

## **THE VOODOO DOLL SELF-INJURY TASK: A NEW MEASURE OF SUB-CLINICAL SELF-HARM TENDENCIES**

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We introduce a new measure of sub-clinical self-harm tendencies, the Voodoo Doll Self-Injury Task (VDSIT). In this computer task, participants virtually stick a number of sharp pins in a doll that represents themselves. Across five community and undergraduate samples who were not recruited based on their self-harm history or risk (total  $N = 1,289$ ), VDSIT scores were higher among participants with histories of actual self-injury and were positively correlated with state and trait level motivations to self-harm. VDSIT scores did not correspond to tendencies to harm others, showed sensitivity to experimental manipulations that increase self-harm tendencies, and were positively correlated with established risk factors for self-harm (e.g., depression). The VDSIT did not, on average, elicit significant distress from participants during or after the task, even among participants who had previously engaged in self-harm. Whereas the clinical utility of this measure remains unexamined, these findings provide initial support for the VDSIT's sub-

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clinical validity, which can help researchers accurately, economically, and rapidly measure state and trait level self-harm tendencies using both correlational and experimental designs.

*Keywords:* self-harm, non-suicidal self-injury, measurement, voodoo doll self-injury task, VDSIT

Self-harm is the intentional act of directly harming one's own physical body (Nock, 2009). This behavior is strikingly prevalent, particularly among adolescents and emerging adults who experience it at a rate between 13–23% (Jacobson & Gould, 2007). As such, it is critical for those who seek to research self-harm to be well-armed with psychometric tools capable of measuring the tendency to self-harm. In what follows, we introduce a new measure of self-harm tendencies, the Voodoo Doll Self-Injury Task (hereafter VDSIT). We present data from five studies that provide converging, empirical evidence for the validity and utility of the VDSIT.

## CURRENT PSYCHOMETRIC APPROACHES TO SELF-HARM MEASUREMENT

The current literature on self-harm provides a wide array of psychometric tools, which mainly take the form of self-report questionnaires. Commonly used measures include the Inventory of Statements About Self-Injury (Klonsky & Glenn, 2009), the Non-Suicidal Self-Injury Assessment Tool (Whitlock, Exner-Cortens, & Purington, 2014), the Deliberate Self-Harm Inventory (Gratz, 2001), and the Self-Injury Questionnaire (Santa Mina et al., 2006). These measures provide rich and crucial information about current (i.e., state) and dispositional (i.e., trait) tendencies to self-harm. These two levels of assessment are crucial as trait-level assessments person-level factors (e.g., personality traits, genetic heritability), whereas state-level assessments are crucial to test hypotheses about environmental inputs.

The VDSIT is put forward as a new measure of both momentary shifts in and stable dispositions toward self-harming tendencies. Further, the VDSIT is not conceptualized as a replace-

ment of any currently-used self-harm measurement systems, but as a complementary tool that has specific benefits and limitations that differentiate it from other currently-used approaches. As such, the incremental validity of this task above-and-beyond questionnaires is not of interest in this current investigation.

## THE VOODOO DOLL SELF-INJURY TASK

The VDSIT is a variant of a previously-validated measure of aggressive behavior, the Voodoo Doll Aggression Task (VDAT; DeWall et al., 2013). In the VDAT, participants are given the opportunity to stick anywhere from 0 to 51 sharp pins in a plush doll that represents a certain individual. Participants' scores on the VDAT (i.e., the number of pins participants stuck in the doll) reliably correlated with other validated measures of aggression, and showed excellent test-retest reliability both within and between participants, and exhibited similar psychometric properties whether the VDAT was performed over the internet or in a laboratory. The VDAT is also responsive to experimental manipulations of negative social feedback intended to increase aggressive behavior (e.g., Chester & DeWall, 2017), demonstrating that the VDT can capture both state and trait levels of aggressive tendencies.

Since its validation as an aggression measure, the VDAT has proven effective at measuring aggression towards participants' children (McCarthy, Crouch, Basham, Milner, & Skowronski, 2016), marital partners (Bushman, DeWall, Pond, & Hanus, 2014), provocateurs (Chester, Merwin, & DeWall, 2015), and rejecters (Chester & DeWall, 2016, 2017). These findings demonstrate the VDAT's flexibility and the extent to which humans can readily bestow personhood upon a simple, virtual representation of a human-like doll.

Voodoo Doll Tasks, whatever the doll represents, capitalize on the human tendency to grant objects magical properties (e.g., struggling to impale pictures of babies; King, Burton, Hicks, & Drigotas, 2007; Rozin, Millman, & Nemeroff, 1986). Humans, instead of being purely rational actors, often approach the world with superstitious intuitions about actions and objects that are remarkably resilient to counterfactuals (Risen, 2016). Voodoo

Doll Tasks avail themselves of the natural ability of humans to mentalize, perspective-take, and bestow minds upon non-human entities that allow for the ready perception of sentient, supernatural agents (Gervais, 2013). While a simple voodoo doll may seem to be a contrived and alien surrogate for self-harm behaviors, the human tendency to confer such objects with minds and personhood, as well as to dispense with rational disbelief, suggest that such an approach can closely approximate true self-harm without actually inflicting any damage.

