

## **A Rasch Analysis of the Child Interpersonal Relationships and Attitudes Assessment**

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*The Child Interpersonal Relationships and Attitudes Assessment (CIRAA) is an instrument which was designed to measure progress in child therapy (Holliman & Ray, 2013). The CIRAA has undergone psychometric evaluation with exploratory factor analysis (Holliman & Ray, 2013) as well as confirmatory factor analysis (Chung, 2013). The current study analyzes the original data from the CIRAA using Rasch analysis methods to determine the ability of the CIRAA to distinguish different levels of behavioral strengths among children as well as determine differential functioning of the instrument among gender and cultural groups. The results indicate an instrument which is well suited for a variety of cultural groups and one that can measure individuals with a range of characteristics in the domains of self-control, interpersonal skills, coping skills, and locus of evaluation.*

*Keywords: CIRAA, childhood trauma, assessment, child therapy*

In the evolution of therapeutic approaches, appropriate instruments for outcome evaluation play a vastly important role. When the proponents of an approach attempt to elevate the therapy to an empirically supported treatment, the rigors for research are paramount. Child-Centered Play Therapy (CCPT) has been a subject that has produced a voluminous amount of literature. CCPT has been examined in the treatment of ADHD, anxiety, adverse childhood experiences, academic difficulties, aggressive behavior, and

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more more (Ray et al., 2009; Blanco & Ray, 2011; Kram, 2019; Robinson et al., 2017; Stulmaker & Ray, 2015). However, in these studies, the instruments which have been used to measure outcomes have contrasted markedly with the philosophy of CCPT. Some of the commonly used instrument in CCPT studies include but are not limited to: the Parenting Stress Index (PSI; Abidin, 2012), the Child Behavior Checklist (CBC; Achenbach & Rescorla, 2001), and the Behavioral Assessment System for Children-2 (BASC-2; Reynolds & Kamphaus, 2004). For each of these instruments, the focus is on pathological behaviors or dysfunctional relationship dynamics. However, CCPT was originally based on the work of Carl Rogers (Axline, 1947), who emphasized the growth potential in humans when provided a certain kind of relationship. To use a pathology-based assessment instrument seems problematic at best and at worst, it represents deep confusion of the constructs that are actually being measured.

### **Child Centered Play Therapy**

It is possible to track the origins of play therapy to Freud and his analysis of the case of little Hans, in which a parent presented his child's behavior to Sigmund Freud and was provided with an analysis based on the child's conduct (Freud, 1909/1959). However, Sigmund Freud's work mainly focused on adults. However, his daughter Anna Freud and another prominent therapist, Hug Helmuth, investigated how to adapt therapeutic techniques to direct work with children, as opposed to detached analyses based solely on parent report, as Sigmund Freud had done (Freud, 1946; Hug-Helmuth, 1921). The development of CCPT started with Virginia Axline, a student of Carl Rogers, who attempted to apply the principles of the person-centered approach to children (Axline, 1947). Axline developed eight principles for working with children when applying a child-centered approach

1. The therapist must develop a warm, friendly relationship with the child.
2. The therapist accepts the child exactly as he/she is.
3. The therapist develops a feeling of permissiveness so that child feels free to express feelings completely.

4. The therapist recognizes and reflects feelings (of a child) so that the child can gain insight into his/her behaviors.
5. The therapist respects that the child can solve his/her problems and believes that the responsibility to change rests on the child.
6. The therapist does not attempt to direct the child but lets the child lead the way as the therapist follows.
7. The therapist understands that therapy is a gradual process and does not rush the child.
8. The therapist establishes only those limitations that are necessary to anchor the therapy to the real world and to facilitate the child's awareness for his/her responsibility in the relationship. (pp. 73-74)

One of the next significant developments in CCPT was the pioneering work of Garry Landreth, who outlined the process of CCPT in his text *The Art of the Relationship* (2012). This text provided a foundation for the training of play therapists in the child-centered approach. Landreth helped direct many dissertations on the topic of child-centered play therapy providing a strong basis of research from which CCPT was able to grow and gain recognition (Homeyer, 1994; McGuire, 2000; Tyndall-Lind, 1999;). Another of Landreth's contributions which is of importance to this article was the development of treatment objectives for play therapy. Landreth (2012) outlined the objectives of CCPT:

1. Develop a more positive self-concept.
2. Assume greater self-responsibility.
3. Become more self-directing.
4. Become more self-accepting.
5. Become more self-reliant.
6. Engage in self-determined decision making.
7. Experience a feeling of control.
8. Become sensitive to the process of coping.
9. Develop an internal source of evaluation.
10. Become more trusting of himself. (p. 84)

These objectives serve as a significant tool in outcome evaluation. These objectives provide a guideline for clinicians and researchers to compare their intended outcome measures against, to ensure that they are measuring the outcomes that are expected from CCPT.

## **Development of the CIRAA**

### **Initial Development Study**

The CIRAA was developed in 2010 in response to a perceived problem with measurement of CCPT outcomes. According to Holliman and Ray (2013), many of the instruments used for measuring the effects of CCPT were either based in a pathology perspective or were incongruent with the stated philosophy of CCPT.

