Abstract Title Page

Title:
Psychometric Properties of VESIP, a Social Information Processing Simulation Assessment for Children

Authors and Affiliations:
Nicole Russo-Ponsaran[1]
Clark McKown[1]
Ashley Karls[1]
Everett Smith[2]
Jeremiah Folsom-Kovarik[3]

[1]Rush University Medical Center Department of Psychiatry & Behavioral Sciences
[2]University of Illinois at Chicago
[3]SoarTechnology, Inc.

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Background:

Daily interactions at school and at play require a range of key interpersonal skills. In particular, children's social information processing (SIP) skills, here defined as the ability to understand and reason through challenging social situations (Crick & Dodge, 1994, Crick & Dodge, 1996; Dodge & Schwartz, 1997), are critical for successfully navigating daily interactions.

There is increasing recognition that social-emotional learning (SEL) competencies, including SIP skills, influence a wide range of students' functional outcomes (Dusenbury, Yoder, Dermody, & Weissberg, 2019; Elias, 2019; Johnson, Simon, & Mun, 2014; Taylor, Oberle, Durlak, & Weissberg, 2017). While advances in SEL standards and interventions have been made, there are few tools to assess SEL competencies in the classroom. To address this gap, we developed Virtual Environment for Social Information Processing (VESIP™), a web-based virtual simulation through which children view and engage in challenging situations (Russo-Ponsaran et al., 2018).

Purpose:

The purpose of this study was to report the psychometric properties of VESIP in general education students in 3rd-7th grades. We assessed VESIP's internal consistency reliability, factor structure, and evidence of criterion-related validity.

Setting and participants:

Participants in the field trial (n = 1,321) and validation study (n = 334) were recruited during 2015-2016 from three suburban school districts near Chicago, Illinois. These school districts offer a demographically diverse population and have SEL curricula in place. Participants in the norming study were recruited during 2017-2018 from three states (n = 1,081).

Assessment description:

Wearing headphones and working individually on their own computers, children can complete VESIP (approx. 30 minutes). VESIP assesses children's SIP skills by measuring problem identification, solution preference, goal preference, emotional response, evaluation of hostile intent, and self-efficacy. Children create an avatar, personalizing hair style/color, face shape, and wardrobe (administrators preset age, gender, and ethnicity). They navigate 10 social situations (e.g., bullying, friendship initiation) within a virtual school environment and answer questions through interactions with a simulated peer. Children select preferred items that are incorporated into five situations.

Research design:

VESIP was administered by school staff as part of a psychometric field trial, an add-on validation study, and a national norming study. For the add-on study, teacher rating scales were collected and research staff administered validation measures individually to consented students. To reduce bias, VESIP allows for personalization of the self-avatar according to various demographic features (e.g., girl vs. boy, multiple race options, and age). Measurement equivalence analyses were also completed to evaluate potential bias.

Data collection/analysis:

We received a waiver of informed consent from the university IRB. Partner districts administered VESIP for free for program evaluation purposes, and we obtained de-identified data. For the add-on component, the WASI-II and subsets of the SIP-AP and AIMSweb were

administered. Teachers completed the SSBS-2 and the TOPS Short Form. A subset of teachers also completed the SSIS. Schools with linked peer nomination data shared those data for consented 3rd – 5th graders. A subset of children completed VESIP twice at a two-week interval, permitting an estimate of temporal stability. Data analysis methods are integrated into the summary of Findings below.

Findings:

Reliability. VESIP produces domain scores, derived from average scores across a single question type, and composite scores, which combine domain scores according to the three-factor structure described below. Internal consistency reliabilities (Cronbach's α) from the norming dataset were .87 for the "Social Information Processing" (SIP) composite and .83 for the "Emotion Processing" (EP) composite, whereas they were .80 and .84, respectively, from the field trial dataset. Reliabilities of domain scores ranged from .60 to .79 and averaged .74 and .70 in the two datasets, respectively.

Factor structure. Data from the field trial fit a three-factor solution (CFI = .95, RMSEA = .082). The first factor, SIP, includes problem identification, goal preference, and solution preference. The second factor, EP, includes emotion response and degree of hostile intent. The third factor includes Self-Efficacy. The factor structure was replicated in the norming dataset and fit the observed scores well (CFI = .94, RMSEA = .095). A series of uni- and multidimensional Rasch models were estimated and compared for relative fit, with the multidimensional partial credit model providing the best combination of fit and generalizability, lending additional support to the CFA findings.

Criterion-related validity. The SIP composite was significantly associated with five out of six SIP-AP (e.g., aggressive goal: $\beta = -.28$; no-prosocial goal: $\beta = -.24$; and aggressive solution: $\beta = -.27$). The SIP composite was also associated with the SSBS-2 social competence score ($\beta = .12$). The EP composite was significantly associated with all SIP-AP scores, particularly self-reported anger ($\beta = -.42$) and hostile attribution ($\beta = -.31$). Sociometric least-liked status was significantly predicted by VESIP's SIP composite ($\beta = –.17$, $p < .05$), solution preference ($\beta = –.14$, $p < .05$), and problem identification ($\beta = –.14$, $p < .05$) scores. Self-efficacy significantly predicted least-liked status ($\beta = –.20$, $p < .01$) and social preference scores ($\beta = .19$, $p < .01$). From the norming study, SIP and EP composite scores predicted teacher-rated academic competencies on the SSIS ($\beta = .14$ and .12, both $p < .05$).

