



Moxie: individual variability in motivation intensity

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Abstract

Motivation intensity differs across individuals. While prior work has examined how situational factors contribute to these discrepancies, the present work takes an individual differences approach. We developed a new tool to measure a novel construct we call “moxie” to assess individual differences in motivation intensity. Seven studies were conducted to examine the psychometric properties of the proposed Moxie Scale. A single factor structure was demonstrated through exploratory and confirmatory factor analyses, and the Moxie Scale was shown to have high internal consistency and strong test–retest reliability. Convergent, discriminant, criterion-related, and incremental validity were established by exploring associations between moxie and the Big Five personality traits, as well as related motivational constructs such as grit, self-control, volition and inhibition systems, and procrastination. Moxie also predicted intrinsic and extrinsic motivation above other motivational constructs. Finally, moxie predicted goal achievement over time and mediational analyses indicated that this occurred because those high in moxie invested more resources into their goal. Collectively, these findings suggest that moxie is an important and distinct motivational construct and offer new insights regarding individual differences in motivational intensity.

Keywords Motivation · Goals · Energy · Scale development

Hundreds of thousands of people around the world run marathons. In 2018, for example, 456,700 individuals completed a marathon in the United States alone (Andersen, 2021). Although each person who finishes a marathon accomplishes the same 26.2-mile goal, anyone who has observed the finish line at such a race knows that not everyone pursues this goal with the same level of intensity. Some give it their all, running the entirety of the course and finishing in under 2.5 h. Others take a slow and steady approach, walking the course and concluding their race in 5–6 h. Consequently, marathons illustrate how people differ in the amount of energy they put into achieving a given goal.

Much of motivation research has been devoted to identifying the factors that influence how much energy or effort people put into a task or goal (e.g., Bargh et al., 2010; Freydefont et al., 2016; Gendolla et al., 2019; Silvestrini & Gendolla, 2019). Such “effort mobilization” or “motivation

intensity” has been shown to be impacted by a number of situational variables, including task difficulty, strength of the need, outcome importance or value, ego-involvement, and mood (for review see Richter et al., 2016). However, far less attention has been paid to chronic, individual differences in motivation intensity. Indeed, the role of individual trait-like differences in effort mobilization has been acknowledged as an important topic for future motivation research (Brinkmann et al., 2021; Gendolla et al., 2012).

As the marathon example illustrates, the idea that some people put more effort and energy into a task than others is not new. Anecdotal evidence of this difference is visible in ourselves, our pupils, our graduate students, and our colleagues. In the English language, there is an abundance of idioms that nod to the fact that some people are more likely to “pour their heart and soul” into a task, “put their blood, sweat, and tears” into a goal, or “give it their all.” Indeed, over a century ago, William James (1907, p. 324) remarked on such an individual difference, stating in his treatise *The Energies of Men*, that “men the world over possess amounts of resource, which only very exceptional individuals push to their extremes of use.” Similarly, Sir Francis Galton (1869/2006, p. 84), most known for his seminal work on intelligence, stated that success was not only a function of

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intellectual ability but also of “vigour.” Yet, no clear, direct individual difference measure exists to globally assess trait variability in energy intensity.

In appreciation of this fact, the present work sought to develop and validate a measure that assesses individual differences in motivation intensity. We refer to this individual difference construct as *moxie*. The word “moxie” originated from a soft drink invented in the 1880s and popularized in the 1920s that promised its users energy (Cassidy, 1995). Since then, the term has become synonymous with vigor, verve, and pep (Cassidy, 1995). Thus, someone described as having moxie is a person who displays high levels of energy and vigor when approaching a task or goal. In the following sections, we provide a theoretical basis for this new assessment and explore how it relates to currently existing motivational theories and measures.

Motivational theories of effort

A core component of motivation is energy (Bargh et al., 2010; Geen, 1995). All actions require the mobilization of energy because all actions require such energy in order to be executed (Gendolla & Silvestrini, 2010). As such, much of motivation research is concerned with identifying the processes and mechanisms that affect the (1) direction, (2) initiation, (3) persistence, and (4) intensity of this energy (Burkley, 2016; Geen, 1995; Richter et al., 2016). The *direction* component of the energy process refers to whether the goal involves approaching desirable events or avoiding undesirable events (Elliot, 1999; Higgins, 1998). The *initiation* component refers to starting a new goal behavior and has been explored within the context of both situational factors (e.g., effect of stress on procrastination, Fincham & May, 2021; Tice & Baumeister, 1997; effect of temporal landmarks on goal initiation, Dai & Li, 2019; Hennecke & Converse, 2017) and individual difference factors (e.g., trait procrastination, Tuckman, 1991; locomotion, Kruglanski et al., 2000; Kruglanski et al., 2018). The *persistence* component pertains to the continuation of energy expenditure over time. It too has been examined within the context of both situational factors (e.g., self-control depletion, Baumeister et al., 1998; Jordalen et al., 2020) and individual difference factors (e.g., trait perseverance, Määttä et al., 2021; Whiteside et al., 2005; grit, Dale et al., 2018; Duckworth et al., 2007).

The final component motivational energy, *intensity*, refers to the amount of resources expended to carry out a goal. As Brehm and Self (1989, p. 110) suggest, motivation intensity “is the difference, for example, between moving 100 pounds of books one book at a time or all at once.” Motivation intensity has been referenced as early as 1817 in the writings of philosopher Jeremy Bentham, who listed intensity as one of several factors that play a role in any action choice. Yet,

despite these classic roots, intensity has received less empirical attention than the other four components of the energy process, especially regarding individual differences (Gendolla et al., 2012).

