Published in final edited form as:

Psychiatry Res. 2017 February ; 248: 40–47. doi:10.1016/j.psychres.2016.11.004.

SOCIAL AND EMOTIONAL INFORMATION PROCESSING IN ADULTS: DEVELOPMENT AND PSYCHOMETRICS OF A COMPUTERIZED VIDEO ASSESSMENT IN HEALTHY CONTROLS AND AGGRESSIVE INDIVIDUALS

Emil F. Coccaro, M.D., Jennifer R. Fanning, Ph.D., Eliana Fischer, M.A., Laurel Couture, M.S.W., and Royce J. Lee, M.D.

Department of Psychiatry and Behavioral Neuroscience University of Chicago

Abstract

A computerized version of an assessment of Social-Emotional Information Processing (SEIP) using audio-video film stimuli instead of written narrative vignettes was developed for use in adult participants. This task allows for an assessment of encoding of relevant/irrelevant social-emotional information, attribution bias, and endorsement of appropriate, physically aggressive, and relationally aggressive responses to aversive social-emotional stimuli. The psychometric properties of this Video-SEIP (V-SEIP) assessment were examined in 75 healthy controls (HC) and in 75 individuals with DSM-5 Intermittent Explosive Disorder (IED) and were also compared with the original questionnaire (SEIP-Q) version of the task (HC=26; IED=26). Internal consistency, inter-rater reliability, and test-retest properties of the V-SEIP were good to excellent. In addition, IED participants displayed reduced encoding of relevant information from the film clips, elevated hostile attribution bias, elevated negative emotional response, and elevated endorsement of physically aggressive and relationally aggressive responses to the ambiguous social-emotional stimuli presented in the V-SEIP. These data indicate that the V-SEIP represents a valid and comprehensive alternative to the paper-and-pencil assessment of social-emotional information processing biases in adults.

Keywords

social emotional information processing; aggression; hostile attribution

1. Introduction

Human aggression is a complex, multi-determined, behavior influenced by a variety of factors including neurobiological and psychological processes (Coccaro et al., 2015). Neurobiological processes include an imbalance in central neurotransmitter systems between those that inhibit (e.g., serotonin) or those that facilitate (e.g., vasopressin) aggressive

behavior. Together these systems regulate the threshold for an individual to respond aggressively given sufficient provocation.

Naturally, there is inter-individual variability in this threshold due to a number of factors. That said, a “low threshold” to respond aggressively to threat is relatively stable over time in aggressive individuals (Olweus, 1979). For example, with the exception in modest changes associated with seasonal variation, central serotonin function varies little over time and assessments of central serotonin tend to be highly correlated over time. The actual enactment of aggressive behavior, particularly impulsive aggressive behavior, is likely due to the interaction of a low threshold to respond aggressively and perceived threat in the immediate environment. Of course, perceived threat across individuals is highly variable with some individuals being more sensitive to threat compared with others. Over the past few decades, work in developmental psychology has identified a number of socially relevant cognitive processes with great relevance to the enactment of aggressive behavior, particularly impulsive aggressive behavior (Dodge, 1986). These processes are incorporated in what is termed social information processing. These constructs fit into a theory of aggression that posits that cognitive processes such as attribution of others’ intentions and response evaluation of possible response options influence whether an individual will behave aggressively in a given situation (Dodge and Coie, 1987). Over the years, this model has been elaborated (Crick and Dodge, 1996) as having several steps: first, an individual encodes situational cues including cues involving others’ cognitive and emotional states; second, cues are interpreted and attributions made about another person’s intent in a social interaction; third, goals regarding the possible outcome of the interaction are considered as are potential responses to the situation are generated; fourth, a decision-making process takes place involving response valuation, outcome expectations, and evaluations of self-efficacy in carrying out a response.

Finally, a response is chosen and enacted. More recently, the role of emotion has been incorporated into this model (Lemerise and Arsenio, 2000) and it is now referred to as a social-emotional information processing (SEIP) model. This addition reflects what we know about the role of negative affect in aggressive behavior (Berkowitz, 1990; Verona et al., 2002), as well as evidence that aggressive individuals have more trait anger (McCloskey et al., 2006), emotional lability (Fettich et al., 2014), and greater physiological reactivity (Patrick, 2008).

Social information processing theory was developed in order to understand how these social cognitive processes develop and lead to aggression so that they can inform interventions aimed at reducing aggressive behavior (Dodge, 2006). Overall, empirical studies in these populations show the most support for hostile attributional bias in aggressive (particularly impulsive aggressive) children and adolescents (Crick and Dodge, 1996; Dodge and Coie, 1987; Crick and Werner, 1998; Werner and Nixon, 2005). Aggressive children interpret the behavior of others as more hostile (Dodge and Coie, 1987; Milich and Dodge, 1984), evaluate aggressive responses to social interaction, especially when ambiguous in nature, more favorably (Asarnow and Callan, 1985), expect more favorable outcomes for aggressive behavior (Crick and Dodge, 1989; Perry et al., 1986), and have greater self-efficacy for

carrying out aggressive behavior (and lower self-efficacy for inhibiting aggressive behavior; Crick and Dodge, 1989) compared to their non-aggressive peers.

While studies show that aggressive adults also exhibit cognitive and emotional biases (Eckhardt and Cohen, 1997), relatively little research has been conducted in adults within the framework of a social-emotional information processing model. Those that do find that angry and aggressive adults: a) display attentional bias toward aggression-themed words (even when irrelevant to the assigned task) in dot-probe and emotional Stroop tasks (Cohen et al., 1998; Honk et al., 2001; Smith and Waterman, 2003); b) tend to expect aggressive outcomes to ambiguous social interactions; and c) tend to interpret others' ambiguous (and even neutral) behavior as aggressive (Dill et al., 1997).

