

Abstract Title Page

Title:

A Web-Based System for Measuring Social Emotional Skills in Kindergarten to Third Grade

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Abstract Body

Background and Purpose

Despite increasing consensus that social-emotional learning, or SEL, is an important contributor to success in school and life, few tools are available for educators to assess SEL skill and to use assessment results to inform educational practice. In particular, there are no scalable, feasible, usable, and scientifically sound assessment systems that measure social-emotional comprehension, which includes mental processes enlisted to encode, interpret and reason about social and emotional information. Social-emotional comprehension includes the abilities to infer others emotions from nonverbal cues, to take others' perspectives, to solve social problems, and to enlist cognitive strategies involved in self-control. Well developed social-emotional comprehension is associated with success in school and life (McKown, Allen, Russo-Ponsaran, & Johnson, 2013; McKown, Russo-Ponsaran, Johnson, Russo, & Allen, 2015; McKown, Russo-Ponsaran, Allen, Johnson, & Warren-Khot, 2015).

To address this need, with support from the Institute of Education Sciences, we developed SELweb, a web-based assessment system for students in Kindergarten through third grade that is designed to assess four dimensions of social-emotional comprehension (Lipton and Nowicki, 2009), including emotion recognition or "Social Awareness" (Nowicki & Duke, 1994), social perspective-taking or "Social Meaning" (Happé, 1994; Wellman & Liu, 2004). Social problem-solving or "Social Reasoning" (Bauminger, Edelsztein, & Morash, 2005; Crick & Dodge, 1994), and "Self-Control," or mental processes involved in delaying gratification and controlling emotions to achieve a goal (Duckworth, 2011).

We present a summary of evidence from three studies of the psychometric properties of SELweb. In addition, we provide an interactive electronic demonstration of SELweb describing features that facilitate its broad use in education settings.

Methods

Setting and participants. This research took place during three academic school years and includes an ethnically and socioeconomically diverse sample of 8,881 children from kindergarten through third grades.

Assessment description. SELweb is a web-based system to assess social-emotional comprehension in kindergarten through third grade, designed to maximize usability in schools. Throughout the research project, education partners' input was sought and integrated into assessment procedures, and the design of assessment report output. From the first field trial, assessment results were shared with education partners to use to understand their students and programs.

For the social awareness module, children viewed digitized photographs of faces and clicked to indicate whether the face reflected happy, sad, angry, scared, or just okay. Item scoring for all SELweb modules is described in Table 1.

For the social meaning module, we created 12 illustrated and narrated vignettes in which a character is disappointed, scared, sarcastic, lying, hiding feelings, or harboring a false belief. After each story, children were asked a question whose correct answer required accurate inferences about the story character's mental state.

For the social reasoning module, we created five illustrated and narrated vignettes involving ambiguous provocation and five involving peer entry. After each vignette, children selected: (a) a description of the problem, (b) a social goal, and (c) solution preference. To

reduce respondent fatigue, we created five test forms with six vignettes each. Each form included three ambiguous provocation vignettes and three peer entry vignettes. Each vignette was included on three forms.

To assess self-control, we developed a choice-delay task (Kuntsi, Stevenson, Oosterlaan, & Sonuga-Barke, 2001) and a frustration-tolerance task (Bitsakou, Antrop, Wiersema, & Sonuga-Barke, 2006).

Research Design

This research included three psychometric field trials. In two field trials SELweb and validation measures were concurrently administered. In all field trials, a subset of children completed SELweb twice during the school year, permitting an estimate of temporal stability.

All students in kindergarten through third grade completed SELweb and the University's IRB granted a waiver of informed consent for the research team to use de-identified SELweb and academic data. School personnel administered SELweb in one or two group sessions.

SELweb data that were reasonably interpretable were shared with education partners for use in understanding their students and guiding instruction.

Findings / Results

Across the three studies, SELweb's composite score reliabilities averaged .85 and six-month temporal stabilities averaged .65. In all three field trials, scores on the assessment modules fit a hypothesized four-factor model of Social-Emotional Comprehension.

Overall performance on SELweb was positively associated with teacher reported social skill, peer acceptance, and academic competence, and negatively associated with teacher reported problem behavior. Standardized regression coefficients reflecting the association between SELweb performance and criterion measures averaged .31 (range = .21 to .46)

Using data from the first two field trials, we tested convergent and discriminant validity with nested structural equation models that imposed equality constraints testing model fit with convergent and discriminant paths omitted. "Convergent" paths—or paths from SELweb latent variables to latent variables of the same hypothesized construct using alternate measures—were moderate to large and significant. In addition, when each convergent path was constrained to zero, it significantly reduced model fit. Discriminant paths—or paths from SELweb latent variables to latent variables of different hypothesized SEL constructs—were small and non-significant. When discriminant paths were constrained to zero, model fit was not significantly changed. See Figure 1 for a summary.