The items for the CIRAA were developed based on the objectives of CCPT and individual interviews with parents of children who had experienced positive outcomes in play therapy at a campus mental health clinic, operationalized by improvement of scores on the Child Behavior Checklist (Achenbach & Rescorla, 2001) and the Parenting Stress Index (Abidin, 1994). The resulting 50 questions were administered to a sample of 139 individuals. Using exploratory factor analysis, Holliman and Ray (2013) retained 30 of the original questions and developed a four factor solution that accounted for 53.85% of the variance in responses. In addition to construct validity, the instrument was also compared the CBC and PSI to establish concurrent validity. The CIRAA demonstrated adequate positive validity with the CBC, through a Pearson's R correlation analysis,  $r = .75$ ,  $n = 80$ ,  $p > .001$ , indicating a comparable ability to detect behavioral problems. The CIRAA also demonstrated adequate positive correlation with the child domain of the PSI,  $r = .74$ ,  $n = 101$ ,  $p < .001$ .

The final product of the CIRAA generated a 30 item instrument that was composed of statements that participants could rate with one of the following choices: strongly agree, agree, neither agree nor disagree, disagree, strongly disagree. A few representative items of the CIRAA are as follows: "my child blames others for his/her mistakes", "My child is often sad for prolonged periods of time," and "my child exhibits self-control." The CIRAA

generates a score for both the total instrument and each subscale with higher scores indicating higher levels of desirable behaviors, with scores of 2.5 indicating clinically concerning behavior (Holliman & Ray, 2013).

### **Confirmatory Factor Analysis of the CIRAA**

In 2013 Chung conducted a study that sought to confirm the factor solution of the CIRAA using a different sample of participants than the initial development sample. The sample consisted of 206 children. The ages of the children ranged from three years old to ten years old with a mean age of 6.14 years old. The samples consisted of 131 males, which comprised 63.6% of the sample and 75 females, which comprised 36.4% of the sample. The ethnicities of the sample were as follows: 125 Caucasian participants (60.7%), 29 Latinx participants (14.1%), 14 African-American participants (6.8%), 8 Asian participants (3.9), 12 Bi-racial participants (5.8%), and 18 participants who did not identify their ethnicity (8.7%). The sample was composed of two sub-samples: a clinical sample of 105 children who had been referred for counseling services and a non-clinical sample that consisted of 101 children who responded to request for participation through schools, parent education groups, and graduate level classes.

Chung (2013) performed a confirmatory factor analysis and analyzed goodness of fit indices and localized area of strain to evaluate the four factor-model of the CIRAA. Four goodness of fit indices were examined:  $\chi^2$ , root mean square error of approximation (RMSEA), comparative fit index (CFI), and non-normed fit index (NNFI). For the  $\chi^2$  analysis,  $\chi^2(405)=1,049.66$ ,  $p<.01$ , indicating statistical significance. The RMSEA analysis yielded a result of .088, which was slightly outside of the suggested range of .06 to .08, suggesting a borderline fit. Both the CFI and NNFI yielded results of .95 indicating acceptable fit.

Chung (2013) examined localized strain by examining the modification index and the expected parameter change (EPC) for the model. These two statistics examine whether the  $\chi^2$  of the model might change if a fixed or constrained parameter were allowed to freely estimate (Brown, 2006). The modification index yielded statistically significant differences if the Self-Regulation and Coping Skills subscales were allowed to correlate. However,

when analyzing the EPC's it was found that the change in the model would be negligible and thus it was suggested that a modification to the four factor solution would not enhance the model.

### **Concurrent validity of the CIRAA**

Holliman et al. (2020) conducted a study which explored the concurrent validity of the CIRAA subscales when compared with the Social Emotional Assets and Resiliency Scale (SEARS; Merrell, 2011). Research conducted by Holliman and Ray (2013) and Chung (2013) focused largely on the total score of the CIRAA and its performance in aggregate, with some exploration of how the subscales correlate with each other and perform on reliability measures. This study examined the Self-Regulation and the Interpersonal Skills subscales. When comparing the Self-Regulation scale of the CIRAA and the Self-Regulation and Responsibility scale of the SEARS, a Pearson's product-moment correlation yielded  $r=.89$ ,  $n=42$ ,  $p<.001$ , indicating a strong positive correlation. As well, the Interpersonal Skills subscale of the CIRAA was compared to the Social Competence subscale of the SEARS. The Pearson's product-moment correlation for this analysis yielded  $r=.67$ ,  $n=42$ ,  $p>.001$ . This indicates a statistically significant moderate positive relationship between the Interpersonal Skills and Social Competence subscales. As a result of these analyses, researchers and clinicians can have greater faith in the subscales of the CIRAA, with evidence to bolster the CIRAA not only at the total score level but also for several of the subscales.

### **Purpose of the Study**

The current literature for the CIRAA has provided sufficient psychometric evidence for the instrument to be used as a research and clinical instrument (Holliman & Ray, 2013; Chung, 2013). However, several aspects of the CIRAA bear further investigation. The initial validation study as well as the study investigating the confirmatory factor, provided data about the CIRAA's psychometrics with the samples as a whole. However, no analysis has currently been undertaken to measure the functioning of the CIRAA in regard to gender

or ethnicity. Furthermore, the previous analyses of the CIRAA have focused on the ability of the instrument as whole and the subscales to determine the presence of certain traits and qualities. However, this is a more binary approach to psychometrics, as opposed to examining the degree to which the instrument is able to measure the intensity of a trait. Finally, a concern in the development and refining of any instrument is the degree to which individual items contribute to the ability of the assessment to differentiate groups by ability, which can be complicated when items are relatively “easy to endorse” providing little data for differentiation or are relatively noisy “are extraordinarily difficult to endorse” leading to an item that provides little to the overall categorization ability of the instrument. Thus, the current study endeavors to answer the following questions:

1. To what degree to items of the CIRAA function differently based on gender or ethnicity?
2. What is the CIRRA’s ability on the instrument and item level to differentiate different abilities of the traits measured by the instrument?
3. To what degree does the CIRAA contain items that contribute poorly to the ability to differentiate individual by differing levels of ability.