## CURRENT RESEARCH

In the current research, we modified the VDAT to have a different target: the self. The purpose of doing so was to establish this modified task (i.e., the VDSIT) as a flexible, rapid, symbolic, and behavioral measure of the tendency to harm the self.

Specifically, we sought to demonstrate that VDSIT scores would correspond to other measures of self-harm tendencies, in order to establish the convergent validity of the VDSIT. To provide evidence for construct validity, we tested the VDSIT's relation with known risk-factors for self-harm tendencies and experimental manipulations that magnify self-harm tendencies. Further, we assessed discriminant validity by testing the relation of VDSIT scores with a measure of harming others (i.e., physical aggressiveness). Finally, we tested whether the VDSIT was problematically distressing by measuring momentary affect before, during, and after administration of the task. To accomplish these goals, we conducted a series of five studies that provide preliminary, empirical evidence for the validity and utility of the VDSIT.

## STUDY 1

Study 1 served to test the hypothesis that the VDSIT would exhibit higher scores among individuals who had previously self-harmed, thus establishing construct and convergent validity of the task. This study also tested a second hypothesis that would serve to support the construct validity of the VDSIT, that an experimental induction of a social experience known to mag-

nify self-harm tendencies (i.e., social rejection; Groschwitz, Ple-ner, Groen, Bonenberger, & Abler, 2016) would increase VDSIT scores.

## METHODS

### PARTICIPANTS

Participants consisted of 203 adult undergraduates recruited from an introductory psychology subject pool (157 females; Age:  $M = 18.72$ ,  $SD = 1.19$ ). Participants' racial composition was 83.3% White, 10.3% Black, 2.0% Asian, 1.0% American Indian, 1.0% Hispanic or Latino, 1.0% Mixed, 1.0% Other, and 0.5% Arabic. The ethnic composition of the sample was 1.0% Hispanic or Latino and 99.0% Non-Hispanic or Latino. Participants were compensated with course credit.

### MATERIALS

*Voodoo Doll Self-Injury Task (VDSIT)*. Participants viewed a doll that represented themselves (materials freely and publicly available at <https://osf.io/7tp4g/>). Then, participants viewed the self-doll with a range of 1 to 19 pins stuck in it at various anatomical doll locations. Then, participants viewed the doll with the full 51 pins stuck into it. Finally, participants were shown the doll again without any pins stuck in it and were given a slider bar to use to select the number of pins to stick into the self-doll. Participants were asked: "Now, how many pins do you wish to insert into the doll that represents YOU?" The open-ended and vague nature of this question prevented the researchers from leading the participant towards higher or lower VDSIT scores.

*History of Self-Harm*. The Inventory of Statements About Self-Injury (ISAS; Klonsky & Glenn, 2009) is a self-report measure of intentional and non-suicidal self-injury. This measure contains an initial question that asks if participants had ever harmed themselves intentionally.

## PROCEDURE

Participants completed this experiment over the internet and were randomly assigned to be either socially accepted or rejected via two fellow undergraduates via the Cyberball paradigm (version 4.0; Williams, Cheung, & Choi, 2000; Williams, Yeager, Cheung, & Choi, 2012). In reality, these Cyberball partners were computer programs who were preset to throw the ball to the participant an equitable number of times (acceptance condition) or only a few times at the beginning of the task and then to throw it only to their fellow computer program (rejection condition).<sup>1</sup> Participants then completed the VDSIT, followed by a battery of questionnaires, including the ISAS item “have you ever intentionally harmed yourself?”

## RESULTS AND DISCUSSION

### DESCRIPTIVE STATISTICS

A Kolmogorov-Smirnov test revealed that the distribution of number of pins was zero-inflated and positively skewed,  $k(203) = .32, p < .001$ . Subsequently, a Poisson loglinear distribution was adopted for subsequent analyses using generalized linear modeling (as recommended by DeWall et al., 2013), instead of standard parametric approaches. Age was unassociated with VDSIT scores,  $B = .01, \chi^2(1, 201) = 0.09, p = .759$ . Females had lower VDSIT scores than males,  $B = -.55, \chi^2(1, 201) = 36.36, p < .001$ , which may seem strange given that females typically have a higher rate of self-injury (Jacobson & Gould, 2007). However, males engage in more severe forms of self-injury (Andover, Primack, Gibb, & Pepper, 2010), which males' higher VDSIT scores appear to reflect.

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1. This manipulation was crossed with instructions that asked participants to either imagine that they were being accepted/rejected by the game as they watched it unfold, or to have it actually happen to them. This manipulation was included as part of a larger project on imagined experiences of rejection and self-harm tendencies.