Conclusions

Three studies provided evidence that: (a) composite assessment scores exhibited high reliability, (b) together, assessment modules demonstrated a theoretically coherent factor structure, (c) factor scores demonstrated convergent and discriminant validity, and (d) a score reflecting overall SELweb performance demonstrated good evidence of criterion-related validity. In addition, SELweb is highly usable, easily scalable, and feasibly administered in school settings. Educators find SELweb informative, and further work is needed to ensure that SELweb assessment findings guide educators to use evidence-based instructional practices.

Demonstration

The widespread use and increasing appetite for SELweb stems as much or more from its design features as from its psychometric properties. Alongside a traditional research poster presenting empirical findings, we will host an interactive display highlighting design features

that facilitated SELweb's broad adoption and enthusiastic reception among education partners, including: (a) ease of use; (b) self-administering features such as voice-over and illustration; and (c) automated score reporting. Those who come to the poster will be able to sample from these features using headphones and a laptop computer. See Figure 2.

Appendices

Appendix A. References

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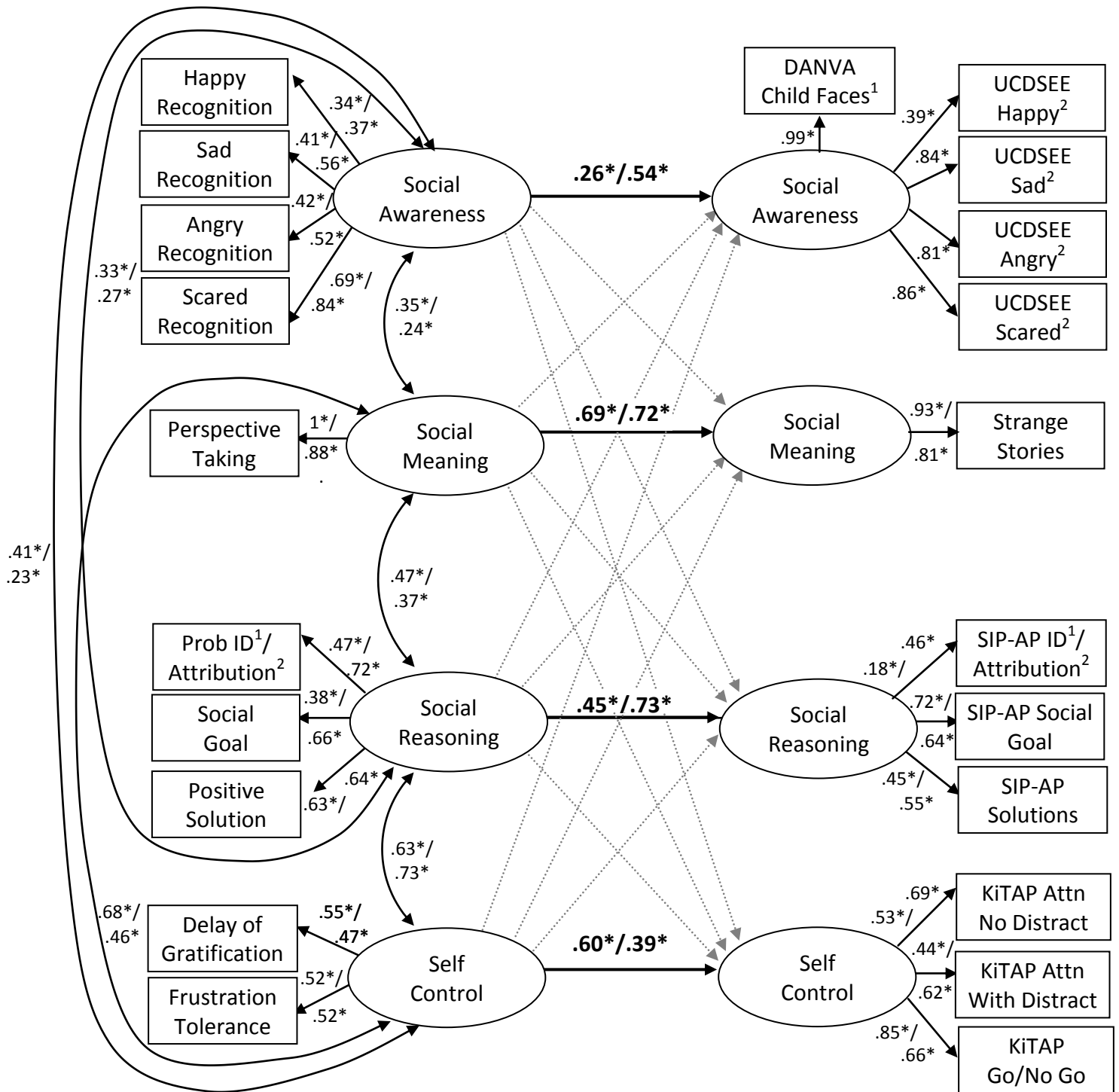
Appendix B. Tables and Figures