In terms of modern approaches, research on energy intensity has almost exclusively focused on its situational influences and has fallen under the guidance of Brehm’s Motivation Intensity Theory (Brehm & Self, 1989; Brehm et al., 1983). At this theory’s core is the assumption that people use information about task difficulty to determine how much energy they will invest in a task: the more difficult the task, the greater the amount of energy invested. However, this assumption only holds when information about task difficulty is available. When such information is unavailable, inaccessible, or unspecified, which is often the case in real-world goal pursuit, people look to other sources of information to decide their energy investment. In particular, when task difficulty is unknown, then the goal’s perceived importance or value often determines energy intensity (Richter et al., 2016; Stanek & Richter, 2021). The more desirable or valuable the goal, the more energy the person is willing to invest (see also expectancy-value theory; Feather, 1982).

Although a great deal of research has examined the situational factors that impact motivation intensity, far less attention has been paid to individual differences in this construct. (Gendolla et al., 2012). In recognition of this gap in the literature, the present work introduces the concept of moxie as a way to capture a global assessment of individual variability in motivation intensity.

Moxie and its relation to other motivational constructs

We define *moxie* as the extent to which a person chronically invests and exerts energy toward a goal. People high in moxie tend to approach tasks with a high level of energy and willingly mobilize and invest resources and effort into achieving their goals. Conversely, people low in moxie have a tendency to approach tasks with little effort and are reluctant to expend their resources or “give it their all.”

On the surface, a number of constructs and measures within the field of motivation may appear to relate to moxie, including conscientiousness, volition and inhibition systems, trait self-control, grit, and trait procrastination. For example, conscientiousness is a personality trait associated with self-discipline, orderliness, and achievement striving (McCrae & Costa, 1987; Saucier, 1994). Thus, conscientiousness focuses on how efficient and methodical people are when approaching their goals.

The volition and inhibition systems reflect tendencies to be primarily motivated by volition (approach) or inhibition (avoidance) tendencies. The distinction between the two

systems is central to the concepts of promotion versus prevention orientation (Higgins, 1998; Lockwood et al., 2002) and behavioral activation system (BAS) versus behavioral inhibition system (BIS) sensitivities (Carver & White, 1994). Similarly, trait self-control refers to people's chronic ability to inhibit their inner responses and impulses (Tangney et al., 2004). Thus, volition and inhibition/self-control are focused on how people direct their motivational energy.

Grit is defined as “perseverance and passion for long-term goals” (Duckworth et al., 2007, p. 1087). Grit has been shown to be predictive of both academic and real-world success (Duckworth et al., 2007, 2011), although recent work has challenged the usefulness of this construct (Abuhassan & Bates, 2015; Credé et al., 2017; Kannangara et al., 2018; Rimfeld et al., 2016; Vazsonyi et al., 2019). Nevertheless, enthusiasm for grit remains, especially in educational research, so it is important that moxie distinguishes itself from this construct. While moxie captures energy intensity, grit is focused exclusively on the persistence of motivational energy and effort employed *over time*.

Finally, trait procrastination refers to the tendency to delay or completely avoid starting an activity (Tuckman, 1991). As such, procrastination pertains to the *initiation* of motivational energy. In sum, although these constructs all play a role in motivation, they are theoretically distinct from moxie because they focus on individual variability in the efficiency (conscientiousness), direction (volition and inhibition, trait self-control), persistence (grit), and initiation (procrastination) of motivational energy, rather than its intensity (moxie). Thus, as moxie is a unique, distinct component of motivation, the present research aimed to develop a novel tool to measure this construct.

Scale development and studies overview

Given the absence of an existing global measure of individual variability in motivation intensity, we sought to develop and validate our own. As an initial step, we generated a pool of 21 items that asked participants to respond to the varying level of effort or intensity that they typically contribute toward a goal. Items were rated on a 1 (*not at all true*) to 7 (*very true*) scale. We then eliminated 11 items based on item-total correlations (0.30 retained per Field, 2013), redundancy, and unclear wording. Thus, the final Moxie Scale consisted of 10 items (Table 1). Studies 1–3 examined the Moxie Scale's factor structure, internal reliability, and test–retest reliability. Studies 4–6 investigated the scale's convergent and divergent validity by exploring its relation to other relevant constructs. Lastly, studies 6 and 7 examined the scale's predictive and incremental validity. Collectively, these studies aimed to establish moxie as a distinct motivational construct, develop a new scale to assess individual differences in moxie, and examine the psychometric properties of this measure.

Study 1

In Study 1, we conducted an exploratory factor analysis (EFA) to determine if the hypothesized single-factor structure of the Moxie Scale was supported.