In order to better understand SEIP biases in adults with problematic aggression, Coccaro and colleagues have developed a series of assessment tools for studying SEIP in adults. The first of these measures was a vignette-based self-report questionnaire which queried adult participants about attributions and emotional responses to ambiguously aggressive social encounters (the Social Information Processing Attribution and Emotional Response Questionnaire; SIPAEQ; (Coccaro et al., 2009). Initial validation of this instrument was conducted in two samples of 923 and 461 community adults and found that its subscales: a) had adequate to good internal consistency, with the highest alphas for hostile attribution and negative emotional responding; b) good test-retest reliability; and, c) data supporting the convergent, construct, and discriminant validity of the assessment. Next, our group expanded their assessment to include response evaluation and decision variables. This work also found good to excellent psychometric properties as well as data to support the overall reliability and validity of what is now referred to as the SEIP-Q (Social-Emotional Information Processing Questionnaire; SEIP-Q; Coccaro et al., 2016). The SEIP-Q assesses all of the social information processing stages proposed by Crick and Dodge (1996) with the exception of the encoding of relevant social cues. This stage would be challenging to assess within the multiple choice format of the questionnaire. Most recently, we placed the SEIP-Q on a computer platform with the SEIP-Q vignettes presented as audio-visual clips and the content portrayed by actors. This format makes it more engaging for the subject, makes the instrument more accessible to subjects who may have limited reading ability, which may in turn reduce bias in the results (Chan and Schmitt, 1997). Furthermore, an open-ended response format for allows us to assess the encoding phase of SEIP (Chan and Schmitt, 1997).

2. Study I: development of the V-SEIP and comparison with the SEIPQ.

This paper reports on two related studies. Study I involved instrument development of the V-SEIP and a comparison with the original questionnaire version of this assessment (SEIP-Q; Coccaro et al., 2016) in healthy control participants (HC; n=26) and participants meeting DSM-5 criteria for intermittent explosive disorder (IED; n=26). Study II examined the psychometric characteristics and group differences of the V-SEIP in an expanded group of 150 participants (75 HC and 75 IED).

2.1. Study I methods

2.1.1. Participants.—Overall, one-hundred-fifty adult participants completed data for this study. All were medically healthy by medical history and were systematically evaluated in regard to aggressive and other behaviors as part of a larger program designed to study the biological and phenomenological correlates of aggression and other personality-related behaviors. Participants were recruited from public service announcements and newspaper advertisements seeking out individuals who did and who did not consider themselves to have difficulty due to behavioral conditions and were willing to participate in studies of personality. All participants gave informed consent and signed the informed consent document approved by the local Committee for the Protection of Human Subjects (IRB).

2.1.2. Diagnostic assessment.—Syndromal and personality disorder diagnoses were made according to DSM-V criteria (American Psychiatric Association, 2013). Diagnoses were made using information from: (a) the Structured Clinical Interview for DSM Diagnoses (SCID-I; First et al., 1997) for syndromal disorders and the Structured Interview for the Diagnosis of DSM Personality Disorder (Pfohl et al., 1997) for personality disorders; (b) clinical interview by a research psychiatrist; and (c) review of all other available clinical data. The research diagnostic interviews were conducted by individuals with a masters, or doctorate, degree in Clinical Psychology. All diagnostic raters went through a rigorous training program that included lectures on DSM diagnoses and rating systems, videos of expert raters conducting SCID/SIDP interviews, and practice interviews and ratings until the rater were deemed reliable with the trainer. This process resulted in good to excellent inter-rater reliabilities (mean kappa of 0.84+0.05; range: 0.79–0.93) across mood, anxiety, substance use, impulse control, and personality disorders. Final diagnoses were assigned by team best-estimate consensus procedures involving research psychiatrists and clinical psychologists as previously described (Coccaro et al., 2012). Participants with a life history of bipolar disorder, schizophrenia (or other psychotic disorder), or mental retardation were excluded from this study as were potential participants with a current alcohol or other drug use disorder. Comorbid diagnoses for the IED participants in Study I and Study II are displayed in Table 1. For IED participants, most (80%) reported: a) a history of formal psychiatric evaluation and/or treatment (57%) or, b) a history of behavioral disturbance during which the participant, or others, thought they should have sought mental health services but did not (21%).

2.1.3. Study I: development of the V-SEIP and comparison with the SEIP-Q.—The purpose of Study I was, first, to adapt the SEIP-Q assessment to a computer-based assessment using audiovisual clips instead of written narrative vignettes and, second, to compare the two forms of this assessment on their primary outcome variables in fifty-two participants (HC=26; IED=26).

2.1.4. Composition and production of SEIP videos.—The V-SEIP was adapted from the original questionnaire (SEIPAEQ; Coccaro et al., 2009). Sixteen audio-video clips based on eight vignettes (one for each gender) were produced and filmed. A professional director and group of professional actors were contracted to produce the audio-video clips. The clips were scripted to follow the story-line of the written vignettes from the original

SEIP-AEQ questionnaire developed specifically for adult participants (Coccaro et al., 2009). Each video clip presented a socially ambiguous situation in which an aversive action by “Actor A” is directed at the person the participant is asked to identify with (“Actor B”). The video clips depicted aversive actions in two categories: a) overt aggression (e.g., being “hit”) and b) relational aggression (e.g., being “excluded” in a social situation). For each vignette the aversive action was revealed in the last two seconds of the video clip. The video clips were edited by the director and first author (EFC) so that the duration of each clip was between 10 and 15 seconds. The video clips were then placed on an EPrime platform in random order with the following constraints: a) four video clips focused on male actors and four focused on female actors; and b) four video clips focused on physically aggressive interactions and four focused on relationally aggressive interactions. After viewing each video clip, participants were asked to speak into a microphone to digitally record (without time limit) their verbal summary of the action in the video clip. This audio file was later reviewed by two independent masters-level assessors (EF and LC) to count the number of elements the participant identified which were relevant (an element that appeared in the video) and irrelevant (an element that did not appear in the video) to the action in each video clip. Afterwards, participants were prompted to answer six (6) questions. Two questions related to “Hostile Attribution” (e.g., “How likely is it that Actor A committed the action to Actor B to physically or emotionally hurt Actor B” and “How likely is it that Actor A committed the action to Actor B to make Actor B look bad to others”). Two other questions related to “Benign Attribution” (e.g., “How likely is it that Actor A committed the action to Actor B by accident”) and to “Instrumental Attribution” (e.g., “How likely is it that Actor A committed the action to Actor B to get something Actor A wanted”). The last two questions related to “Negative Emotional Response” (e.g., “If what happened to Actor B happened to you, how angry would you be?” and “If what happened to Actor B happened to you, how upset would you be?”). This was then followed by three brief video clips in which Actor B responds to Actor A in: 1) a socially appropriate fashion; b) a direct (physically) aggressive fashion; and c) in a relationally aggressive fashion. After each response video clip the participant was asked seven (7) Likert-style questions related to the favorable or non-favorable endorsement of each response (e.g., “How likely is it you would respond this way?”).