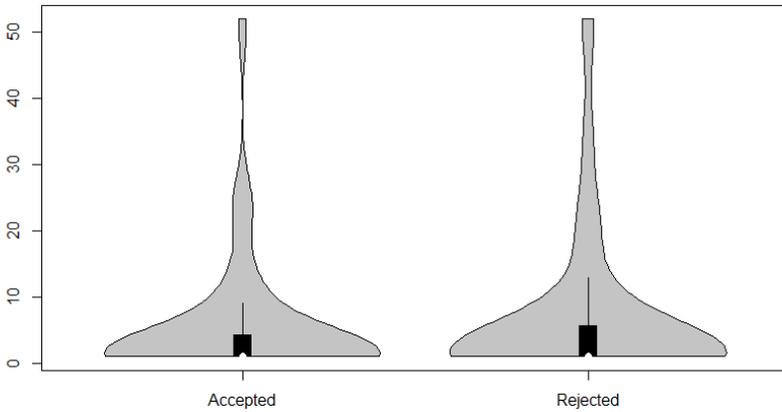


FIGURE 1. Violin plots (i.e., combination box-plot and kernel density histogram) depicting distribution of Voodoo Doll Self-Injury Task (VDSIT) scores from Study 1, by Cyberball condition.

## GROUP COMPARISONS

Rejected individuals had higher VDSIT scores than their accepted counterparts,  $B = .29$ ,  $\chi^2(1, 200) = 19.86$ ,  $p < .001$  (Figure 1). Among our participants, 19.7% indicated that they have previously harmed themselves. Participants who had previously injured themselves stuck more pins in the doll than those who had not injured themselves,  $B = .78$ ,  $\chi^2(1, 201) = 134.12$ ,  $p < .001$  (Figure 2). Study 1 thus provided the first evidence for the VDSIT's construct and convergent validity in a sample of undergraduate students.

## STUDY 2

Study 2 sought to replicate Study 1's association with individuals' histories of self-harming. Further, Study 2 tested the VDSIT's association with measures of trait and state tendencies to self-harm. Study 2 also tested the association between the VDSIT and measures of traits that are reliably linked to self-harm: anxiety and depression (Klonsky, Oltmanns, & Turkheimer, 2003), self-criticism (Gilbert et al., 2010), and self-esteem (Laye-Gindhu & Schonert-Reichl, 2005).

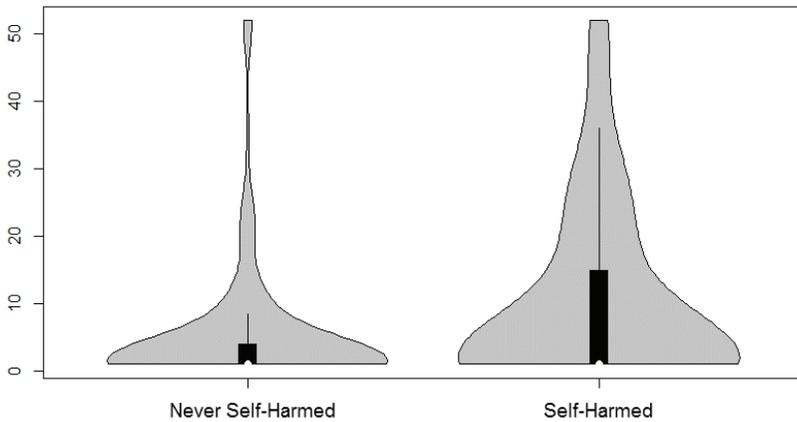


FIGURE 2. Distribution of VDSIT scores from Study 1, by whether participants reported that they had previously self-harmed or not.

## METHODS

### PARTICIPANTS

Participants consisted of 368 adult undergraduates recruited from an introductory psychology subject pool (243 females; Age:  $M = 21.35$ ,  $SD = 3.36$ ). Racial and ethnic data were not collected from these participants. Participants were compensated with course credit.

### MATERIALS

*Anxiety.* The Beck Anxiety Inventory (BAI) is a validated measure of anxiety symptoms (Beck, Epstein, Brown, & Steer, 1988). In this 21-item measure, participants rated how much they were bothered by various anxiety symptoms over the past month along a 4-point, not at all to severely—it bothered me a lot response scale.

*Depression.* The Beck Depression Inventory—II (BDI) is a validated measure of depression symptoms (Beck, Steer, & Brown 1996). For each of this measure's 21 items, participants select among four levels of a given depressive symptom.

*Self-Criticism.* The Levels of Self-Criticism Scale (LSCS) is a validated measure of trait-level internalized and comparative self-criticism (Thompson & Zuroff, 2004). In this 22-item measure, participants rated how much various statements describe them along a 7-point, not at all to a lot response scale.

*Self-Esteem.* The Rosenberg Self-Esteem Scale (RSES) is a validated measure of trait-level self-esteem (Rosenberg, 1965). This study used four items from this larger scale, which participants rated regarding how much each statement described them along a 7-point, strongly disagree to strongly agree response scale.