## **Methods**

### **Participants**

The current sample consists of the combination of two separate studies, one which was published and one that is currently under review (Holliman & Ray, 2013; Holliman et al., 2020). In both studies, the subjects were children in Title I elementary schools. There were 178 participants in the study. In the sample, 112 participants were male which constituted 62.9% of the sample and 66 were female, which constituted 37.1% of the sample. The ethnicity breakdowns were as follows: 92 participants were Caucasian, which comprised 51.7% of the sample.; 33 Participants were Latinx, which comprised 18.5% of the sample; 28 participants were African-American, which comprised 15.7% of the sample; 21 participants identified themselves as multi-racial, which comprised 11.8% of the sample; and, 4 participants identified themselves as either “other” or they declined to respond,

which comprised 2.2% of the sample. The mean age of participants in the sample was 6.4, with ages ranging from 3 years old to 10 years old.

## **Procedures**

In the first study, participants were selected from a single Title I elementary school in the Southwest United States. Participants were eligible to take part in the study if they were a child enrolled in grades between kindergarten and fourth grade. All eligible participants were sent a packet in their take-home folders which contained a letter describing the study, an informed consent document, and a series of assessment instruments which included the CIRAA, the Parenting Stress Index (PSI; Abidin, 1994) and the Child Behavior Checklist 6-18 (Achenbach & Rescorla, 2011). If parents wished to participate in the study, they were asked in the letter to return the signed informed consent document and the completed assessments, which were returned in the child's school folder.

For the second study, participants were selected from all the kindergarten classrooms in a single Title I elementary school in the Southwest United States. Participants were sent home with a packet to take to their parents in their take-home folder. The packet included a letter describing the study, an informed consent document, the CIRAA, and the Social Emotional Assets and Resiliency Scale (Merrell, 2011). If the parents chose to participate, they were asked to return the signed informed consent and the assessment instruments. In both studies, once the participants completed all the assessments required, they were provided with a \$10 gift card as a modest incentive.

The rationale for combining two samples bears some explanation. Rasch analysis is unique in that can provide robust statistical data with relatively modest sample sizes (Citation). However, the researcher had a specific interest in looking at the differential functioning of the CIRAA based on ethnicity and gender, and the initial sample did not provide sufficient participants that were female or identified as African American to provide the opportunity for such analyses. Thus a second sample was integrated into this study. Several steps were taken to ensure that participants in the second sample were similar to the overall population of the first sample. First both samples were drawn from



the same school district and the same general age ranges. As well, the schools in both studies were classified as Title I elementary schools, indicating that at least 50% of the students enrolled qualified for free or reduced lunch, thus ensuring that the socio-economic status of participants was largely similar. Thus, the second sample added the ability to provide a more robust analysis of the CIRAA, while taking several steps to ensure the uniformity of the samples.

### **Instrument**

The CIRAA is comprised of 30 Likert-scale items that ask parents (or other caregivers) about a child's self-regulation, interpersonal skills, coping skills, and locus of evaluation. These facets were developed from the treatment objectives that Landreth (2012) set forth, previously discussed in this manuscript. As mentioned previously in this article the instrument has well-established reliability and validity (Chung, 2013; Holliman & Ray, 2013). The CIRAA has demonstrated good concurrent validity with the Parenting Stress Index (Abidin, 1994) and the Child Behavior Checklist (Achenbach & Rescorla, 2001). As well, the factor validity of the CIRAA has been measured by both exploratory factor analyses and confirmatory factor analyses, indicating the stability and viability of the four factor solution. The CIRAA has also been examined to measure its ability to separate typical children and children referred for clinical services (Chung, 2013; Holliman & Ray, 2013). The instrument showed significant ability to differentiate among groups in this regard.

### **Analysis and Results**

To analyze the psychometric properties of the CIRAA, a Rasch analysis model was conducted using Winsteps version 4.5.2 (Linacre, 2020a). Rasch analysis operates on the principle that a specified response on an item in a psychometric instrument is a function of both person and item parameters. Specifically, the Rasch model allows researchers to investigate the ability or presence of a characteristic in individuals completing an instrument and the item difficulty/endorsability (Linacre, 2020b). In addition to examining

item difficulty and person characteristics, Rasch analysis is useful because of use of the logit scale. A logit is a logarithmic function that helps assess probability curves (Boone, 2016). In Rasch analysis, logit scales are used to convert Likert scale items, which are ordinal questions, to ratio level questions upon which meaningful statistics can be performed. As well the logit scale allows researchers to assess where on a logit scale a particular person might be located (thus evaluating the ability of the person) or where an item might be located (thus evaluating the difficulty of the item) (Linacre, 2020b). Several facets of the CIRAA when analyzed from a Rasch Model will be presented including: Item differential functioning, item difficulty, item distribution, person statistics, and Item response categories. For reference, a list of items with question text and factor is provided in Table 1.