2.1.5. Protocol for study I.—Participants came in for two visits. The first visit was a screening/eligibility visit during which time participants who met inclusion criteria went on to complete either the V-SEIP or the SEIP-Q, by random assignment. During the second visit, participants completed the other assessment. In addition to the SEIP-Q, participants also completed a series of questionnaire assessments related to aggression and automatic thoughts (both hostile and non-hostile in nature). These data, along with data from other participants, are reported on and discussed in Study II.

2.1.6. Statistical analysis.—Study I was performed to compare the nature of scores on the SEIPQ with those on the V-SEIP assessments. Thus, the primary analysis was Pearson correlation comparing each common outcome variable on the SEIP-Q with that of the V-SEIP assessment. Since the SEIP-Q, unlike the V-SEIP, cannot assess the encoding of social cues displayed in the written vignettes, the encoding variable was not included in this

analysis. Response evaluation and decision (RED) variables were calculated separately for each of three response scenarios: the socially appropriate response, the overtly aggressive response, and the relationally aggressive response. These variables were first examined as an overall RED variable for each response scenario and then as the four separate components that made up the overall RED variable. For ease of presentation, the aggressive RED variable was first examined as the average of the scores obtained from the overtly aggressive and the relationally aggressive response options before examining each separately. A sample of 52 participants had 80% power to detect medium-sized correlations ($r=0.37$) and 98% power to detect large correlations ($r=0.50$) at an $\alpha=0.05$ between the two assessments. We expected to see large correlations between SEIP-Q and V-SEIP variables.

2.2. Study I results: comparison of the V-SEIP with the SEIP-Q

Correlations of V-SEIP and SEIP-Q variables in Study I participants were all statistically significant. For the attribution variables, V-SEIP and SEIP-Q correlations were: $r=0.56$ ($p < 0.001$) for hostile attribution, $r=0.34$ ($p=0.012$) for instrumental attribution, and $r=0.65$ ($p < 0.001$) for benign attribution. For negative emotional response, the VSEIP and SEIP-Q correlation was $r=0.79$ ($p < 0.001$). For the overall RED variables, the correlations were $r=0.49$, $p < 0.001$ for the socially appropriate response option and $r=0.81$ ($p < 0.001$) for the combined aggressive response options; comparative correlations for overtly ($r=0.82$, $p < 0.001$), and relationally ($r=0.69$, $p < 0.001$), aggressive responses were similar and did not differ from each other.

3. Study II: V-SEIP psychometric properties and between group comparisons.

3.1. Study II methods.

3.1.1. Participants.—In addition to the V-SEIP data collected in Study I, an additional 98 study participants (HC=49; IED=49) completed Study II for a total of 150 (75 HC and 75 IED) participants.

3.1.2. Protocol.—For Study II, participants came in for two ($n=72$) or three ($n=26$) study visits. The first visit was a screening/eligibility visit during which time participants completed the V-SEIP and a series of questionnaire assessments related to aggression and social cognition (automatic thoughts of both a positive and hostile nature). Twenty-six participants (HC=13; IED=13) came in an additional time to repeat the V-SEIP for the assessment of test-retest reliability of the V-SEIP variables.

3.1.3. Measures of aggression—Aggression was assessed with the Aggression score from the Life History of Aggression (LHA) assessment and with the total scores from the Physical and Verbal Assault subscales of the Buss Perry Aggression Questionnaire (BPAQ). The LHA assesses history of actual aggressive behavior and BPAQ assesses aggressive tendencies as a personality trait. LHA and BPAQ scores were highly correlated ($r=0.71$, $p < 0.001$) and, accordingly, a Composite Aggression score was calculated by taking the average of the z-scores for the LHA and BPAQ.

3.1.4. Measures of hostile and positive social cognition—Hostile social cognition was assessed with the Hostile Automatic Thought questionnaire (HAT). The HAT (Snyder et al., 1997) is a 30-item self-report instrument designed to measure hostile thoughts and tendencies (e.g., physical aggression, derogation, and revenge). Modeled after a measurement of automatic thoughts associated with depression (Hollon and Kendall, 1980), the HAT requires the participant to estimate the frequency of various hostile self-statements over the previous week. The HAT has good internal reliability ($\alpha > 0.90$) and correlates strongly with indices of aggression. Positive social cognition was assessed with the 30-item Positive Automatic Thought questionnaire (PAT; Ingram and Wisnicki 1988). Modeled on similar automatic thought assessments, the PAT requires the subject to estimate the frequency of various positive cognitions regarding daily functioning, self-evaluation, evaluation of self by others and future expectations over the previous week. The PAT has good internal reliability ($\alpha > 0.90$) and correlates inversely and moderately with measures of negative affect and distress.

3.1.5. Statistical analysis.—Study II, which included participants from Study I, was performed to determine the: a) the psychometric characteristics of the V-SEIP, including internal consistency, inter-rater reliability of the encoding variables, and test-retest reliability; b) relationships with relevant external criteria (i.e., aggression, hostile automatic thoughts, positive automatic thoughts) and variables thought to be orthogonal to SEIP concepts (i.e., extraversion); c) relationships among the V-SEIP variables; and d) group differences between non-aggressive healthy control adult participants and impulsive aggressive adult participants meeting DSM-5 criteria for intermittent explosive disorder (IED). These aims utilized Cronbach α and Pearson r procedures as well as ANOVA and MANOVA. Encoding variables expressed the number of relevant and irrelevant cues recalled from the video vignettes. Response evaluation and decision (RED) variables were handled in the same manner as described above. This sample of 150 participants had 80% power to detect small to medium-sized correlations ($r=0.23$) and medium-sized differences ($d=0.25$) at a two-tailed alpha level of 0.05. We expected to see at least small to medium-sized effects in this part of the study.

