlated with if-then planning propensity. Attesting to its criterion validity, a small positive correlation between the single item and indicators of subjective and objective socioeconomic status was observed. The correlations between the single item measure and the markers of divergent and construct validity were of similar magnitude as the ones observed between the BSCS and the same measures. With the exception being that the BSCS displayed a higher correlation with the SBPS ( $r = -.616$ ) than the single item measure ( $r = -.397$ ).

One reason for the large correlation between BSCS and SBPS might be that some items in both scales overlap with respect to the latent construct they map onto. The psychometric network analyses lend some credence to this point: These analyses revealed that the BSCS, the SBPS, and the ITPS form differentiable subgroups within a larger psychometric network. Importantly, the single item measure for self-control was spatially located within the self-control subnetwork, while sharing no connections with items that belonged to the boredom subnetwork. In contrast, some items of the BSCS were strongly connected with SBPS (#3: "I am lazy", #10: "I have trouble concentrating", and #13: "I often act without thinking through all the alternatives").

## Limitations and Implications for Future Research

While our data indicate that a single item measure for self-control can be a useful addition to the measurement toolbox of researchers that are interested in self-control, some limitations of the present study should be addressed.

First, self-control as conceptualized by the BSCS spans a broad nomological network and one single item measure likely does not capture the construct in its entirety. Depending on the research question, a more comprehensive coverage of the latent construct of interest might be required to ensure all relevant aspects of self-control are covered (also with respect to the different conceptualizations of self-control that exist in the literature). Importantly, the evidence for the single item's convergent, divergent and criterion validity, as well as the negligible differences between self-control monikers regarding validity indicators, suggest that participants have a lay conceptualization of self-control that closely mirrors the scientific conceptualization. Still, further research is needed to validate the single item measure against additional external indicators of self-control.

Second, our data are cross-sectional and stem from paid online workers. Future research should assess the single item with respect to its retest-reliability, with additional measures for validity (Duckworth & Kern, 2011), its validity in predicting real-life behavior and in different samples. However, with our large sample size ( $N > 1500$ ), we were able to survey a heterogenous sample that reflected the average population in the US quite well with respect to age (Statista, 2021a), gender (Statista, 2021b), and years of education (Roser & Ortiz-Ospina, 2016). Thus, while further research along the lines outlined above is needed, our data are promising with respect to the validity and utility of a single item measure of self-control.

Beyond the development and validation of the single item measure of self-control, the psychometric analyses provide further evidence for the theorized link between self-control, boredom proneness, and if-then planning as related but distinct psychological dispositions that are relevant for adaptive behavior. Indeed, boredom proneness was negatively correlated with indicators of subjective and objective socioeconomic status, supporting the proposition that high boredom proneness is a maladaptive self-regulatory disposition (Tam et al., 2021). However, the high correlation between the BSCS and SBPS, along with the strong cross-construct connections between some items in the psychometric network might be cause for concern. Indeed, researchers have questioned the factorial structure of the BSCS (Maloney et al., 2012), and if these multi-item measures of boredom proneness and self-control adequately capture the latent constructs of interest (i.e., boredom proneness and trait self-control respectively; Gana et al., 2019; Lab et al., 2019; Maloney et al., 2012; Manapat et al., 2021; Tam et al., 2021). The spatial location of some items (e.g., BSCS #10: “I have trouble concentrating”, and SBPS #1: “I often find myself at ‘loose ends’, not knowing what to do”) in the psychometric network indicates that, due to the way both scales are currently constructed and used, they might span a too wide nomological network that taps into related adjacent constructs. Interestingly, the newly developed single item measure did not display this overlap with boredom. A tentative explanation might be that such a single item measure provides a – potentially somewhat too narrow and reductive – purer assessment of trait self-control than the BSCS. This tentative interpretation warrants further research, and it might be worthwhile to develop and validate single item measures for boredom proneness and if-then planning as well.

## Conclusion

Taken together, our results suggest that a single item measure of self-control can adequately capture self-control as it is currently measured via the well-established Brief Self-Control Scale. We would like to stress that such a single item measure of self-control is understood as an addition to the methodological toolbox and not as a replacement of established multi-item measures. This addition provides a highly efficient way of assessing trait self-control when resources and/or circumstances prohibit the use of more

in-depth multi-item measures. This can, for example, be the case in large-scale panel surveys (Galesic & Bosnjak, 2009) where assessment time comes at a premium, in clinical samples where patients might struggle with lengthy surveys (Rolstad et al., 2011), or in postal surveys where researchers want to minimize non-responses or drop-outs among participants (Sahlqvist et al., 2011). Lastly, we show that self-control, boredom proneness, and if-then planning are related but distinct dispositions that form distinct subnetworks in a larger nomological psychometric network.

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**Data Availability:** For this article, data is freely available, for access see [Index of Supplementary Materials](#).

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## Supplementary Materials

For this article, the following Supplementary Materials are available (for access see [Index of Supplementary Materials](#) below):

- the questionnaire
- the raw data along with a code book that indicates the labeling of the variables in the dataset
- the R-code that was used to produce the main analyses reported in this manuscript
- Appendix A, which includes additional figures that provide insight into the network structure of the self-control items that used willpower and self-discipline as monikers for self-control
- Appendix B, which included figures that display the network of correlations and partial correlation of the single item self-control measure and the BSCS. This highlights how the network solution found by EBICglasso is parsimonious
- Appendix C, which also visualizes correlations and partial correlations, but this time for the larger nomological network that also includes the SBPS and the ITPS scales

### Index of Supplementary Materials

Wolff, W., Bieleke, M., Englert, C., Bertrams, A., Schüler, J., & Martarelli, C. S. (2021). *Supplementary materials to "A single item measure of self-control – validation and location in a nomological network of self-control, boredom, and if-then planning"* [Data, codebook, materials]. OSF. <https://osf.io/qg6fz/>

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