Table 1.

*CIRAA Items by Factor*Factor 1: Self-Regulation

- 
- 1. My child shares with other children
  - 5. My child has verbal fights with other students at school.
  - 7. My child apologizes for hurting others' feelings.
  - 8. My child blames others for mistakes
  - 13. My child hits/kicks family members.
  - 15. My child gets along with other children.
  - 18. My child exhibits self-control
  - 20. My child disrupts family events/outings.
  - 23. My child yells frequently.
  - 25. My child often receives reports of disruptive behavior from his/her teacher.
  - 26. My child often acts without thinking.
  - 29. My child has physical fights with other children.
- 

Factor 2: Interpersonal Relationships

- 2. My child complains few people like him/her.
  - 3. My child is often sad for prolonged periods of time.
  - 9. My child is teased by other children.
  - 11. My child complains other children are mean to him/her
  - 14. My child often compares him/herself unfavorably ~~of~~ others.
  - 17. My child is overly sensitive
  - 22. My child complains no one likes him/her
- 

Factor 3: Coping Skills

- 4. My child is upset by minor things
  - 6. My child becomes anxious over small matters
  - 19. My child is able to express his/her feelings when he/she is feeling upset.
  - 21. My child can name things he/she likes about him/herself.
  - 27. For his/her age, my child is able to enter new situations with confidence.
  - 28. My child can calm down when upset.
- 

Factor 4: Internal Locus of Evaluation

- 10. My child enjoys doing things for him/herself.
- 12. My child volunteers to help out around the house.
- 16. My child shows me projects he/she is proud of.
- 24. My child talks about accomplishments of which he/she is proud of.
- 30. My child tells me things he/she is proud of.

## **Item Difficulty**

Rasch analysis draws from item response theory which posits that not all items are of the same difficulty, and that performance on a test requires the examination of both person ability and item difficulty (van Alphen et al., 1994). In Likert scale type items for which no true right or wrong answer exists the term difficulty to endorse which refers to how strong a particular characteristic in a person must be for them to endorse an item (Bond & Fox, 2007). The difficulty measures for the items in the CIRAA ranged from -1.45 (indicating a significant lack of the measured characteristics) to .81 (indicating the presence of the measured characteristic).

Item difficulty was also analyzed by item subscale, using both the median of the item difficulty and the overall range, and is summarized in Table 2. Median was used because logits extend to negative and positive numbers, rendering a mean difficulty score relatively useless. For the Self-Regulation subscale the median difficulty was .225 logits with a range of 1.49 logits. This would seem to indicate an acceptable range but a slight bias towards lack of the trait. The Interpersonal Relationships subscale had a median difficulty of .36 with a range of .49 logits. This subscale also indicates an overall lack of bias towards high or low ability, though the range is somewhat more constrained. The Locus of Control subscale item difficulty yielded a median of -.06 indicating a bias towards those with less self-control and the total range for the subscale was .69 indicating a moderate range of ability captured by the scale. The Coping subscale had a median item difficulty of -.43 indicating a bias towards lack of the trait but the range for the scale was 1.51, indicating that the scale as a whole has a variety of items to capture a large range of presentations of the trait.

Table 2.  
*CIRAA Items Difficulty Arranged by Factor*

Item #	Difficulty
<u>Factor 1: Self Regulation</u>	
1	-.68
5	.53
7	-.51
8	.62
13	.20
15	-.44
18	-.62
20	.25
23	.52
25	.81
26	-.01
29	.26
<u>Factor 2: Interpersonal Relationships</u>	
2	.36
3	.02
9	.44
11	.51
14	.34
17	.49
22	.14
<u>Factor 3: Coping Skills</u>	
4	.2
6	.31
19	-.28
21	-.16
27	.04
28	-.38
<u>Factor 4: Locus of Control</u>	
10	-.41
12	-.44
16	-1.45
24	.06
30	-.43

## Differential Item Functioning

A significant concern in psychometrics is how a test may respond to different populations. The history of psychometrics unfortunately includes deep concerns about psychometric instruments with vastly different functioning among ethnic groups being used for the oppression of other groups (Grant, 2006). Differential item functioning is a deeply important concept. According to Zwick (2012) items can be grouped into three broad categories for differential item functioning. Items in the A group has an absolute DIF contrast  $< .43$  logits, which places the difference into the negligible category, indicating that the difference would be too small to be noticeable. Items in category B have a DIF contrast  $\geq .43$  and are considered to have slight to moderate differential functioning. Finally, items in category C are considered to have an absolute DIF contrast value of  $\geq .64$  logits, indicating moderate to large differential functioning. Furthermore, Linacre (2020b) indicates that for a noticeable difference to be present, the  $p$  value must be  $< .05$ , and the differential item functioning contrast values must be greater than  $|.50|$ . Differential item functioning for the CIRAA was analyzed for two broad categories: gender and ethnicity

For gender, Mantel-Haenszel chi-square analyses were conducted to determine if statistically significant differences existed for any of the items on the basis of gender, the full results of the gender differential item functioning can be found in table 3. The majority of items did not meet criteria for statistically significant differential function, however a few did, which include the following items: 4 (part of the Coping Skills factor) with a  $p$  of  $.04$  and Item 14 (part of the Interpersonal Relationships factor), with a  $p$  of  $.01$ . In the case of item 4 the absolute DIF contrast is  $.23$ , indicating a lack of noticeable difference in functioning. In the case of item 14 the absolute DIF contrast is  $.45$ , indicating a lack of noticeable difference in functioning. Thus, the CIRAA appears to function similarly across male and female participants.