3.2. Study II results

3.2.1. Subjects.—Table 1 (left-hand column) displays the diagnostic characteristics of the IED participants and Table 2 displays the demographic and behavioral characteristics of the two study groups for Study II. The groups did not differ significantly in demographic characteristics, though they differ significantly in regard to aggression and hostile and positive automatic thoughts. Because adding demographic characteristics to the statistical models did not change the outcome of any of analysis, reported results are from analyses using raw V-SEIP data.

3.2.2. Psychometric properties of the V-SEIP: encoding.—For technical reasons (e.g., corruption of the digital audio file, incomprehensible audio recording) audio recordings were available in 133 of the 150 (88.7%) participants. Inter-rater reliability coefficients for the encoding (i.e., identification) of relevant and irrelevant items were $r=0.95$ ($p < 0.001$) and $r=0.71$ ($p < 0.001$), respectively. Alpha coefficients for the internal

consistency of these variables were 0.86 and 0.85, respectively. Test-retest reliability coefficients for the encoding of relevant cues ($r=0.95$, $p < 0.001$) and irrelevant cues ($r=0.73$, $p < 0.001$) were statistically significant.

3.2.3. Psychometric properties of the V-SEIP: attribution and emotional response variables.—Alpha coefficients for hostile attribution was nearly excellent ($\alpha=0.87$). In contrast, alpha coefficients were less than acceptable for instrumental ($\alpha=0.51$) and benign ($\alpha=0.42$) attribution. The test-retest reliability coefficients were large for hostile ($r=0.68$, $p < 0.001$) and instrumental ($r=0.77$, $p < 0.001$) attribution and were less so for benign attribution ($r=0.50$, $p < 0.01$). The alpha coefficient for negative emotional response was nearly excellent ($\alpha=0.88$) and its test-retest reliability coefficient was as large as that for hostile attribution ($r=0.68$, $p < 0.001$).

3.2.4. V-SEIP response evaluation and decision (RED) variables.—Alpha coefficients for all mean RED variables and for each individual RED component variable were good-to-excellent for each response option; Table 3A. Test-retest reliability coefficients for these variables, respectively, were large for socially appropriate responses and even larger for aggressive response options; Table 3B.

3.2.5. Correlates of V-SEIP variables (Table 4): encoding V-SEIP encoding, as reflected by the identification (encoding) of relevant items in the video clips, correlated inversely with both composite aggression ($r=-0.31$, $p < 0.001$) and hostile automatic thoughts (HAT; $r=-0.30$, $p < 0.001$) and positively with positive automatic thoughts (PAT; $r=0.18$, $p < 0.05$) score as expected.—Relevant encoding also correlated significantly and inversely with hostile attribution (HA) score ($r=-0.32$, $p < 0.001$), but not with benign attribution (BA; $r=-0.10$, $p=0.255$), instrumental attribution (IA; $r=-0.03$, $p=0.716$), or negative emotional response (NER; $r=-0.12$, $p=0.180$). Relevant encoding correlated significantly with mean response evaluation and decision variables for each aggressive response option. Relevant encoding correlated inversely and significantly with the mean RED score for both aggressive ($r=-0.32$, $p < 0.001$) response options. Corresponding correlations for each of the RED component variables are displayed in Table 4.

3.2.6. V-SEIP attributional, negative emotional response, and response evaluation and decision (RED) variables.—As expected, V-SEIP HA and NER scores correlated positively with composite aggression (HA: $r=0.25$, $p < 0.001$; NER: $r=0.37$, $p < 0.001$). In addition, these variables correlated (positively) with hostile attributions (HA: $r=0.46$, $p < 0.001$; NER: $r=0.43$, $p < 0.001$) and (inversely) with positive attributions (HA: $r=-0.22$, $p=0.012$; NER: $r=-0.27$, $p=0.001$). In turn, BA scores correlated inversely with hostile ($r=-0.21$, $p=0.014$) and positively with positive ($r=0.19$, $p=0.023$) automatic thought scores. IA scores did not correlate with any of these variables (Aggression: $r=-0.01$, $p=0.875$; HAT: $r=0.05$, $p=0.565$; PAT: $r=0.08$, $p=0.370$). V-SEIP HA and NER scores correlated with the overall RED variables for the aggressive response option (HA: $r=0.53$, $p < 0.001$; NER: $r=0.48$, $p < 0.001$), but significantly less so, and inversely, with the socially appropriate (HA: $r=-0.17$, $p=0.039$; NER: $r=-0.16$, $p=0.044$) response option. Correlations

between V-SEIP HA and NER scores with overtly and relationally aggressive responses, separately, were the same.

3.2.7. Differences between HC and IED participants on V-SEIP encoding

variables (Table 5).—The mean number of relevant encoded items was significantly lower ($F[1,134]=11.14$, $p=0.001$) in IED compared with HC participants; Table 5. In contrast, the mean number of irrelevant encoded items did not differ ($F[1,134]=1.21$, $p=0.274$) between IED and HC participants.

3.2.8. Differences between HC and IED groups on V-SEIP attributional and

negative emotional response variables (Table 5).—IED showed significantly greater HA ($F[1,148]=6.81$, $p=0.01$) and NER ($F[1,148]=25.58$, $p < 0.001$) scores compared to HC; Table 5. In contrast, HC and IED groups did not differ in IA ($F[1,148]=0.23$, $p=0.632$), or in BA ($F[1,148]=0.14$, $p=0.714$), scores.