*State and Trait Self-Harm Tendencies.* The Self-Injury Intention Measure (SIIM) is a 4-item measure that assesses individual's current and dispositional intention to harm themselves (items listed in Table 1). Participants respond to the likelihood of enacting each item along a 1 (not at all likely) to 9 (extremely likely) response scale.

## PROCEDURE

Participants completed this experiment over the internet through a third-party survey host. Participants completed a battery of questionnaires, included the ISAS and SIIM. Then participants completed the VDSIT and measures of BAI, BDI, LSCS, and RSES.

## RESULTS AND DISCUSSION

### DESCRIPTIVE STATISTICS

The distribution of VDSIT pins were zero-inflated and positively skewed,  $k(326) = .38, p < .001$ . Unlike Study 1, age was positively associated with VDSIT scores,  $B = .02, \chi^2(1, 324) = 5.39, p = .020$ . As in Study 1, females had lower VDSIT scores than males,  $B = -.64, \chi^2(1, 324) = 103.22, p < .001$ .

TABLE 1. Correlations Between VDSIT Scores and the Self-Injury Intention Measure (SIIM) from Study 2

	Full Sample	Prior Self-Harm	No Prior Self-Harm
	<i>B</i> (Poisson)	<i>B</i> (Poisson)	<i>B</i> (Poisson)
1.	.37*	.38*	.33*
2.	.41*	.46*	.33*
3.	.36*	.35*	.35*
4.	.41*	.42*	.37*

\* $p < .001$

### ASSOCIATIONS WITH SELF-HARM MEASURES

*State and Trait Self-Harm Tendencies.* VDSIT scores were positively correlated with state- and trait-level tendencies to self-harm (Table 1). These associations were observed among participants with and without histories of actual self-harm (Table 1). Thus, the VDSIT captured a wide array of self-harm motives and tendencies.

1. Right now, how strong is your urge to hurt yourself on purpose?
2. In general, how often do you think about hurting yourself on purpose?
3. How likely do you think it is that you will hurt yourself on purpose in the future?
4. In general, how strong is your urge to hurt yourself on purpose?

*History of Self-Harm.* Among participants, 38.7% indicated that they have previously, intentionally, and physically-harmed themselves. As in Study 1, participants who had previously injured themselves had higher VDSIT scores than those who had not injured themselves,  $B = .49$ ,  $\chi^2(1, 324) = 62.78$ ,  $p < .001$ .

### ASSOCIATIONS WITH SELF-HARM RISK FACTORS

VDSIT scores were positively associated with anxiety, depression, and self-criticism, and negatively associated with self-esteem (Table 2). The overall pattern of correlations illustrates a

TABLE 2. Correlations Between VDSIT Scores and Other Measures from Study 2, Alongside Internal Consistency Estimates.

	<i>B</i> (Poisson)	$\alpha$ (Cronbach)
BAI	.06*	.99
BDI	.09*	.94
LSCS	.75*	.88
RSES	-.53*	.82

\* $p < .001$

nomological net around the VDSIT that is similar to other self-harm measures.

### STUDY 3

Study 3 was conducted to (A) replicate the evidence for the VDSIT's construct validity using an essay feedback manipulation that provided either negative or positive social feedback, given criticism's well-established role in promoting self-harm (Glassman, Weierich, Hooley, Deliberto, & Nock, 2007). Study 3 was a re-analysis of the first published research to use the VDSIT, which originated as a study on maladaptive perfectionism (Chester et al., 2015).

## METHODS

### PARTICIPANTS

Participants consisted of 186 adult undergraduates recruited from an introductory psychology subject pool (136 females; Age:  $M = 19.42$ ,  $SD = 1.88$  for a study on Mental Visualization and Personality. Participants' racial composition was 75.7% White, 9.7% Black, 5.9% Asian, 0.0% American Indian, and 7.0% Other. The ethnic composition of the sample was 5.4% Hispanic or Latino and 94.6% Non-Hispanic or Latino. Participants were compensated with course credit.

## MATERIALS

*Voodoo Doll Self-Injury Task (VDSIT)*. Study 3 employed a modified version of the VDSIT that was used in Studies 1 and 2. These instructions falsely informed participants that “people perform better when they punish themselves for past failures. In this task, we will give you an opportunity to figuratively punish yourself for your performance on the essay task.” Participants were then shown the typical VDSIT doll and told “you will get to choose how many needles (up to 51) you would like to put in the doll that represents you to punish you for your performance on the essay task.”

## PROCEDURE

Participants completed this experiment over the internet through a third-party survey host, which ostensibly sought to measure how various personality traits impact peoples’ ability to mentally visualize events. The experiment began with a social feedback task used in previous research to experimentally simulate an aversive social interaction with a fictitious partner (Chester et al., 2015). Participants wrote an essay (800 character minimum) about a time they were very angry. Participants’ essays received either negative (10/35 points) or positive (30/35 points) feedback from an essay evaluator, alongside a comment, which either stated “one of the worst essays that I have EVER read!” (negative feedback condition) or “great essay!” (positive feedback condition).