Table 1 Item factor loadings and communality estimates (h^2) for the moxie scale for EFA (Study 1) and CFA (Study 2)

Items	EFA		CFA
	loadings	h^2	loadings
1. I put everything I've got into achieving my goal	.87	.76	.87*
2. When I set a goal I typically put my blood, sweat, and tears into achieving it	.87	.75	.86*
3. I pour my heart and soul into everything I do	.78	.61	.84*
4. When I have a goal, I devote all I have into achieving it	.78	.61	.90*
5. I often commit all my energy to achieve a goal I'm pursuing	.85	.73	.88*
6. I'm usually “all in” when I pursue a goal	.82	.67	.87*
7. I put a great deal into my goal	.81	.66	.89*
8. I give it all I have	.84	.71	.88*
9. I invest a lot of time, energy, and effort into it	.84	.71	.86*
10. I usually “give it my all”	.82	.66	.83*

EFA, Exploratory factor analysis; CFA, Confirmatory factor analysis

Instructions for the Moxie Scale are as follows: “Please answer the following questions in regards to how you typically respond to a task or goal you have to complete”

* $p < .001$

Method

Participants and procedure Two hundred and fifteen undergraduate students (141 women; $M_{\text{age}} = 19.70$, $SD = 1.66$) from a large Southwestern university participated in this online study in exchange for course credit. In terms of racial background, 76.28% identified as Caucasian, 8.84% as African American, 5.58% as Native American, 4.19% as Asian, 3.72% as Latino, and 0.93% as “other”. Sample size was determined based on recommendations for factor analysis which suggest 10 participants per item (Everitt, 1975) or a total sample size of at least 100 (Kline, 1994; MacCallum et al., 1999).

Results and discussion

We tested the factor structure of the Moxie Scale using a principal axis factoring EFA and sought a one factor solution. Bartlett’s test of sphericity was $\chi^2(45) = 1849.23$, $p < 0.001$, and the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.96 indicating that the data were appropriate for factor analysis. Parallel analysis and scree plots were used to determine the number of factors to retain. With consideration of the parallel analysis, factors from the data were retained if their eigenvalues were greater than those obtained from simulating random data (O’Connor, 2000). Based on 1,000 random data sets, the results indicated that only the first eigenvalue (6.86) from the raw data was larger than the mean (0.40) and 95th percentile (0.51) of the random data eigenvalues in the parallel analysis. As seen in Table 1, all items loaded highly on the single factor, meeting or exceeding 0.78. Finally, the 10-item scale demonstrated excellent internal consistency (Cronbach’s $\alpha = 0.96$, 95% CI [0.95,0.96], McDonald’s $\omega = 0.96$, 95% CI [0.95,0.97]). Overall, these results support our assumption that the Moxie Scale represents a single factor.

Study 2

In Study 2, we conducted a confirmatory factor analysis (CFA) to determine if the hypothesized single-factor structure was again supported.

Method

Participants and procedure Two hundred and fourteen undergraduate students (133 women; $M_{\text{age}} = 19.87$, $SD = 2.31$) from a large Southwestern university participated in this online study in exchange for course credit. In terms of racial background, 77.57% identified as Caucasian, 10.75% as African American, 4.21% as Latino, 3.74% as Native American, 2.34% as Asian, and 1.40% as “other”. The target

sample size for Study 2 was guided by recommendations of 20 individuals per item for a CFA (Mundfrom et al., 2005). Post hoc power analyses demonstrate that this sample size yielded greater than 0.80 power for RMSEA at the 0.05 level (Preacher, & Coffman, 2006).

We conducted a CFA on the sample ($n = 214$) using maximum likelihood estimation with AMOS 7 (Arbuckle, 2006). Following previous recommendations (Hu & Bentler, 1999; Schreiber et al., 2006), we used the following fit indices to test model fit: Tucker–Lewis–Index (TLI), the comparative fit index (CFI), and the root-mean-square-error of approximation (RMSEA), where good fit is indicated by values greater than or equal to 0.95 for the TLI and CFI and values less than or equal to 0.06 for the RMSEA. We also calculated the chi-square and confidence intervals for RMSEA for this CFA.

Results and discussion

Once again, all items loaded highly on the single factor, meeting or exceeding levels of 0.83 (Table 1). The overall chi-square for the CFA was significant, $\chi^2(35) = 62.73$, $p < 0.01$. This was to be expected, however, as previous work (e.g., Bentler & Bonett, 1980) states that cases with sample sizes larger than 200 often result in significant chi-square statistic ($n = 214$). We thus turned to the previously selected indices. These fit indices demonstrated excellent fit: TLI = 0.98, CFI = 0.99, and RMSEA = 0.06, 90% Confidence Interval (CI) for RMSEA = 0.04–0.09. Furthermore, the Moxie Scale demonstrated excellent internal consistency (Cronbach’s $\alpha = 0.97$, 95% CI [0.96,0.97], McDonald’s $\omega = 0.97$, 95% CI [0.96,0.97]). Overall, these results again provide evidence for the single-factor structure of the Moxie Scale.

Study 3

In Study 3, we assessed the Moxie Scale’s test–retest reliability to provide support for our assertion that moxie is a stable individual difference variable.

Method

Participants Thirty-eight undergraduate students (30 women; $M_{\text{age}} = 22.34$, $SD = 5.62$) from a large Southwestern university participated in this classroom setting study in exchange for course credit. In terms of racial background, 81.58% identified as Caucasian, 7.89% as African American, 7.89% as Latino, and 2.63% as Native American.

Procedure and materials Participants completed the Moxie Scale using a 1 (*not at all true*) to 7 (*very true*) rating scale. Data collection was conducted at two time periods set three weeks apart.

Results and discussion

The Moxie Scale demonstrated excellent internal consistency at Time 1 (Cronbach's $\alpha = 0.93$, 95% CI [0.89,0.96], McDonald's $\omega = 0.94$, 95% CI [0.90,0.97]) and Time 2 (Cronbach's $\alpha = 0.96$, 95% CI [0.93,0.98], McDonald's $\omega = 0.96$, 95% CI [0.94,0.98]). As expected, moxie scores at Time 1 were strongly associated with moxie scores at Time 2, $r = 0.73$, $p < 0.001$, 95% CI [0.53,0.85]. This finding provides support for the test–retest reliability of the Moxie Scale.