3.2.9. Differences between HC and IED groups on V-SEIP response

evaluation and decision (RED) variables.—HC and IED participants differed in response evaluation and decision variables (MANOVA $\lambda=0.720$, $F[2,147]=28.50$, $p < 0.001$) for both the socially appropriate ($F[1,148]=5.64$, $p=0.019$), and aggressive ($F[1,148]=57.15$, $p < 0.001$), response vignettes. As expected, HC participants evaluated the socially appropriate response option more positively than IED participants while the reverse was true for the aggression response options. Mean RED scores for overtly ($F[1,148]=61.85$, $p < 0.001$) and relationally ($F[1,148]=40.31$, $p < 0.001$) aggressive response options were similar. Similar findings were observed for outcome expectancy and response enactment (likelihood of engaging in the response). IED participants, first, expected a more positive outcome from an aggressive response (overt or relational) and, second, reported they were more likely to engage in an aggressive response compared to HC participants. The opposite pattern was observed for socially appropriate responses (see Table 5). The two groups did not differ in their reported efficacy for carrying out socially appropriate or aggressive responses.

3.2.10. V-SEIP variables: relationship to aggression variables.—Placing all relevant V-SEIP variables into the same multiple regression model ($F[4,131]=21.09$, $p < 0.001$) accounted for 37% of the variance in composite aggression scores and revealed that relevant encoding ($\beta=-0.17$, $p=0.027$), negative emotional response ($\beta=0.18$, $p=0.027$) and the overall response evaluation and decision variable for the aggressive response scenarios ($\beta=0.54$, $p < 0.001$) each played a significant role in predicting composite aggression scores as expected with the latter variable playing the largest role in this regard. Hostile attribution scores also related, modestly, to aggression scores but in an inverse, as opposed to a direct, fashion ($\beta=-0.17$, $p=0.053$).

4. Discussion

In Study I, we observe that the V-SEIP video assessment is comparable to the SEIP-Q questionnaire assessment for nearly all SEIP variables (except for encoding which is not part of the SEIP-Q). Among the most critical of these variables, hostile attribution demonstrated

a large correlation between the two assessments while negative emotional response and the overall response evaluation and decision (RED) variable for the aggressive scenario options demonstrated even larger correlations between the two assessments. The V-SEIP has the advantage of being delivered on a computer platform which allows for automatic data entry and scoring. In contrast, the SEIP-Q has the advantage of being easily administrated to participants without the need for a computer making it more amenable certain settings (i.e., forensic). That said, only the V-SEIP assesses the first SEIP step of encoding and only the V-SEIP can present the main story and response scenarios in a realistic and standardized format.

Study II demonstrates the very good to excellent basic psychometric properties of the V-SEIP, particularly for encoding of relevant cues, hostile attribution, negative emotional response, and for the response evaluation and decision making variables, particularly for the aggressive scenario responses. Of the two remaining V-SEIP variables, instrumental and benign attribution seem to have less than optimal psychometric properties and may have limited utility in future studies of SEIP in adults. While this is unfortunate, we note that these variables had similarly weaker psychometric properties on the SIPAEQ (Coccaro et al., 2009) and the SEIP-Q (Coccaro et al., 2016), suggesting that these two SEIP variables are less reliably captured by either the SEIP-Q or the V-SEIP. Further, of the three attribution VSEIP variables, only hostile attribution ($\beta=0.25$, $p=0.003$), but not instrumental ($\beta=-0.03$, $p=0.678$) or benign ($\beta=-0.06$, $p=0.454$) attribution, scores predicted aggression scores when all variables were placed in a multiple regression analysis ($F[3,146]=3.40$, $p=0.02$). Accordingly, investigators might consider not using instrumental or benign attribution variables in future studies.

One of the most important SEIP variables assessed by the V-SEIP is the encoding of relevant cues. This variable cannot be assessed by any paper and pencil questionnaire because it requires the presence of a rater at time of assessment or, as in the V-SEIP, of an audio recording by the participant to examine how many relevant cues have been received and recalled after viewing each video vignette. This V-SEIP variable had excellent inter-rater reliability ($r=0.95$), nearly excellent internal consistency ($\alpha=0.86$), and excellent test-retest reliability ($r=0.95$). It also demonstrated predictable relationships with other core V-SEIP variables and displayed good separation between nonaggressive healthy controls and impulsively aggressive IED participants.

Relevant encoding correlated inversely with hostile attribution scores, as expected, but not with negative emotional response scores. This was unexpected because of the strong correlation between hostile attribution and negative emotional response. We posit that relevant encoding may be more critical to hostile attribution and that any effect relevant encoding may have on negative emotional response is through hostile attribution. In addition, relevant encoding was positively related to the overall RED score for socially appropriate response scenarios but inversely related to the RED score for the aggressive response scenarios as expected. When using composite aggression scores as the dependent variable we observed that relevant encoding also predicted aggression in an inverse fashion as expected. Clearly, relevant encoding is an important SEIP variable that should be assessed along with the other SEIP variables that are easier to assess with paper and pencil measures.

While its companion variable, encoding of irrelevant cues has more than adequate psychometric properties, these characteristics are not as strong as for encoding of relevant cues, especially for inter-rater reliability, test-retest reliability, and for subject-control differences. More research will be needed to see if this variable is as valuable as that of the encoding of relevant cues.

When it comes to predicting aggression, most of the V-SEIP variables play a significant (or near significant) role. The four most important (relevant encoding, hostile attribution, negative emotional response, and response evaluation and decision) variables each appear to play a role in predicting aggression. Relevant encoding (inversely), and negative emotional response (positively), scores each related modestly to aggression scores while the overall RED variable strongly related to aggression scores. Surprisingly, hostile attribution scores related modestly, but inversely, to aggression scores. It is possible that complex, and not straight-forward, inter-relationships among the SEIP variables account for this. Further study with a larger sample size may be necessary to more fully understand this result.

4.1. Limitations

This study presents limitations that should be addressed. First, the samples, while not small, are relatively modest in size especially for the comparison between SEIP-Q and V-SEIP and for the test-retest analyses. That said, these sample sizes were powered to detect the relevant relationships needed for this study. In addition, the sample size for examination of the overall psychometrics of the V-SEIP, and participant-control analyses, was reasonably large for this type of study. Second, the data presented in this paper cannot speak to the temporal sequence of cognitive, emotional, and behavioral components of aggression. The preliminary correlational data presented in this manuscript is meant to direct future research in terms of providing a link between social and emotional information processes. Third, while the IED participants were recruited from the community and not from treatment centers, we note that most (80%) of the IED participants had a history of psychiatric treatment or of behavioral issues for which they should have received psychiatric evaluation and/or treatment. Thus, the IED participants may not be very different than those seen at treatment centers.