Measurement equivalence. Measurement equivalence analyses were based on the three-factor confirmatory model. Preliminary analyses suggest that VESIP demonstrates configural, metric, and partial scalar invariance across ethnicity and sex.

Test-retest data. A sample of 63 students (grades 3-7) from the large scale field trial completed VESIP at two time points, separated by approximately two weeks. Those data supported no significant difference in response patterns (paired samples t-tests, $.061 \leq p \leq .882$) and highly correlated composite responses ($r_{SIP} = .64$ and $r_{EP} = .74$, both $p \leq .001$).

Conclusions:

VESIP is a feasible SIP assessment for universal classroom administration to 3rd -7th graders, is technically sound, and closely approximates the experience of challenging social situations. While interpretation of domain scores should be undertaken with caution, practitioners may be able to use composite scores to understand individual student skill levels. While VESIP performance was associated with some teacher-reported behavior and peer acceptance, associations were inconsistent. Thus further exploration is warranted.

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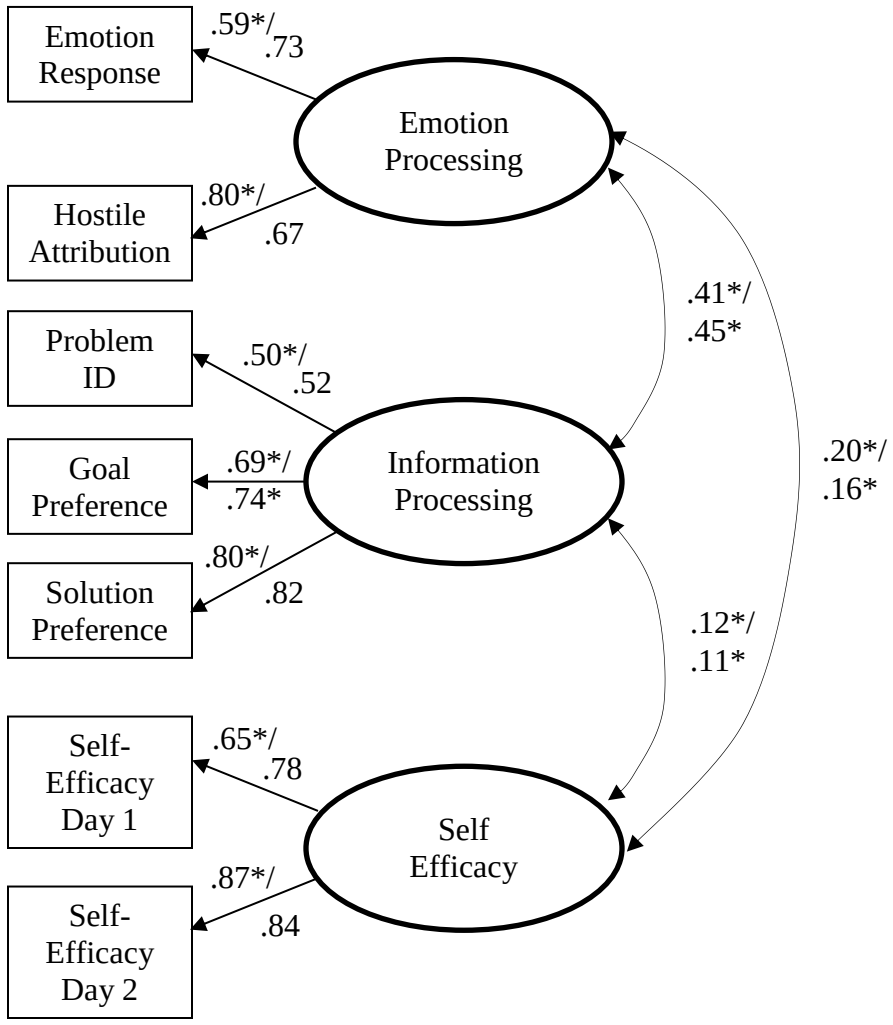
Table 1

Reliability and average scores of VESIP

	Field Trial (n=1321, 691 male)		Norming Study (n=1081, 573 male)	
VESIP domains (score ranges)	α	*M (SD)*	α	*M (SD)*
Solution preference (0-2)	0.71	1.60 (.30)	0.79	1.51 (.37)
Problem identification (0-2)	0.60	1.54 (.26)	0.62	1.46 (.29)
Goal preference (0-3)	0.75	2.01 (.66)	0.77	1.79 (.73)
Emotion encoding (0-3)	0.69	2.16 (.43)	0.75	2.13 (.50)
Degree of hostile intent (0-5)	0.71	3.14 (.81)	0.75	3.10 (.88)
Self-efficacy (0-5)	0.73	3.95 (.74)	0.77	3.94 (.80)
Social information processing composite	0.80		0.87	
Emotion processing composite	0.84		0.83	

Figure 1. Sample screenshot from scenario assessing the response to children laughing in child's direction

Figure 2. Confirmatory factor analyses



Notes Figures before the / are from the field trial; after the / are from the norming study.
IFI = .95/.94 ; CFI = .95/.94 ; RMSEA = .082/.095