Table 3  
*Gender Differential Item Functioning*

Item #	Absolute DIF Contrast	Mantel-Haenszel Chi-Square	Mantel-Haenszel Probability
1	.15	.0051	.9432
2	.22	1.4215	.2332
3	.28	1.4087	.2353
4	.23	4.1352	.0420
5	.10	.6181	.4317
6	.19	.1079	.7425
7	.17	.3312	.5650
8	.00	.9554	.3284
9	.25	2.9033	.0884
10	.31	2.8494	.0914
11	.11	.4490	.5028
12	.11	.6433	.4225
13	.00	.7184	.3967
14	.45	8.3203	.0039
15	.08	1.0147	.3138
16	.66	2.0763	.1496
17	.13	.7371	.3906
18	.13	.4935	.4824
19	.07	.0067	.9350
20	.24	.0413	.8391
21	.24	.3663	.5450
22	.13	.0306	.8611
23	.08	.2906	.5899
24	.34	1.8135	.1781
25	.02	.0643	.7998
26	.07	.0281	.7998
27	.08	.0009	.9763
28	.20	.6768	.4107
29	.09	.1319	.7164
30	.22	.4511	.5018

Mantel-Haenszel chi-square analyses were conducted for differences between participants who were Caucasian, Latinx, and African American. The full results of the analysis examining the differential functioning between Latinx and Caucasian participants can be found in table 4, and the results of the differential item functioning between African American and Caucasian participants can be found in table 5. Four items had statistically significant differences when Caucasian and Latinx participants were compared: items 13, 24, 29, and 30. For items 13, 24, and 29, the absolute DIF contrasts were .40, .24, and .43, respectively. This would place items 13 and 29 in category A for negligible differential functioning, and item 30 would be placed in category B for slight to moderate differential functioning, though it should be noted that it is on the borderline of such a categorization. None of the aforementioned items meets Linacre's (2020b) guidelines for an absolute logit value of .50. However item 24 has an absolute DIF contrast of .74, which would place it in category C and exceed Linacre's guidelines for logit values of  $< .50$ . Thus, this item should be considered carefully in future studies and clinical use. None of the items in the differential function analysis between Caucasian and African American participants yielded statistically significant scores.



Table 4  
*Differential Item Functioning for Latinx Participants*

Item #	Absolute DIF Contrast	Mantel-Haenszel Chi-Square	Mantel-Haenszel Probability
1	.03	.0687	.7932
2	.09	.6767	.4107
3	.19	1.1715	.2791
4	.27	1.5457	.2138
5	.28	1.1385	.2860
6	.31	1.1591	.2816
7	.19	.5050	.4773
8	.10	.5129	.4739
9	.16	.0860	.7693
10	.11	.5197	.4710
11	.17	1.4085	.2353
12	.01	.0418	.8380
13	.40	6.4136	.0113
14	.08	.2053	.6505
15	.02	.0001	.9921
16	.29	1.7941	.1804
17	.13	.0112	.9157
18	.20	.1066	.7440
19	.11	.7489	.3868
20	.32	1.7370	.1875
21	.14	.4933	.4824
22	.34	.7339	.3916
23	.15	.3729	.5414
24	.74	5.4940	.0191
25	.03	.0595	.8073
26	.16	1.5772	.2092
27	.21	1.5425	.2142
28	.04	1.8463	.1742
29	.24	7.1861	.0073
30	.43	5.1343	.0235

Table 5  
*Differential Item Functioning African American Participants*

Item #	Absolute DIF Contrast	Mantel-Haenszel Chi-Square	Mantel-Haenszel Probability
1	.40	.0548	.8149
2	.19	2.9444	.0862
3	.19	.5185	.4715
4	.19	.90	.9245
5	.09	.0700	.7913
6	.08	.3092	.5781
7	.14	.3398	.5599
8	.05	.0014	.9704
9	.46	2.7985	.0944
10	.11	.9346	.3337
11	.18	.2134	.6441
12	.29	2.9550	.0856
13	.56	1.4406	.2300
14	.05	.0449	.8322
15	.18	.1267	.7219
16	.28	.1263	.7223
17	.45	1.5949	.2066
18	.35	.5701	.4502
19	.59	2.8403	.0919
20	.26	.9330	.3341
21	.04	1.1115	.2918
22	.37	.5759	.4479
23	.02	1.8913	.1691
24	.35	.1029	.7484
25	.03	.0001	.9905
26	.31	.9028	.3420
27	.16	1.9254	.1653
28	.12	2.2360	.1348
29	.07	.0507	.8219
30	.12	.3106	.5773

**Item Misfit**

Item misfit is an attempt to measure the ability of particular questions to provide productive data about the individuals taking the test (Linacre, 2020b). Two forms of statistics are generated in terms of fit: information-weighted fit (infit) and outlier sensitive fit (outfit). Infit tends to be more sensitive to patterns of responses targeted on the person, while outfit tends to be more sensitive to responses that are outliers based on a person's estimated ability (Linacre, 2020b). Fit scores that exceed 2.0 are often referred to as having "noise", while scores less than 0.5 tend to indicate being "muted." In the context of Rasch analysis, noise indicates that a particular item has responses that are unpredictable and thus are unable to provide reliable information about test-takers (Linacre, 2020b). While muted scores are so predictable they provide little information about test-takers and don't add to the instrument's ability to differentiate test takers of differing ability.