4.2. Conclusion

The V-SEIP offers a valid and reliable method of assessing all steps in the current SEIP model in adults and, appears to be a valid measure in psychiatric and control groups as well. In addition, like the SEIP-Q, the V-SEIP is balanced so that social cognition responses to both overtly aggressive and relationally aggressive stimuli can be assessed as well as response evaluation and decision making variables associated with overtly aggressive and relationally aggressive response can be assessed. Accordingly, we posit that the V-SEIP will allow investigators to assess social emotional cognition in adult populations within the context of personality, mood, and other disorders of emotional dysregulation.

Acknowledgments

Author Note

This work was supported in part by grants from the National Institute of Mental Health: R21 MH73811, R21 MH99393, and R01 MH104673 (Dr. Coccaro) and from the Pritzker-Pucker Foundation (Dr. Coccaro). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

References

- Asarnow JR, Callan JW, 1985 Boys with peer adjustment problems: Social cognitive processes. *J. Consult. Clin. Psychol* 53 (1), 80–87. [PubMed: 3980833]
- American Psychiatric Association, A.P., 2013 Diagnostic and Statistical Manual of Mental Disorders: DSM-5. American Psychiatric Press, Washington, DC.
- Berkowitz L, 1990 On the formation and regulation of anger and aggression: A cognitive-neoassociationist analysis. *Am. Psychol* 45 (4), 494–503. [PubMed: 2186678]
- Chan D, Schmitt N, 1997 Video-based versus paper-and-pencil method of assessment in situational judgment tests: subgroup differences in test performance and face validity perceptions. *J. Appl. Psychol* 82 (1), 143–159. [PubMed: 9119795]
- Coccaro EF, Noblett KL, McCloskey MS, 2009 Attributional and emotional responses to socially ambiguous cues: validation of a new assessment of social/emotional information processing in healthy adults and impulsive aggressive patients. *J. Psychiatr. Res* 43 (10), 915–925. [PubMed: 19345371]
- Coccaro EF, Nayer H, McCloskey MS, 2012 Personality disorder-not otherwise specified evidence of validity and consideration for DSM-5. *Comp. Psychiatry* 53 (7), 907–914.
- Coccaro EF, Fanning JR, Phan KL, Lee R, 2015 Serotonin and impulsive aggression. *CNS Spectrums* 20 (3), 295–302. [PubMed: 25997605]
- Coccaro EF, Fanning J, Lee R, 2016 Development of a Social Emotional Information Processing Assessment for Adults (SEIP-Q). *Aggress. Behav.* (In Press).
- Cohen DJ, Eckhardt CI, Schagat KD, 1998 Attention allocation and habituation to anger-related stimuli during a visual search task. *Aggress Behav.* 24 (6), 399–409.
- Crick NR, Dodge KA, 1989 Children's Perceptions of Peer Entry and Conflict Situations: Social Strategies, Goals, and Outcome Expectations. Kluwer-Nijhoff, Boston, MA.
- Crick N, Dodge K, 1996 Social information-processing mechanisms in reactive and proactive aggression. *Child Dev.* 67, 993–1002. [PubMed: 8706540]
- Crick NR, Werner NE, 1998 Response decision processes in relational and overt aggression. *Child Dev.* 69, 1630–1639. [PubMed: 9914643]
- Dill KE, Anderson CA, Anderson KB, Deuser WE, 1997 Effects of aggressive personality on social expectations and social perceptions. *J. Res. Personality* 31, 272–292.
- Dodge KA, 1986 A social information processing model of social competence in children In: Perlmutter M (Ed.), *The Minnesota Symposium of Child Psychology* 18. Erlbaum, Hillsdale, NJ, 77–125.
- Dodge KA, 2006 Translational science in action: hostile attributional style and the development of aggressive behavior problems. *Dev. Psychopathol* 18 (3), 791–814. [PubMed: 17152401]
- Dodge KA, Coie JD, 1987 Social-information-processing factors in reactive and proactive aggression in children's peer groups. *J. Personal. Soc. Psychol* 53 (6), 1146–1158.
- Eckhardt CI, Cohen DJ, 1997 Attention to anger relevant and irrelevant stimuli following naturalistic insult. *Personal. Ind. Diff* 23 (4), 619–629.
- Fettich KC, McCloskey MS, Look AE, Coccaro EF, 2014 Emotion regulation deficits in intermittent explosive disorder. *Aggress. Behav.* 11 (17).
- First MB, Spitzer RL, Gibbon M, Williams JBW, 1997 Structured Clinical Interview for DSM-IV Axis I Disorders (SCID) Psychiatric Institute, Biometrics Research, New York.
- Honk JV, Tuitena A, de Haana E, vann de Houtb M, Stamc H, 2001 Attentional biases for angry faces: Relationships to trait anger and anxiety. *Cogn. Emot* 15 (3), 279–297.
- Lemerise E, Arsenio W, 2000 An integrated model of emotion processes and cognition in social information processing. *Child Dev.* 71 (1), 107–118. [PubMed: 10836564]

- McCloskey MS, Noblett KL, Coccaro EF, 2006 Intermittent explosive disorder-integrated research diagnostic criteria: convergent and discriminant validity. *J. Psychiatr. Res* 40, 231–242. [PubMed: 16153657]
- Milich R, Dodge KA, 1984 Social information processing in child psychiatric populations. *J. Abnorm. Child Psychol.* 12, 471–490. [PubMed: 6747124]
- Olweus D, 1979 Stability of aggressive reaction patterns in males: a review. *Psychol. Bull* 86 (4), 852–875. [PubMed: 482487]
- Patrick CJ, 2008 Psychophysiological correlates of aggression and violence: an integrative review. *Philos. Trans. R. Soc. Lond. B: Biol. Sci* 363 (1503), 2543–2555. [PubMed: 18434285]
- Perry DG, Perry L, Rasmussen P, 1986 Cognitive social learning mediators of aggression. *Child Dev.* 57 (3), 700–711. [PubMed: 3720399]
- Pfohl B, Blum N, Zimmerman M, 1997 Structured Interview for DSM-IV Personality Disorder: SIDP-IV. American Psychiatric Press, Washington DC.
- Smith P, Waterman M, 2003 Processing bias for aggression words in forensic and nonforensic samples. *Cog. Emot* 17 (5), 681–701.
- Verona E, Patrick CJ, Lang AR, 2002 A direct assessment of the role of state and trait negative emotion in aggressive behavior. *J. Abnorm. Psychol* 111 (2), 249. [PubMed: 12003447]
- Werner NE, Nixon CL, 2005 Normative beliefs and relational aggression: An investigation of the cognitive bases of adolescent aggressive behavior. *J. Youth Adol* 34, 229–243.