Study 4

In Study 4, we investigated the convergent and divergent validity of the Moxie Scale in relation to a common personality measure: the global Big Five personality facets (John, et al., 2008; McCrae & Costa, 1987). Of the five traits assessed in this measure, we expected moxie to be most strongly associated with the trait of conscientiousness. However, we expected this relationship with conscientiousness to be moderate in size, given our assertion that moxie is a related but distinct construct.

Method

Participants Two hundred and seventy-one undergraduate students (192 women; $M_{\text{age}} = 19.34$, $SD = 1.93$) from a large Southwestern university participated in this online study in exchange for course credit. In terms of racial background, 86.3% identified as Caucasian, 3.3% as African American, 4.4% as Native American, 1.1% as Asian, 2.6% as Latino, and 1.5% as “other”.

Procedure and materials

Moxie The Moxie Scale demonstrated excellent internal reliability (Cronbach's $\alpha = 0.98$, 95% CI [0.98,0.99], McDonald's $\omega = 0.98$, 95% CI [0.98,0.99]).

Big five factors in personality To assess the Big Five personality factors, the Big Five Inventory (BFI; John et al., 1991) was utilized. This 44-item scale assesses the five factors: openness (e.g., “I see myself as someone who values artistic, aesthetic experiences”; $\alpha = 0.78$), conscientiousness (e.g., “...does things efficiently”; $\alpha = 0.80$), extraversion (e.g., “... is outgoing, sociable”; $\alpha = 0.85$), agreeableness (e.g., “... likes to cooperate with others”; $\alpha = 0.79$), and neuroticism (e.g., “...worries a lot”; $\alpha = 0.85$). Ratings were made on a 1 (*disagree strongly*) to 5 (*agree strongly*) scale.

Results and discussion

Descriptive statistics and zero-order correlations between moxie and the Big Five factors can be found in Table 2. As expected, moxie correlated most strongly with conscientiousness ($r = 0.47$) and this correlation was positive and moderate in size. Moxie also correlated positively with extraversion and agreeableness and negatively with neuroticism, but the magnitude of these correlations were relatively small (r 's = -0.22 to 0.25). Overall, these results confirm that moxie is related to, but distinct from, the Big Five factors.

Study 5

In Study 5, we examined the convergent and divergent validity of the Moxie Scale by examining its relation to measures associated with the volition and inhibition systems. These included measures of promotion and prevention orientation (ELSamen, 2011), and sensitivity to the Behavioral Activation System (BAS) and Behavioral Inhibition System (BIS; Carver & White, 1994). Because moxie is concerned with

Table 2 Descriptive statistics and intercorrelations (Study 4)

Variable	1	2	3	4	5	6
1. Moxie	-					
2. Openness	.06	-				
3. Conscientiousness	.47**	-.04	-			
4. Extraversion	.14*	.12	.16**	-		
5. Agreeableness	.25**	.13*	.39**	.24**	-	
6. Neuroticism	-.22**	-.03	-.34**	-.33**	-.27**	-
Mean	5.49	3.45	3.77	3.34	3.90	2.90
Standard Deviation	1.25	0.60	0.60	0.79	0.59	0.81
Cronbach's alpha	0.98	0.78	0.80	0.85	0.79	0.85

* $p < .05$. ** $p < .01$

the mobilization of effort toward a goal (and not away from a goal), we expected moxie to be most associated with measures relevant to the volition system (i.e., BAS and promotion subscales).

Method

Participants One hundred and seventeen undergraduate students (71 women, $M_{\text{age}} = 19.74$, $SD = 1.52$) from a large Southwestern university participated in this online study in exchange for course credit. In terms of racial background, 71.80% identified as Caucasian, 14.50% as African American, 4.30% as Native American, 2.60% as Asian, 4.30% as Latino, and 2.60% as “other”. All participants completed the study online.

Procedure and materials

Moxie The Moxie Scale demonstrated excellent internal reliability (Cronbach’s $\alpha = 0.96$, 95% CI [0.95,0.97], McDonald’s $\omega = 0.96$, 95% CI [0.95,0.97]).

BAS/BIS To assess individual differences BIS and BAS sensitivity, the BIS/BAS scale (Carver & White, 1994) was utilized. This 24-item scale is comprised of four subscales: BIS (e.g., “I worry about making mistakes”; $\alpha = 0.75$), BAS-Drive (e.g., “I go out of my way to get things I want”; $\alpha = 0.85$), BAS-Fun Seeking (e.g., “I crave excitement and new sensations”; $\alpha = 0.80$), and BAS-Reward (e.g., “When I see an opportunity for something I like, I get excited right away”; $\alpha = 0.82$). Ratings were made on a 1 (*very false for me*) to 7 (*very true for me*) scale.

Promotion and prevention The 10-item General Regulatory Focus Measure-Short (ELSamen, 2011) was utilized to assess promotion ($\alpha = 0.84$) and prevention orientations ($\alpha = 0.78$). This scale represents a shortened version of Lockwood et al. (2002) goal orientation scale and is thought

to have superior psychometric properties to the original (ELSamen, 2011). Example items include, “I often think about the person I would ideally like to be in the future (promotion)” and “In general, I am focused on preventing negative events in my life (prevention).” Ratings were made on a 1 (*not at all true of me*) to 7 (*very true of me*) scale.