The mean infit and outfit scores for the CIRAA were 1.00, and 1.01 respectively. The scores for the CIRAA items on infit ranged from 1.57 to .67, which places most of the items in the preferred 0.5 to 1.5 range of fit. The full range of scores for item misfit can be found in table 6. For outfit the scores ranged from 1.52 to 0.70, which places most of the items in the preferred 0.5 to 1.5 range. This indicates that the items on the CIRAA neither have a great degree of unpredictability, nor are they so muted that they provide little ability to distinguish different kinds of test-takers.

Table 3  
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6	.19	.1079	.7425
7	.17	.3312	.5650
8	.00	.9554	.3284
9	.25	2.9033	.0884
10	.31	2.8494	.0914
11	.11	.4490	.5028
12	.11	.6433	.4225
13	.00	.7184	.3967
14	.45	8.3203	.0039
15	.08	1.0147	.3138
16	.66	2.0763	.1496
17	.13	.7371	.3906
18	.13	.4935	.4824
19	.07	.0067	.9350
20	.24	.0413	.8391
21	.24	.3663	.5450
22	.13	.0306	.8611
23	.08	.2906	.5899
24	.34	1.8135	.1781
25	.02	.0643	.7998
26	.07	.0281	.7998
27	.08	.0009	.9763
28	.20	.6768	.4107
29	.09	.1319	.7164
30	.22	.4511	.5018

## Person Statistics

A common challenge in psychometric analysis is that data depends on characteristics of the persons taking the test, specifically how much (or little) of the characteristics being measured does the sample possess (Primi et al., 2016). For this sample measure statistics, which provide a metric of the presence of the characteristics in the individual members of the sample, were analyzed. The measure statistics range from 3.6 to .17, with an average measure score of 1.24. The range of 3.43 logits indicates a significant range of ability. Two other important person statistics are separation indices and person reliability. Separation indices are conceptually similar to a t-test that differentiates different strata of persons with differing ability levels (Duncan et al., 2003). Typically separation indices of 1.5 indicate acceptable separation, 2.0 indicate good separation, and 3.0+ indicate excellent separation. The number of strata of ability levels which can be ascertained in a sample can be determined from the following formula:

$$(4G+1)/3$$

Where G= person separation index (Fisher, 1992). For the sample in the current study the person separation index was 3.13, indicating that in this particular sample, four different strata can be distinguished.

Person reliability is somewhat different than item reliability, which tends to refer to the consistency of responses across time or items (Nunnally & Bernstein, 1994). Person reliability is based on the idea that a curvilinear relationship can be established by endorsed responses matched to person ability and item difficulty to endorse. The degree to which a sample adheres to the estimated curve is represented in the person reliability score. The person reliability score for the current sample is .91, indicating a high propensity for individuals in the sample to be matched on ability and item difficulty.

## Item Response Categories

For each response category (e.g. Strongly agree to strongly disagree) on the CIRAA, the average ability of person's endorsing that response were calculated. It is expected that the ability scores of individuals will increase monotonically across response categories

with low abilities with the lower categories and higher abilities with the higher categories (Andrich, 1996). Twenty-three of the 30 items on CIRAA increased monotonically as would be expected for the instrument. However, seven items indicated disordered categories, specifically: items 3, 16, 18, 19, 27, 28, and 30. In conducting analysis of these disordered functions, a few dynamics were observed. First, in four of the seven items, (items 19, 27, 28, and 30) the middle score “Not sure” was a significant contributor to the disordering. Some feedback that participants left as notes on the instrument was that the not-sure category was confusing in its wording, and they would prefer different wording like “sometimes agree and sometimes disagree” or “neutral.” Items 3, 18, and 19 had some disordering that centered around problems distinguishing strongly disagree and disagree, which may warrant more investigation into the functioning of these items.

## **Discussion**

The CIRAA has demonstrated a wide variety of psychometric characteristics which show promise for its use as both a research instrument and a clinical assessment tool. This article as well as the research conducted by Holliman and Ray (2013) and Chung (2013) demonstrated the instrument has a stable factor structure, good concurrent validity with instruments which are industry standards, and excellent reliability. The Rasch analysis conducted in the present study was able to provide insight into some deeper psychometric functioning of the instrument. The instrument showed the capacity to measure an acceptable range of abilities, indicating its clinical utility and usefulness in research. The differential item function analysis demonstrated that the items on the CIRAA did not function differently for gender or ethnicity groups in any significant ways.

Another focus of the Rasch analysis which is a frequent cause of concern was the item misfit. Frequently assessment instruments must contend with items that are so similar that they do not contribute meaningfully to the instrument’s ability to differentiate groups from one another. Conversely some items are so unpredictable that they have unreliable ability to discriminate groups. The infit and outfit statistics of this analysis indicate that the items on the CIRAA are neither too unpredictable nor overly-predictable.

A very interesting result of this Rasch analysis comes from the person analyses. The separation indices gives users of the instruments ideas on how many different broad levels of ability can be ascertained by the instrument in question. The separation index of 3.13 indicated that four different levels of ability could be measured from the results of the CIRAA. Thus the CIRAA has demonstrated its ability to distinguish respondents with varying levels of self-regulation, interpersonal skills, coping skills, and locus of evaluation.