TABLE 1

DSM-5 Syndromal and Personality Disorders in the IED Group

	Study I (N = 26)	Study II* (N = 75)
<u>Current Syndromal Disorders:</u>		
Intermittent Explosive Disorder	23 (88.5%)	41 (54.7%)
Any Depressive Mood Disorder	5 (19.2%)	7 (9.3%)
Any Anxiety Disorder	4 (15.4%)	11 (14.7%)
Traumatic and Stress Disorders	3 (11.5%)	5 (6.7%)
Eating Disorder	2 (7.7%)	3 (4.0%)
Somatoform Disorder	1 (3.8%)	1 (1.3%)
Obsessive-Compulsive Disorders	0 (0.0%)	1 (1.3%)
Impulse Control Disorders (Not-IED)	0 (0.0%)	1 (1.3%)
<u>Lifetime Syndromal Disorders:</u>		
Intermittent Explosive Disorder	26 (100%)	75 (100%)
Any Depressive Mood Disorder	18 (69.2%)	31 (41.3%)
Substance Use Disorder	16 (61.5%)	23 (30.7%)
Any Anxiety Disorder	6 (23.1%)	17 (22.7%)
Traumatic and Stress Disorders	4 (15.4%)	11 (14.7%)
Eating Disorder	3 (11.5%)	7 (9.3%)
Obsessive-Compulsive Disorders	3 (11.5%)	4 (5.3%)
Impulse Control Disorders (Not-IED)	2 (7.7%)	3 (4.0%)
Somatoform Disorder	1 (3.8%)	1 (3.8%)
<u>Personality Disorders:</u>		
Any Personality Disorder	23 (88.5%)	49 (65.3%)
Cluster A	3 (11.5%)	10 (13.3%)
Cluster B	8 (30.8%)	18 (24.0%)
Cluster C	4 (15.4%)	8 (10.7%)
PD-NOS	14 (53.8%)	26 (34.7%)

* Includes the 26 participants from Study I.

TABLE 2

Demographic and Behavioral Data in HC and IED Participants

Variable	HC Subjects (n = 75)	IED Subjects (n = 75)	p
Demographic Variables			
Age	34.6 ± 9.7	37.8 ± 10.2	NS
Gender (Male / Female)	37 / 38	36 / 39	NS
Race (White / AA / Other)	32 / 26 / 17	22 / 40 / 13	NS
Education (High School / College / Post-College)	3 / 59 / 13	11 / 55 / 9	NS
Behavioral Variables			
LHA Aggression	4.3 ± 3.1	17.8 ± 4.1	< 0.001
BPAQ Aggression	26.8 ± 7.4	44.7 ± 11.1	< 0.001
Hostile Social Cognition (HAT)	37.7 ± 12.2	56.9 ± 18.0	< 0.001
Positive Social Cognition (PAT)	68.1 ± 13.5	55.3 ± 16.3	< 0.001

Table 3AAlpha (α) Coefficients for V-SEIP Response Evaluation and Decision (RED) Variables

Response Type	All RED Variables ^a	Response Evaluation	Outcome Expectation	Response Efficacy	Response Enactment
Socially Appropriate	0.92	0.77	0.91	0.88	0.77
All Aggressive	0.96	0.89	0.95	0.96	0.92
Overtly Aggressive	0.93	0.80	0.90	0.92	0.88
Relationally Aggressive	0.94	0.82	0.91	0.93	0.82

^aMean α based on appropriate, overtly aggressive, and relationally aggressive response options only.

Table 3B

Test-Retest Pearson (r) Coefficients for V-SEIP Response Evaluation and Decision (RED) Variables

Response Type	All RED Variables ^a	Response Evaluation	Outcome Expectation	Response Efficacy	Response Enactment
Socially Appropriate	0.70	0.64	0.64	0.84	0.68
All Aggressive	0.94	0.86	0.79	0.93	0.88
Overtly Aggressive	0.91	0.82	0.68	0.92	0.89
Relationally Aggressive	0.92	0.79	0.83	0.89	0.83

Note: p values for all r coefficients < 0.001;

^a mean r based on appropriate, overtly aggressive, and relationally aggressive response options only.

Table 4

Correlations Between V-SEIP Encoding, Attributional, and Emotional Response Variables With Response Evaluation and Decision (RED) Variables