Table 1

Description of SELweb modules, questions, and item scoring

Module	Stimulus	Question and Response Options	Item Score
Social Awareness	Respondents view individual child faces and indicate emotion expressed.	What is the child feeling? Happy, Sad, Angry, Scared, Just OK	2 Correctly recognizes emotion; 1 Mistakes emotion for neutral; 0 Selects incorrect emotion
Social Meaning	Respondents hear illustrated, narrated vignette and must infer the mental state of a character. Example: A boy has a false belief about the location of a soccer ball and looks in the wrong place.	Questions about character intention (e.g., “Why did the boy look in the basket?”) Illustrated, narrated forced choice, four possible responses.	2 Correct mental state inference (e.g. “He <i>thinks</i> it is in the basket.”) 1 Correct answer, no mental state inference (e.g. “He looks in the basket.”) 0 Incorrect answer (e.g. “His brother told him to look there.”)
Social Reasoning	Respondents hear illustrated, narrated vignettes involving either ambiguous provocation (e.g. getting bumped into by a classmate) or peer entry (e.g. trying to join an ongoing game of basketball).	Problem Identification (Study 1) What is the problem? Illustrated, narrated forced choice (e.g. “There is no problem”; “Someone bumped you”; “You feel bad”; “Someone bumped you & you feel bad”) Attribution (Study 2) Did the person do it to be mean? Yes or no; if yes, a little or a lot? Goal Preference How do you want it to turn out? Narrated forced choice with positive (e.g. “Become friends”) or retribution (e.g. “Get back at them.”) options Solution Preference What would you do? Illustrated, narrated forced choice, four response types (e.g. “Hit or yell at him.”; “Ask the teacher for help.”; “Talk to him.”; and “Walk away.”)	2 Descriptive (e.g. “Someone bumped into you.”) 1 Resilient (e.g. “There is no problem”) 0 Reactive (e.g. “Someone bumped into you & you feel bad.”) 2 “no” 1 “yes” and “a little” 0 “yes” and “a lot” Study 1 1 Positive goal; 0 Negative goal; Study 2 2 Positive goal; 1 Retribution goal; 0 Revenge goal 2 Competent assertive (e.g. “Talk to him.”); 1 Self-advocacy (e.g. “Ask the teacher for help”) and ignoring (e.g. “Walk away.”); 0 Aggressive (e.g. “Hit him.”)
Self-Control: Choice Delay Task	Children send illustrated rocket ships to space. One is fast. One is slower. One is very slow.	Children are told to get as many points as possible in ten trials.	3 Slowest rocket; 2 Medium rocket; 3 Fast rocket
Self-Control: Frustration Tolerance	Children view pairs of shapes and indicate whether they match. Several items are programmed to get “stuck.”	Children click on a “√” if the shapes are the same and an “X” if they are different. Children do as many items as possible in 90 sec.	1 Correct response; 0 Incorrect response

Figure 1 Convergent and discriminant validity



IFI = .90/.93

RMSEA = .054/.047 (90% CI = .040 - .068/.036 - .058)

Note: * $p < .05$; coefficients are standardized. Coefficients before “/” are from Study 1; those after “/” are from Study 2. For simplicity of presentation, not all modeled covariates, errors and covariances are represented; ¹Study 1 only; ²Study 2 only; DANVA = Diagnostic Analysis of Nonverbal Accuracy; UCDSEE = U.C. Davis Set of Emotion Expressions; SIP-AP = Social Information Processing Application; KiTAP = Test of Attentional Performance for Children.

Figure 2 Sample interaction demonstration screen shots