The analysis also examined the ordering of item response categories. This diagnostic yields useful information about the different response categories and how often they were endorsed. In some cases, an individual may be able to see that a certain response category is seldom endorsed, and may not be a meaningful inclusion in the instrument's answer structure. Other problems that can be seen are disordered categories. It is assumed that the response rates for each question category will proceed monotonically. The major of items on the CIRAA followed this pattern, however there were a few that had disordered categories. This provides some areas for future examination as opportunities arise to examine how these items operate with different samples and different groups.

This study yields several interesting results for practitioners. First it speaks to the broad applicability of this instrument. The CIRAA was originally developed as a tool for use in play therapy, as most instruments used in play therapy are based on pathology (Holliman & Ray, 2013; Chung, 2013). However, Child Centered Play Therapy, a prevalent form of play therapy with a wide range of evidence to support it, is focused on the self-direction and inner capacities of children (Landreth, 2012). This indicates a fundamental philosophical mismatch between the underlying approach of therapy and the tools used to measure efficacy both in clinical settings and research studies. The continued evidence for the psychometric utility of the CIRAA provides play therapy practitioners with a tool to engage in thorough evaluation while remaining philosophically consistent.

Play therapy is also an intervention that has been explored with a variety of different cultural and ethnic groups (Baggerly & Parker, 2005; Garza & Bratton, 2005). With an approach that appears to be valid with a variety of ethnic groups, having an instrument which has consistency in scores among gender and ethnic groups will be very important. The differential item functioning analyses in this study provided evidence for practitioners to have confidence in the application of the CIRAA across a diverse base of children.

The study also provided data that can allow uses of the CIRAA confidence in categorizing the functioning of their clients or participants. The person separation index indicated that four different strata of functioning could likely be distinguished using the instrument, and the range of .81 to -1.45 does indicate that a moderate range of abilities could be measured, though the instrument does demonstrate a leaning towards lack of traits as opposed to strong presence of traits, and as such fine gradients such as differences between healthy functioning and superior functioning in self-control, interpersonal skills, coping skills, and locus of control may be difficult with this instrument. However, for the purposes of measuring growth in clients and distinguishing between healthy functioning and non-healthy functioning the CIRAA is more than adequate as an assessment tool.

### **Limitations and Directions for Further Study**

One limitation to this study is that while many demographic groups were included, there were several that were not. The first demographic limitation is related to the age of the children. The average age of the children in the study was 6.5 and in the second wave of data collection the children were primarily in Pre-Kindergarten to 1<sup>st</sup> grade. Thus how the CIRAA functions among children in the upper grades of elementary school may also be a subject of further investigation. As well, the instrument had sufficient populations in the Caucasian, African American, and Latinx groups to conduct differential item functioning and other analyses. However, many other groups such as Asian, Bi-Racial, Native American, and other ethnic groups did not have sufficient numbers for a robust analysis. Future studies would benefit from analyzing the functioning of the CIRAA with these specific groups. Another issue regarding sampling is that the study was taken from approximately five schools, all in the same school district in the Southwest. All the schools were identified as Title I elementary schools. Thus future studies might benefit from a broad examination of geographical locations as well as school status.

### **Conclusion**



The CIRAA from its inception has been an instrument which has focused on philosophical alignment with CCPT and utility for researchers and clinicians. It was meant to be an instrument that could be completed rapidly and provided CCPT investigators and therapists with pertinent data that could guide treatment oriented to the objectives of CCPT. This most current study has answered some important questions about the CIRAA, surrounding its ability to measure individuals with varying levels of the proposed traits, its ability to measure gender groups and ethnic groups without bias, and its ability to appropriately differentiate between groups without being too “muted” or with too much “noise.”

The results of this study, as the previous studies conducted with the CIRAA, once again indicate its solid psychometric principles. This bodes well not only for the CIRAA, but also for CCPT clinicians who have long operated without a philosophically consistent measure that can be administered rapidly. While the job of developing psychometric data for an instrument is never done, the solid body of psychometric evidence for the CIRAA indicates it has a future as a useful tool for the researcher and clinician alike.

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Variables	1	2	3	4	5	6
1. PTG	—					
2. Internal	.155*	—				
3. Chance	.120	-.083	—			
4. PO	.003	-.118	.629**	—		
5. Presence	.301**	.503**	-.253**	-.265**	—	
6. Search	.142*	.208**	.199**	.102	-.060	—
Mean	63.18	15.30	9.60	8.96	24.10	24.46
SD	24.66	3.44	4.11	4.51	6.34	6.98
Range	0-105	6-21	3-21	3-21	5-35	5-35

Prior to interpreting the predictive nature of each of the variables, assumptions of homogeneity of variance, independence of residuals, linearity, normality, and multicollinearity were assessed, and no concerns were found. In line with our first research question, multiple regression analysis was used to test if LOC and meaning were predictive of perceived PTG in the sample. The results indicated that two control variables (i.e., internal LOC, and LOC chance) contributed significantly ( $p < .05$ ) to a model predicting PTG. Together, these two LOC variables explained 4.2% of the variance in PTG scores ( $R^2 = .04$ ,  $F(2, 221) = 4.81$ ,  $p = .009$ ). In addition, an internal LOC was found to make a slightly larger unique contribution ( $\beta = .17$ ,  $p = .01$ ) than chance ( $\beta = .13$ ,  $p = .04$ ) in predicting PTG.