Response Type	Overall RED Variable	Response Evaluation	Outcome Expectancy	Response Efficacy	Response Enactment
<u>Socially Acceptable Response:</u>					
Encoding of Relevant Cues	0.19	0.34 *	0.26 *	-0.04	0.15
Encoding of Irrelevant Cues	0.02	-0.04	-0.13	0.25 *	-0.18
Hostile Attribution	-0.35**	-0.35 *	-0.23 *	-0.21	-0.24 *
Instrumental Attribution	0.07	0.18	0.21	-0.07	0.01
Benign Attribution	0.30 *	0.18	0.24 *	0.16	0.30 *
Negative Emotional Response	-0.25 *	-0.14	-0.12	-0.12	-0.35 *
<u>All Aggressive Responses</u>					
Encoding of Relevant Cues	-0.28 *	-0.28 *	-0.24 *	-0.03	-0.38 *
Encoding of Irrelevant Cues	-0.14	-0.01	-0.01	-0.26 *	-0.02
Hostile Attribution	0.58 *	0.53 *	0.56 *	0.23	0.58 *
Instrumental Attribution	0.07	-0.03	0.05	0.12	0.01
Benign Attribution	-0.11	-0.10	-0.11	-0.07	-0.08
Negative Emotional Response	0.40 *	0.36 *	0.39 *	0.10	0.50 *
<u>Overtly Aggressive Response:</u>					
Encoding of Relevant Cues	-0.26 *	-0.27 *	-0.24 *	0.00	-0.37 *
Encoding of Irrelevant Cues	-0.14	-0.03	-0.03	-0.23	-0.01
Hostile Attribution	0.56 *	0.53 *	0.55 *	0.18	0.56 *
Instrumental Attribution	0.10	-0.02	0.08	0.13	0.05
Benign Attribution	-0.15	-0.16	-0.15	-0.06	-0.12
Negative Emotional Response	0.43 *	0.42 *	0.39 *	0.09	0.51 *
<u>Relationally Aggressive Response:</u>					
Encoding of Relevant Cues	-0.27 *	-0.26 *	-0.23	-0.06	-0.35 *
Encoding of Irrelevant Cues	-0.14	0.02	0.02	-0.27 *	-0.03
Hostile Attribution	0.56 *	0.46 *	0.53 *	0.26 *	0.54 *
Instrumental Attribution	0.04	-0.03	0.02	0.11	-0.03
Benign Attribution	-0.06	-0.02	-0.05	-0.07	-0.01
Negative Emotional Response	0.35 *	0.26 *	0.36 *	0.11	0.43 *

* Note: $p < 0.004$ for twelve comparisons among the Overall RED variable, and $p < .001$ for forty-eight comparisons among individual RED variables, (e.g., Socially Acceptable vs. All Aggressive Responses or Overtly Aggressive vs. Relationally Aggressive Responses).

TABLE 5

Means for V-SEIP Variable Scores in HC and IED Subjects

V-SEIP Variable	HC (N = 75) Mean $\pm$ SD	IED (N = 75) Mean $\pm$ SD	Group Difference	p *
<u>Encoding Variables:</u>				
Encoding of Relevant Cues	3.27 $\pm$ 0.89	2.72 $\pm$ 0.99	HC > IED	= 0.001
Encoding of Irrelevant Cues	0.59 $\pm$ 0.60	0.71 $\pm$ 0.69	IED = HC	= 0.274
<u>Attributional Variables:</u>				
Hostile Attribution	0.86 $\pm$ 0.38	1.05 $\pm$ 0.47	IED > HC	= 0.010
Instrumental Attribution	2.06 $\pm$ 0.34	2.03 $\pm$ 0.46	IED = HC	= 0.632
Benign Attribution	1.24 $\pm$ 0.34	1.22 $\pm$ 0.48	IED = HC	= 0.714
<u>Emotional Variables:</u>				
Negative Emotional Response	1.46 $\pm$ 0.43	1.85 $\pm$ 0.40	IED > HC	< 0.001
<u>Overall Mean for RED Variables for:</u>				
<i>Socially Appropriate Response</i>	2.10 $\pm$ 0.36	1.89 $\pm$ 0.35	HC > IED	< 0.001
<i>All Aggressive Responses</i>	0.65 $\pm$ 0.37	0.98 $\pm$ 0.37	IED > HC	< 0.001
<i>Overtly Aggressive Response</i>	0.63 $\pm$ 0.39	1.00 $\pm$ 0.38	IED > HC	< 0.001
<i>Relationally Aggressive Response</i>	0.67 $\pm$ 0.37	0.95 $\pm$ 0.39	IED > HC	< 0.001
<u>Response Evaluation (R-Eval) for:</u>				
<i>Socially Appropriate Response</i>	2.43 $\pm$ 0.36	2.28 $\pm$ 0.44	HC > IED	= 0.020
<i>All Aggressive Responses</i>	0.48 $\pm$ 0.32	0.75 $\pm$ 0.41	IED > HC	< 0.001
<i>Overtly Aggressive Response</i>	0.43 $\pm$ 0.32	0.77 $\pm$ 0.44	IED > HC	< 0.001
<i>Relationally Aggressive Response</i>	0.52 $\pm$ 0.37	0.78 $\pm$ 0.45	IED > HC	< 0.001
<u>Outcome Expectancy (O-Exp) for:</u>				
<i>Socially Appropriate Response</i>	2.19 $\pm$ 0.36	2.05 $\pm$ 0.36	HC > IED	= 0.026
<i>All Aggressive Responses</i>	0.56 $\pm$ 0.25	0.83 $\pm$ 0.36	IED > HC	< 0.001
<i>Overtly Aggressive Response</i>	0.55 $\pm$ 0.25	0.82 $\pm$ 0.37	IED > HC	< 0.001
<i>Relationally Aggressive Response</i>	0.57 $\pm$ 0.28	0.83 $\pm$ 0.38	IED > HC	< 0.001
<u>Response Efficacy (R-Eff) for:</u>				
<i>Socially Appropriate Response</i>	1.32 $\pm$ 0.87	1.48 $\pm$ 0.62	HC = IED	= 0.191
<i>All Aggressive Responses</i>	1.14 $\pm$ 0.99	1.34 $\pm$ 0.69	HC = IED	= 0.152
<i>Overtly Aggressive Response</i>	1.12 $\pm$ 1.02	1.32 $\pm$ 0.77	HC = IED	= 0.106
<i>Relationally Aggressive Response</i>	1.16 $\pm$ 0.99	1.32 $\pm$ 0.70	HC = IED	= 0.252
<u>Response Enactment (R-Enact) for:</u>				
<i>Socially Appropriate Response</i>	2.10 $\pm$ 0.49	1.75 $\pm$ 0.52	HC > IED	< 0.001
<i>All Aggressive Responses</i>	0.43 $\pm$ 0.41	0.99 $\pm$ 0.60	IED > HC	< 0.001
<i>Overtly Aggressive Response</i>	0.43 $\pm$ 0.45	1.10 $\pm$ 0.71	IED > HC	< 0.001
<i>Relationally Aggressive Response</i>	0.44 $\pm$ 0.41	0.88 $\pm$ 0.58	IED > HC	< 0.001

* After significant ANOVA or MANOVA.