Results and discussion

Descriptive statistics and zero-order correlations between moxie and the volition and inhibition measures can be found in Table 3. As expected, moxie correlated with the volition measures, including the promotion subscale ($r = 0.47$) and the three BAS subscales (r 's = 0.23 to 0.44). Also as expected, moxie did not significantly correlate with the inhibition measures. Overall, these results confirm that moxie is related to, but distinct from, measures that assess the direction of motivational energy.

Study 6

In Study 6, we examined the convergent and divergent validity of the Moxie Scale by examining its relation to several common measures in the motivational literature, including procrastination, trait self-control, and grit. Because of the distinctions described earlier, we expected moxie would positively, but only moderately, correlate with these other scales.

We also examined the predictive and incremental validity of the Moxie Scale by examining its relation to intrinsic and extrinsic motivation. As prior researchers have suggested, the attractiveness or enjoyment of a goal is a direct function of the amount of energy mobilized to achieve the goal (Brehm et al., 1983; Wright & Brehm, 1989). In support of this assertion, goals that require little effort (i.e., easy goals) are perceived as less desirable and enjoyable than goals that require a great deal of effort (i.e., difficult goals;

Table 3 Descriptive statistics and intercorrelations (Study 5)

Variable	1	2	3	4	5	6	7
1. Moxie	-						
2. BAS-Drive	.44**	-					
3. BAS-Fun Seeking	.23*	.57**	-				
4. BAS-Reward	.33**	.60**	.49**	-			
5. BIS	.07	.01	-.11	.28**	-		
6. Promotion	.47**	.46**	.30**	.64**	.13	-	
7. Prevention	-.05	.14	.10	.10	.36**	.14	-
Mean	4.96	4.61	4.84	5.67	4.58	5.25	4.15
Standard Deviation	1.30	1.28	1.26	0.98	1.05	1.21	1.29
Cronbach’s alpha	0.96	0.85	0.80	0.82	0.75	0.84	0.78

* $p < .05$. ** $p < .01$

Brehm et al., 1983). In the present study, we sought to find a similar pattern using an individual difference variable rather than the manipulation of goal difficulty.

Because moxie is related to how people approach goals globally, rather than how they approach one specific goal, we needed a measure of goal desirability and enjoyment that was global in nature. That led us to the constructs of intrinsic and extrinsic motivation (Ryan & Deci, 2000). The more people engage in a goal because of personal enjoyment, the more intrinsically motivated they are toward the goal. Conversely, the more people engage in a goal because of external reasons (e.g., money, status, praise), the more extrinsically motivated they are toward the goal.

Because of the clear relationship between energy mobilization and goal enjoyment (Brehm et al., 1983; Wright & Brehm, 1989), we predicted that moxie would be positively related to intrinsic motivation. Furthermore, we predicted that this association would remain even after controlling for the other motivation measures in this study (i.e., procrastination, grit, self-control). In terms of extrinsic motivation, we did not have a clear prediction. On the one hand, moxie may relate only to intrinsic motivation because of the relationship between effort and goal enjoyment (Brehm et al., 1983; Wright & Brehm, 1989). However, since moxie refers to a high level of motivational intensity *regardless* of the type of goal, it may be that people high in moxie tend to be more motivated for both intrinsic and extrinsic reasons. As such, our examination of the relationship between moxie and extrinsic motivation was exploratory.

Method

Participants One hundred and twenty undergraduate students (74 women; $M_{\text{age}} = 19.78$, $SD = 1.87$) from a large Southwestern university participated in this online study in exchange for course credit. In terms of racial background, 72.50% identified as Caucasian, 10.83% as African American, 5.83% as Native American, 5.83% as Asian, 4.17% as Latino, and 0.83% as “other”. All participants completed the study online.

Procedure and materials

Moxie The Moxie Scale demonstrated excellent internal reliability (Cronbach’s $\alpha = 0.96$, 95% CI [0.95,0.97], McDonald’s $\omega = 0.96$, 95% CI [0.95,0.97]).

Procrastination To assess trait procrastination, the 16-item short version of the Procrastination Scale (Tuckman, 1991) was utilized ($\alpha = 0.91$). Example items include, “I needlessly delay finishing jobs, even when they’re important” and “When I have a deadline, I wait till the last minute”. Ratings were made on a 1 (*not at all true*) to 7 (*very true*) scale.

Grit The original 12-item version of the grit scale (Duckworth et al., 2007) was used to assess motivational perseverance. Although this scale consists of two subscales—consistency of interests (e.g. “My interests change from year to year”; $\alpha = 0.87$) and perseverance of effort (e.g., “I finish whatever I begin”; $\alpha = 0.81$)—most research on grit treats the scale as a single composite score so we did the same ($\alpha = 0.81$). Ratings were made on 1 (*not at all like me*) to 7 (*very much like me*) scale.

Self-control The 13-item Brief Self Control scale (Tangney et al., 2004) was used to assess trait self-control ($\alpha = 0.80$). Example items include, “I am good at resisting temptation (reverse)” and “I have a hard time breaking bad habits.” Ratings were made on a 1 (*not at all*) to 7 (*very much*) scale.

Intrinsic and extrinsic motivation The 30-item Work Preference Inventory (Amabile et al., 1994) was utilized to assess extrinsic ($\alpha = 0.82$) and intrinsic motivation orientations ($\alpha = 0.65$). Example items include, “To me, success means doing better than other people (extrinsic)” and “I enjoy tackling problems that are completely new to me (intrinsic).” Ratings were made on a 1 (*never or almost never true for me*) to 7 (*always or almost always true for me*) scale.