## RESULTS AND DISCUSSION

### DESCRIPTIVE STATISTICS

VDSIT scores were zero-inflated and positively skewed,  $k(184) = .25, p < .001$ . Unlike either Studies 1 or 2, age was negatively associated with VDSIT scores,  $B = -.06, \chi^2(1, 182) = 14.74, p < .001$ , and there was no effect of gender on VDSIT scores,  $B = -.08, \chi^2(1, 182) = 2.17, p = .141$ .

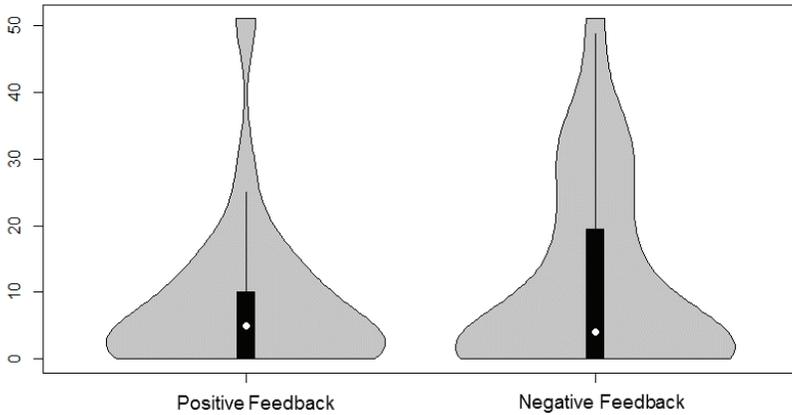


FIGURE 3. Distribution of VDSIT scores across both feedback groups from Study 3.

#### EFFECT OF ESSAY MANIPULATION

We removed 39 participants from this portion of the analysis who indicated total disbelief of the essay manipulation's deceptive elements. Participants who received negative feedback on their essay stuck more pins in the doll than those who received positive feedback,  $B = .27$ ,  $\chi^2(1, 143) = 22.67$ ,  $p < .001$  (Figure 3). The essay feedback's effect on VDSIT scores lends further evidence for the construct validity and experimental sensitivity of the task.

#### STUDY 4

Study 4 sought to replicate the convergent and construct validity of the VDSIT with a non-undergraduate population. Towards this goal, participants completed the VDSIT alongside an experimental manipulation of negative social feedback, self-report measures of state self-harm tendencies, histories of actual self-harm, and depression.

To establish discriminant validity of the VDSIT, we included a measure of physical aggressiveness, the desire to bodily harm others, which the VDSIT does not seek to measure. We hypothesized that VDSIT scores would be unassociated with this measure of aggressiveness. A key concern about the VDSIT is that the task may be substantially distressing to those who complete it, especially those with a history of actual self-injury. To test whether this was the case, measures of negative and positive affect were administered before, during, and after the VDSIT. We hypothesized that participants would not report an increase in negative affect or a decrease in positive affect after they completed the VDSIT.

## METHODS

### PARTICIPANTS

Participants consisted of 397 adult participants recruited from Amazon's Mechanical Turk subject pool (201 females; Age:  $M = 32.70$ ,  $SD = 8.76$ ) for a study on Mental Visualization Abilities. Participants' racial composition was 48.1% White, 3.3% Black, 26.9% Asian, 2.8% American Indian, and 18.5% Other. The ethnic composition of the sample was 16.5% Hispanic or Latino and 83.5% Non-Hispanic or Latino. Participants were compensated with \$0.50. The study was posted with the following keywords: psychology, experiment, survey. We required workers to have a 95% approval rate on all previous MTurk tasks.

### MATERIALS

*Physical Aggressiveness.* The 12-item Brief Aggression Questionnaire (BAQ; Webster et al., 2014) measures trait aggression with a four factor structure of the original questionnaire with a 3-item subscale measuring each construct: anger, hostility, physical aggression, and verbal aggression. Participants rate their agreement with each statement along a 1 (strongly disagree) to 7 (strongly agree) response scale.

**TABLE 3. Partial Correlations Between VDSIT Scores and Other Measures from Study 4 (Controlling for Other Subscales of Each Measure), Alongside Internal Consistency Estimates**

	<i>B</i> (Poisson)	$\alpha$ (Cronbach)
BAQ-Anger	.24*	.60
BAQ-Hostility	.30*	.80
BAQ-Physical	.02	.86
BAQ-Verbal	-.18*	.67
CESD	.82*	.87

\* $p < .001$

*Negative and Positive Affect.* The Need Threat Affect Subscale (NTAS) contains two, four-item subscales that assess current levels of negative and positive affect (Williams, 2009). Participants respond to these items along a 7-point, strongly disagree to strongly agree response scale.

*State Self-Harm Tendencies.* The Self-Injury Intention Measure—State version (SIIM-S) is a 6-item measure that assesses individual's current desire to injure themselves.

## PROCEDURE

Participants completed this experiment over the internet through a third-party survey host, which ostensibly sought to measure how various personality traits impact peoples' ability to mentally visualize events. The experiment began with the essay feedback task used in Study 3. Afterwards, participants completed the NTAS and the VDSIT. After confirming their pin count, participants completed the NTAS that was reframed to ask participants to reflect on their negative and positive affect during and after the VDSIT. Finally, participants completed the SIIM-S, ISAS, BAQ, and CESD.

## RESULTS AND DISCUSSION

### DESCRIPTIVE STATISTICS

Internal consistency was adequate to excellent for all self-report measures (see Table 3). VDSIT scores were zero-inflated and

positively skewed,  $k(390) = .29, p < .001$ . As in Study 3 (though not Studies 1 or 2), age was negatively associated with VDSIT scores,  $B = -.04, \chi^2(1, 388) = 253.03, p < .001$ . As in Studies 1 and 2 (though not Study 3), females had lower VDSIT scores than males,  $B = -.36, \chi^2(1, 388) = 115.00, p < .001$ .

#### ASSOCIATIONS WITH OTHER MEASURES OF SELF-HARM

*State Self-Harm Tendencies.* As in Study 2, VDSIT scores were positively associated with participants' self-reported motivations to currently engage in self-injury behaviors, as measured by the SIIM-S,  $\alpha = .98; B = .27, \chi^2(1, 383) = 2,065.35, p < .001$ . This positive association was present among individuals who had previously self-harmed,  $B = .19, \chi^2(1, 103) = 487.39, p < .001$ , and those who had not,  $B = .29, \chi^2(1, 278) = 1,123.56, p < .001$ .

*History of Self-Harm.* Among Study 4's participants, 26.4% indicated that they had previously harmed themselves. Replicating Studies 1 and 2, participants who had injured themselves stuck more pins in the doll than those who had not injured themselves,  $B = .83, \chi^2(1, 383) = 614.48, p < .001$ .

#### ASSOCIATIONS WITH SELF-HARM RELEVANT TRAITS

VDSIT scores were positively associated with depressive symptoms (as in Study 2), anger, and hostility, and negatively associated with verbal aggressiveness (Table 3). Demonstrating discriminant validity, VDSIT scores were unassociated with physical aggressiveness (Table 3). As such, the VDSIT appears to capture self-harm tendencies and not larger patterns of inflicting harm.

#### EFFECT OF ESSAY MANIPULATION

We removed 142 participants from this portion of the analysis who indicated 'total disbelief' of the rejection manipulation's deceptive elements. Replicating Study 3, participants who received negative feedback on their essay stuck more pins in the doll than

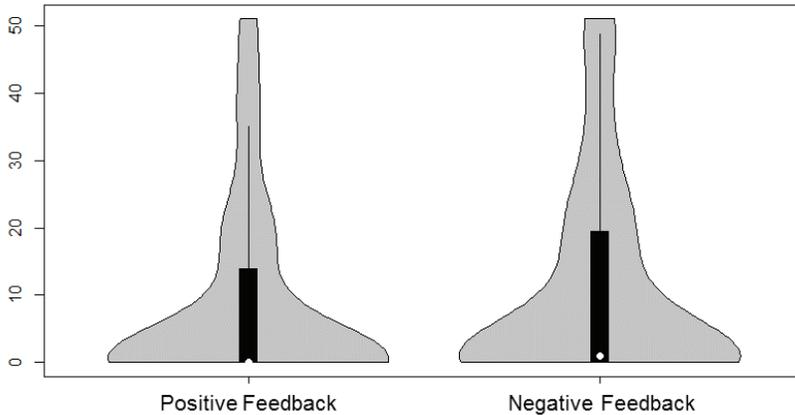


FIGURE 4. Distribution of VDSIT scores across both feedback groups from Study 4.

those who received positive feedback,  $B = .19$ ,  $\chi^2(1, 246) = 19.86$ ,  $p < .001$  (Figure 4).

#### AFFECTIVE DYNAMICS OF THE VDSIT

Among participants who had no history of self-harming behaviors, negative affect did not exceed the scale's midpoint before,  $t(108) = -7.45$ ,  $p < .001$ , during,  $t(108) = -2.74$ ,  $p = .007$ , and after,  $t(108) = -9.64$ ,  $p < .001$ , the VDSIT. Among participants who *had* a history of self-harming behaviors, negative affect did not exceed the scale's midpoint before,  $t(41) = -2.72$ ,  $p = .009$ , during,  $t(41) = -0.94$ ,  $p = .351$ , and after,  $t(41) = -2.66$ ,  $p = .011$ , the VDSIT. As such, the VDSIT does not appear to be a distressing task, even among the vulnerable population of self-harming individuals.