Results and discussion

Descriptive statistics and zero-order correlations between moxie, procrastination, grit and self-control can be found in Table 4. As expected, moxie correlated with all three measures and these correlations were mostly moderate in size. Specifically, moxie negatively correlated with procrastination ($r = -0.34$) and positively correlated with grit ($r = 0.52$) and trait self-control ($r = 0.40$). Thus, these results confirm that moxie is related to, but distinct from, measures that assess the initiation, persistence, and inhibition of motivational energy.

Next, regression analyses were utilized to examine the relationship between moxie and intrinsic and extrinsic motivation, controlling for procrastination, grit, and self-control.

Table 4 Descriptive statistics and intercorrelations (Study 6)

Variable	1	2	3	4
1. Moxie	-			
2. Procrastination	-.34**	-		
3. Grit	.52**	-.59**	-	
4. Self-Control	.40**	-.64**	.52**	-
Mean	4.94	3.78	4.53	4.30
Standard Deviation	1.26	1.10	0.90	0.89
Cronbach’s alpha	0.96	0.91	0.81	0.80

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

As shown in Table 5, separate regression models were conducted for intrinsic and extrinsic motivation. Overall, these results provide support for both the predictive and incremental validity of the Moxie Scale. Moxie significantly and uniquely predicted greater intrinsic motivation and extrinsic motivation, with greater moxie associated with greater motivation. Notably, moxie was also the strongest predictor for both types of motivation.

Study 7

In Study 7, we again examined the predictive and incremental validity of the Moxie Scale, this time in regards to goal achievement. Specifically, we examined if people high in moxie are more likely to achieve their goal than those low in moxie. Greater energy mobilization does not necessarily guarantee greater goal success, especially in the short term (Locke & Latham, 1990, 2013). However, over time it is likely the case that the more energy mobilized toward a goal, the more likely that goal will be achieved. This study was designed to test this assertion.

We also used mediational analyses to examine a potential reason why moxie might relate to goal achievement. Specifically, we predicted that people high in moxie tend to invest more motivational resources toward their goal than their low moxie counterparts. In the motivation literature, the amount of resources (e.g., time, energy, effort, money) people put into a specific goal pursuit is referred to as *goal investments* (Burkley et al, 2013, 2015). Prior work has demonstrated that the more resources people have invested in their goal, the greater their goal commitment (Burkley et al., 2013) and the more likely they are to attain their goal (Burkley et al., 2015; Sheldon & Elliot, 1998). Thus, whereas moxie is a *trait measure* that assesses the chronic and general mobilization of energy, goal investments is a *state measure* that assesses the mobilization of energy and resources toward a specific goal. As such, we predicted that these momentary goal investments would mediate the relationship between moxie and goal achievement.

To capture the mediational nature of the predicted relationship, we conducted a longitudinal study that spanned a

four-month long semester. Our prediction was that moxie measured at Time 1 would predict goal investments at Time 2, which in turn would predict goal achievement at Time 3. If found, this mediational pattern would add support to our assertion that people high in moxie demonstrate a greater intensity of motivation by devoting more resources toward their goals. Because Study 6 found moderately positive correlations of moxie with self-control and grit, and because prior research has found that both self-control and grit predict goal achievement (Duckworth et al., 2007, 2019; Tang et al., 2021; Tangney et al., 2004), we included these two measures in this study. However, we expected the relationship between moxie and goal achievement to hold even after controlling for self-control and grit.

Method

Participants Forty-six undergraduate students (36 women; $M_{age} = 22.00, SD = 6.06$) from a large Southwestern university participated in this classroom setting study in exchange for course credit. In terms of racial background, 71.7% identified as Caucasian, 4.3% as African American, 4.3% as Native American, 2.2% as Asian, 4.3% as Latino, 2% as “other” and 8.2% were unidentified.

Procedure and materials For this study, participants were asked to select a personal goal that they would strive for over the four-month long semester. The type of goal selected varied across participants, with 57% of respondents selecting health goals, 15% selecting academic goals, 4% selecting financial goals, and 24% selecting miscellaneous goals (e.g., volunteer, paint, read more).

On the first day of the semester (Time 1), participants completed the same measures of moxie (Cronbach’s $\alpha = 0.94, 95\% CI [0.91, 0.97]$) grit ($\alpha = 0.81$) and trait self-control ($\alpha = 0.84$) that were used in Study 6. Halfway into the semester (approximately two months later; Time 2), participants completed a three-item measure of goal investments that was specific to the pursued goal (Cronbach’s $\alpha = 0.95$; e.g., “I have put a lot of effort into achieving this goal”; for all items see Burkley et al., 2015). Ratings were made using a 1 (*not at all*) to 7 (*very much*) scale. Finally,

Table 5 Regression models predicting intrinsic and extrinsic motivation (Study 6)

Variable	B	SE	β	t	R ²	B	SE	β	t	R ²
Intrinsic Motivation						Extrinsic Motivation				
					.19					.30
Moxie	.23	.06	.42	4.20***		.32	.06	.48	5.14***	
Procrastination	.17	.08	.27	2.25*		.18	.09	.24	2.12*	
Grit	.05	.09	.06	0.52		.17	.10	.18	1.69	
Self-Control	-.06	.09	-.08	-0.71		.05	.10	.05	0.51	

* $p < .05$, ** $p < .01$, *** $p < .01$

Table 6 Descriptive statistics and intercorrelations (Study 7)