#### STUDY 5

Study 5 sought to replicate the VDSIT's discriminant validity and to investigate if the VDSIT could be effectively employed in a laboratory setting. To test this, participants were randomly assigned to receive negative or positive feedback on an essay,

they then completed the VDSIT, as well as self-report measures of current self-harm tendencies and aggressive tendencies and behaviors. We hypothesized that VDSIT scores would be greater among individuals who received negative, as opposed to positive, feedback and would positively correlate with these measures of self-harm and known risk factors for self-harming behaviors. Finally, we hypothesized that measures of physical aggression would be unassociated with VDSIT scores, as further evidence of the task's discriminant validity.

## METHODS

### PARTICIPANTS

Participants consisted of 197 adult undergraduates recruited from an introductory psychology subject pool (125 females; Age:  $M = 20.06$ ,  $SD = 4.65$ ) for a study on Cognitive Abilities. Participants' racial composition was 44.7% White, 18.3% Black, 19.3% Asian, and 17.8% Other. The ethnic composition of the sample was 13.7% Hispanic. Participants were compensated with course credit.

### MATERIALS

*Voodoo Doll Self-Injury Task (VDSIT)*. Study 5 employed an identical version of the VDSIT that was used in Studies 1, 2, and 4. The exception was that this task was not presented over the internet, instead it was displayed via E-Prime 2.0 stimulus presentation software on a laboratory PC. Instead of using a slider bar, participants simply typed in the number of pins they wished to insert into the doll.

*Sub-Types of Antisocial Behavior (STAB)*. The 32-item STAB is a measure of antisocial behavior, in which individuals report the frequency with which they perform acts of: physical aggression, social aggression, and rule-breaking (Burt & Donnellan, 2009). This measure served as a complimentary assessment of physical aggression that was more objective (i.e., behaviorally-based) than the BAQ.

## PROCEDURE

Participants completed this experiment in our laboratory. The experiment began with an in-person version of the social feedback task used in Studies 3 and 4. Participants hand-wrote an essay about an important moment in their life and then exchanged this essay with a fictitious partner. Based on random assignment, participants either received positive or negative feedback on their essay, as in Studies 3 and 4. After completing the essay task, participants completed the VDSIT, and a battery of questionnaires including the SIIM-S, BAQ, and the STAB.

## RESULTS AND DISCUSSION

### DESCRIPTIVE STATISTICS

A Kolmogorov-Smirnov test revealed that the distribution of number of pins did not meet the assumption of normality as the distribution was zero-inflated and positively skewed,  $k(197) = .35, p < .001$ . Age was positively associated with VDSIT scores,  $B = .03, \chi^2(1, 195) = 12.81, p < .001$ . Females' VDSIT scores were not different from males',  $B = -.13, \chi^2(1, 195) = 1.68, p = .196$ .

### ASSOCIATIONS WITH SELF-HARM TENDENCIES

As in Studies 2 and 4, VDSIT scores were positively associated with participants' self-reported motivations to currently engage in self-injury behaviors, as measured by the Self-Injury Intention Measure—State version,  $\alpha = .97; B = .22, \chi^2(1, 195) = 41.43, p < .001$ . Thus, the VDSIT again was able to accurately capture transient, state-level tendencies to self-harm.

### ASSOCIATIONS WITH PHYSICAL AGGRESSION

The BAQ's Physical Aggression subscale and STAB exhibited sufficient internal consistency, with the exception of the Anger, Hostility, and Verbal Aggression subscales of the BAQ, which

**TABLE 4. Partial Correlations Between VDSIT Scores and Aggression Measures from Study 5 (Controlling for Other Subscales of Each Measure), Alongside Internal Consistency Estimates**

	<i>B</i> (Poisson)	$\alpha$ (Cronbach)
BAQ-Anger	.02	.62
BAQ-Hostility	.31***	.65
BAQ-Physical Aggression	-.08*	.73
BAQ-Verbal Aggression	.09*	.57
STAB-Physical Aggression	-.17	.85
STAB-Rule Breaking	.55***	.87
STAB-Social Aggression	.43***	.71

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

were not of interest to this project. VDSIT scores were negatively- or un-associated with physically aggressive tendencies, as measured by the BAQ and STAB (Table 4). These null correlations provide additional evidence for the ability of the VDSIT to discriminate between self-harm and other-harm inclinations.

#### EFFECT OF ESSAY MANIPULATION

We removed 8 participants from analysis who indicated total disbelief of the essay feedback manipulation's deceptive elements at the end of the study. Replicating Studies 3 and 4, participants who received negative feedback on their essay stuck more pins in the doll than those who received positive feedback,  $B = .24$ ,  $\chi^2(1, 187) = 5.69$ ,  $p = .017$ . Thus, in a laboratory context, the VDSIT exhibits significant sensitivity to experimental inductions of social experiences intended to increase self-harm tendencies.