Variable	1	2	3	4	5
1. Moxie (T1)	-				
2. Grit (T1)	.53**	-			
3. Self-control (T1)	.41**	.49**	-		
4. Goal investments (T2)	.48**	.48**	.26	-	
5. Goal achievement (T3)	.45**	.28	.08	.58**	-
Mean	5.12	4.76	4.47	1.49	4.05
Standard Deviation	0.98	0.85	0.98	1.46	1.48
Cronbach's alpha	0.95	0.81	0.84	0.95	-

T1, Time 1; T2, Time 2; T3, Time 3

** $p < .01$

Table 7 Regression model of T1 variables predicting T3 goal achievement (Study 7)

Variable	B	SE	β	t	R ²
					.22
Moxie	.78	.15	.32	2.47**	
Grit	.13	.37	.08	.37	
Self-control	-.23	.06	-.15	-.83	

** $p < .01$

at the end of the semester (approximately four months from the start of the study; Time 3), participants indicated their level of goal achievement by responding to the question, “To what extent did you achieve your goal?” (Burkley et al., 2015). Ratings were made on a 0 (*not at all achieved*) to 6 (*completely achieved*) scale.

Results and discussion

Descriptive statistics and zero-order correlations for all variables are reported in Table 6. We first regressed goal achievement at Time 3 onto moxie, grit and self-control at Time 1 (Table 7). As predicted, moxie at Time 1 was a significant predictor of goal achievement at Time 3, after controlling for grit and self-control. Specifically, people high in moxie were more likely to report achieving their goal at the end of the semester than those low in moxie, $B = 0.71$, $t(35) = 2.47$, $p = 0.02$. Conversely, grit and self-control at Time 1 did not significantly predict goal achievement at Time 3, after controlling for the other variables.

Mediation analyses We then conducted multiple regression analyses to assess if the impact of moxie on goal achievement was mediated by goal investments (Fig. 1). As expected, moxie at Time 1 predicted greater goal achievement at Time 3, $B = 0.69$, $t(37) = 3.08$, $p = 0.004$, $R^2 = 0.20$, and greater goal investment at Time 2, $B = 0.78$, $t(36) = 3.40$, $p = 0.002$, $R^2 = 0.24$. Furthermore, goal investment at Time 2 predicted greater goal achievement at Time 3, $B = 0.58$, $t(37) = 4.38$, $p = < 0.001$, $R^2 = 0.34$.

Mediation analyses were then tested using the bootstrapping method with 5,000 bootstrap resamples (Hayes, 2013; Preacher & Hayes, 2008). In such analyses, the most pertinent test to demonstrate mediation is the 95% bias-corrected confidence interval (CI) for the indirect effect. If this CI does not include zero, it provides evidence of statistically significant mediation (Hayes, 2013; Preacher & Hayes, 2008). Results confirmed the mediating role of goal investments in the relation between moxie and achievement, as indicated by the 95% CI that did not include zero ($B = 0.40$, $CI = 0.15$ to 0.78 , $R^2 = 0.37$). When controlling for goal investments, the direct effect of moxie on achievement

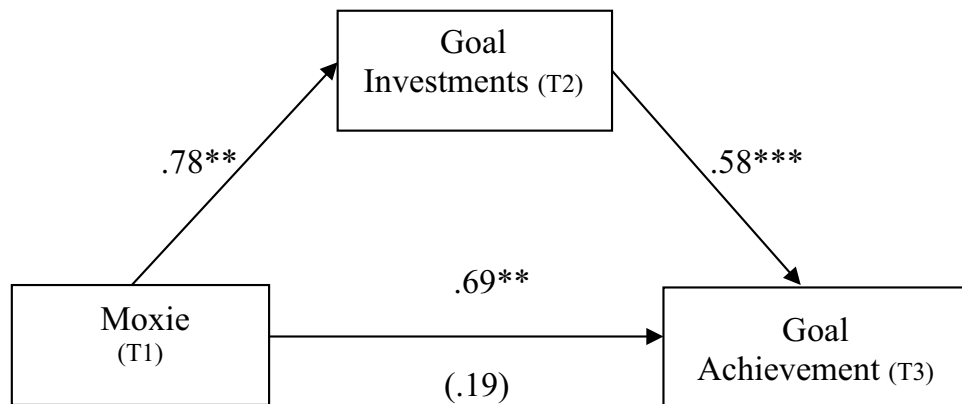


Fig. 1 Goal achievement as a function of moxie and goal investments (Study 7). Note. T1=Time 1, T2=Time 2, T3=Time 3. Figure 1 presents unstandardized regression coefficients for the relationship between moxie and goal achievement as mediated by goal invest-

ments. The unstandardized coefficient in the parentheses represents the link between moxie and goal achievement controlling for goal investments. ** $p < .01$, *** $p < .001$

became non-significant, $B = 0.19$, $t(34) = 0.77$, $p = 0.44$, suggesting full mediation. This mediation model accounted for 37% of the variance in goal achievement. Taken together, these results support our mediation hypothesis, such that greater moxie was associated with greater goal investment, which in turn was associated with a greater likelihood of goal achievement.

General discussion

Summary of results

In this article, we introduced the concept of moxie and developed the Moxie Scale to assess this individual variability in motivation intensity. Across seven studies (each using independent samples), the results provided initial evidence that the Moxie Scale is a reliable, valid, and novel contribution to motivation research. In support of its internal reliability, Cronbach's alphas for the Moxie Scale were consistently high, ranging from 0.93 (95% CI [0.89,0.96]) to 0.98 (95% CI [0.98,0.99]) and McDonald's Omegas ranging from 0.93 (95% CI [0.90,0.97]) and 0.98 (95% CI [0.98,0.99]). Moreover, Study 3 found moxie scores were highly correlated when measured three weeks apart, demonstrating test–retest reliability. Supporting the Moxie Scale's factor structure, both an EFA and CFA found evidence for a single factor model.