#### GENERAL DISCUSSION

In order to understand self-harm tendencies, and subsequently better identify and understand the factors that influence them, researchers need a diverse and valid measurement toolkit. Across five studies, we presented evidence that the VDSIT is likely to be a valuable addition to the self-harm researcher's toolkit. The VDSIT enables researchers to measure self-harm tendencies rap-

idly, validly, and ethically. The task can be administered in an online context (e.g., using participants' home computers or mobile phones) that prevents costly laboratory visits or on a computer in the laboratory for studies using these environments. As a behavioral measure, the VDSIT avoids self-report biases, allowing researchers to measure the tendency to self-harm across individuals who have and have not self-harmed. Additional experimental evidence showed that the VDSIT flexibly responds to experimental manipulations intended to increase self-harm tendencies, allowing for causal inferences. We have made this task freely available (<https://osf.io/7tp4g/>), to promote its use and further attempts at validation, replication, and modification.

What evidence is there that the VDSIT is a valid measure of self-harm tendencies? Three studies demonstrated that more pins were stuck in the task's self-doll among individuals with histories of actual self-harm. Across three studies, VDSIT scores positively correlated with self-report measures of participants' current and dispositional tendencies to self-harm.

However, demographic variables that are reliably linked to self-injury, namely age and gender, exhibited less than reliable associations with VDSIT scores. Females had lower VDSIT scores than males in three of the studies, and did not differ from males on two of them (although the effect estimates were negative in sign). This likely reflects the more extreme self-injury incurred by males (Andover et al., 2010), though null gender effects are often observed in other self-harm measure validation projects (e.g., Gratz, 2001). Age associations were negative in two studies, positive in two studies, and null in a fifth study. Restriction-of-range issues are a likely culprit behind this variability as our samples were mostly undergraduates who are often emerging adults.

Across four studies, experimental manipulations of critical social feedback and social rejection increased the number of pins individuals inserted into the VDSIT. The responsiveness of the VDSIT to experimental manipulations will allow for causal inferences to be made in a largely correlational and descriptive literature. Given that it was possible that VDSIT scores reflected a tendency to symbolically harm people and not just the self, it

was important to test whether the task captured the tendency to harm others. Establishing the discriminant validity of the VDSIT, two studies demonstrated that scores on this task were unassociated with trait and behavioral measures of physical aggression.

As with any vulnerable population, it is crucial to consider whether the VDSIT distresses people with or without histories of self-harm to an extent that would render the task unethical to administer. Supporting the ethical nature of the VDSIT, participants did not report an average level of negative affect during or after the VDSIT that exceeded an ambivalent level. This lack of distress was also observed among participants with a history of self-harming behaviors. As such, the VDSIT appears to avoid causing levels of distress to participants that might ethically compromise this task's utility. However, research with treatment-seeking and other clinical populations is necessary to determine if the VDSIT is truly not a problematically distressing activity for vulnerable populations.

#### LIMITATIONS AND FUTURE DIRECTIONS

Despite the converging evidence that these five studies supplied for the validity and utility of the VDSIT, the current research possessed several limitations. First, these studies used sub-clinical samples and not treatment-seeking or otherwise clinically-relevant samples. As such, the VDSIT may simply capture self-harm tendencies among sub-clinical populations and not extend to clinically-significant forms of self-harm behavior. Future research should validate the VDSIT with clinical populations of self-harming individuals, to assess any clinical or diagnostic utility this task may possess. That being said, it is crucial for self-harm research to identify individuals who are likely to self-harm before they actually do so. Across three studies, the VDSIT captured motivations to self-harm in the future, even among individuals who have yet to self-harm. As such, the VDSIT may be effective at identifying individuals who may self-harm in the future, but have yet to do so. However, doing so will entail unique challenges with introducing the task in a clinical setting (e.g., nondeceptive cover stories).

As a second limitation, the VDSIT inexorably produces a positively-skewed, nonnormal distribution of scores. This zero-inflation, even with a Poisson analytic approach, presents multiple psychometric and data analytic issues. A third limitation is that the task was mostly validated in online and computerized contexts and that this detached, virtual experience may not reflect the visceral and real experience of actual self-harm. Future research should use actual voodoo dolls and pins to replicate our findings, among other approaches to make the task simulate actual self-harm. Further, the task does not facilitate the easy visualization of where the pins are stuck into the doll, rendering it even more of a detached experience. Future versions of the task might seek to make the symbolic injury behaviors more immersive, perhaps through virtual reality.

Fourth, VDSIT scores correspond to multiple facets of self-harm-related constructs (e.g., histories of self-harm, trait and state tendencies to self-harm in the future). As such, it is difficult to parse which one of these constructs is measured by the VDSIT. There may be ways to alter the task to maximize its ability to measure one of these constructs and not the others. Finally, the stability of VDSIT scores across time is currently unknown. Future longitudinal work is needed to assess within-person variability in VDSIT scores and its predictive validity in such cross-temporal assessments.

## CONCLUSIONS

Self-harm is a dynamic and complex behavior that necessitates the use of a wide array of investigative tools. The current research presented evidence for the validity, ethicality, and utility of a new self-harm measure: the Voodoo Doll Self-Injury Task (VDSIT). By providing researchers with a simple, valid, flexible, rapid, and economical tool to measure self-harm tendencies, we hope to promote the understanding and reduction of self-harm.

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