In support of the scale's convergent and divergent validity, results indicated that moxie moderately correlated with—but was statistically distinct from—the Big Five personality traits, most notably conscientiousness ($r = 0.47$). Such a result is important, especially in light of recent research suggesting that popular motivation measures such as grit may be too highly correlated with conscientiousness (r 's ≥ 0.77), and thus may not add much beyond this trait (Abuhassan & Bates, 2015; Credé et al., 2017; Ponnock et al., 2020; Rimfeld et al., 2016; Schmidt et al., 2018). So, although conscientiousness and moxie are related, they appear to be distinct constructs. Moxie was also found to be correlated but distinct from several other individual difference measures commonly used in motivation research. These include promotion-prevention orientations, BAS-BIS sensitivities, procrastination, grit, and self-control.

Finally, providing support for the Moxie Scale's criterion-related and incremental validity, Study 6 found that moxie accounted for significant variance in intrinsic and extrinsic motivation, above and beyond that of other individual difference measures related to motivational energy (i.e., procrastination, self-control, grit). Similarly, Study 7 found that moxie accounted for significant variance in goal achievement over a four-month period, even after controlling for

self-control and grit. The impact of moxie on achievement was also mediated by greater goal investments.

Strengths, limitations, and future directions

The current work demonstrates that moxie is an important construct not captured by existing motivation measures. One strength of the present work is that it highlights the significance and relevance of studying motivation intensity. Several individual difference measures have been designed to assess variability in the direction, initiation, and persistence facets of motivation. However, moxie is unique in that it focuses exclusively on the intensity component of motivation, an aspect that has received far less empirical attention than its counterparts (Gendolla et al., 2012). The present work suggests that individual differences in motivation intensity is an important concept worthy of future study.

A second strength of the present work is that it examined the impact of moxie on goal achievement in a wide range of domains. Previous motivation research has investigated how similar measures, such as procrastination and grit, relate to goal achievements mainly within academic domains (Duckworth et al., 2007; Gustavson & Miyake, 2017; Moon & Illingworth, 2005; Rimfeld et al., 2016; Tang et al., 2021; Tuckman, 1991). The present findings, especially those of Study 7, indicated that moxie predicted achievement within people's self-selected goals, which included a range of different domains such as health, school, finances, and hobbies.

Despite these strengths, additional important questions regarding moxie remain unanswered. First, several items in the Moxie Scale include phrases common in the English language and American culture, such as “pour my heart and soul,” “put my blood, sweat and tears,” and “all in.” It may be that such phrases do not easily translate to other cultures or languages. Consequently, the present studies should be replicated utilizing more culturally diverse samples to examine whether our findings generalize beyond American participants. Along the same line, our study samples consisted of university students exclusively. Thus, the properties of the Moxie Scale should be examined among participants from varying age ranges and educational backgrounds.

Second, we believe that moxie has the potential to moderate a number of already established effects within the motivation literature. For example, research on motivation intensity theory consistently shows that people exert more effort on unspecified difficult tasks compared to unspecified easy tasks (e.g., Brehm et al., 1983; Gendolla et al., 2012, 2019; Mazeres et al., 2021). It is possible that this tendency is moderated by moxie. Those high in moxie may be especially likely to mobilize their energy toward unspecified difficult tasks, thereby showing a stronger deviation in effort based on task difficulty. Conversely, individuals low in moxie may show only modest differences in effort mobilization between

such easy and difficult tasks. Future research should explore the potentially moderating effects of moxie on task difficulty as well as other energy-relevant variables.

Third, future research should consider investigating the impact of moxie on behavioral and/or physiological outcomes. For example, effort mobilization is reflected in increases in myocardial sympathetic activity assessed via various heart activity measures (e.g., systolic blood pressure; Freydefont et al., 2016; Mazeret et al., 2021; Richter et al., 2008; Silvia, 2012; Wright et al., 1990). Several studies have used effort-related cardiovascular reactivity to examine how situational variables impact motivation intensity (e.g., Framorando & Gendolla, 2019; Gendolla et al., 2019; Richter et al., 2008; Silvia et al., 2011; Wright et al., 1990). Upcoming studies could explore if individual variability in moxie also corresponds to differences in cardiovascular reactivity during goal pursuit.

Lastly, future research could explore if moxie is associated with positive life outcomes, such as life satisfaction, well-being, psychological adjustment, and physical health. For example, because people high in trait self-control are more effective in managing goal conflict and resisting temptations, they tend to experience more positive physical and psychological outcomes (Hofmann et al., 2014; Nielsen et al., 2019; Tangney et al., 2004). Given that people with moxie are more likely to achieve their goals, as indicated by the results of Study 7, it seems likely that they too would experience greater physical and emotional benefits. Future studies should investigate this possibility.

In summation, moxie offers a unique assessment of an important individual difference that can be seen simply by observing how people pursue their goals. Thus, it appears that some people are more likely than others to “give it their all.”

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Data availability The datasets generated during and/or analyzed during the current study are available in the Open Science Framework repository, <https://osf.io/ytupn/>

Declarations

Ethics approval Approval was obtained from the Institutional Review Board (IRB) committee of Oklahoma State University.

Consent to participate Informed consent was obtained from all individual participants included in the study.

Competing interests The authors have no relevant financial or non-financial interests to disclose.

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