In further exploring the data, we also explored whether meaning variables (meaning presence and meaning search) added to this model of PTG. Both meaning presence and meaning search significantly predicted PTG within the sample, and when combined with internal LOC and LOC chance, explained nearly 15% of the variance in PTG ( $R^2 = .149$ ,  $F(4, 221) = 9.52$ ,  $p < .001$ ). Both these models of PTG can be found in Table 2.

Table 2

*Results from Regression Analyses Examining Control and Meaning Variables on PTG*

Variable	$\beta$	$t$	$R^2$	$F$	$p$
<i>Model 1</i>			.04	4.81	.01
Chance	.13*	2.02			
Internal	.17**	2.51			
<i>Model 2</i>			.15	9.52	.00
Chance	.40**	2.81			
Internal	-.05	-0.66			
Presence	.38**	5.05			
Search	.14*	2.09			

*Note.* \*\* $p < .01$ , \* $p < .05$ . Internal = LOC subscale, Chance = LOC subscale, Presence = meaning presence, Search = meaning search.

### **Moderation Analysis**

Our final research question asked whether an internal LOC ( $M$ ) would moderate the relationship between meaning presence ( $X$ ) and perceived PTG ( $Y$ ) in those who identified as trauma survivors. We answered this research question by conducting a moderator analysis using the PROCESS macro for SPSS 24.0 (Hayes, 2013). Within this program, model 1 was used, representing the simple moderation of the research question. An internal LOC *did* significantly moderate the relationship between meaning presence and PTG ( $b = -.16$ ,  $t = -2.32$ ,  $p = .02$ ). Results from this analysis are presented in Table 3.

Trauma survivors who reported lower levels of internal LOC reported a significantly larger effect of meaning presence on PTG when compared to those with average and high internal LOC. Similarly, trauma survivors who reported an average level of internal LOC reported a significantly greater effect of meaning presence on PTG when compared to those who reported high internal LOC. Thus, the less internal LOC participants reported, the larger the effect that meaning presence played in perceived PTG.

Table 3

*Results from Moderation Analysis Examining the Effect of Meaning Presence ( $X$ ) on Perceived PTG ( $Y$ ) by an internal LOC ( $M$ ).*

	<i>Coeff</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Constant	-23.67	26.23	-.903	.368
Meaning Presence ( <i>X</i> )	3.54	1.06	3.33	.001
Internal LOC	4.09	1.82	2.24	.026
Moderation ( <i>X</i> x <i>M</i> )	-0.16	0.69	-2.32	.021
$R^2 = .11, MSE = 546.75$				
$F(3, 218) = 9.24, p < .001$				

*Note.* Meaning presence and internal LOC were mean-centered prior to analysis.

### Discussion

This study explored relationships between PTG, LOC, and meaning, in trauma survivors. Results point to a number of ways professional counselors can better understand PTG in trauma survivors, as well as ways to better support such an outcome with clients who have experienced trauma. The results of this study revealed a sample mean PTG score of 63.18, suggesting growth was seen in this sample of trauma survivors, and that PTG scores were equal or slightly lower than scores seen in similar samples of trauma exposed college students (Borowa, Robitschek, Harmon, & Shigemoto, 2016; Sheline & Rosén, 2017). The presence of PTG within the sample is consistent with an array of previous trauma research (e.g., Borowa et al., 2016; Kim & Oh, 2018), which suggests growth is possible even after difficult life experiences. Substantial research exists documenting the negative sequela that may follow a trauma experience (e.g., Badour, Resnick, & Kilpatrick, 2017; Weiss, Tull, Sullivan, Dixon-Gordon, & Gratz, 2016), but these results add to the growing body of literature suggesting an alternative experience also exists for clients who have survived trauma.

When looking at relationships present within the data, significant, positive correlations existed between PTG and internal LOC, as well as PTG and both meaning variables (i.e., meaning making, and the search for meaning). Despite these significant correlations, PTG did not hold significant correlations with the other LOC elements: chance or powerful others. PTG's relationship with an internal LOC is consistent with previous research noting the potential mental health benefits of an internal LOC. Internal

LOC being the strongest LOC predictor of PTG further supports previous research highlighting the emotional benefits of holding an internal LOC. Previous research has suggested relationships between an internal LOC and other post-trauma outcomes, such as fewer PTSD symptoms, and heightened resilience (Böttche et al., 2016; Cumming & Swickert, 2010; Huffman, et al., 2016; Karstoft, et al., 2015). The present study brings new dimension to these post-trauma outcomes associated with an internal LOC, by adding that an internal LOC may actually be predictive of PTG as well.

Meaning variables (i.e., meaning search and meaning making) have previously been found to be strong predictors of PTG in similar samples (e.g., Grad & Zeligman, 2017; Linley & Joseph, 2011; Zeligman et al., 2018), and the present study only adds strength to these previous findings. In contrast to previous studies, however, the present study found that both the presence of meaning, and search for meaning held positive significant relationships with PTG. Previous research has suggested that an already established presence of meaning (i.e., trauma survivors have already made meaning from their suffering, and are no longer searching to understand the trauma they experienced) may be associated with growth (Dezutter et al., 2013). However, individuals still striving to search for meaning may actually have negative relationships with growth (Dezutter et al., 2013; Linley & Joseph, 2011; Zeligman, et al., 2018). This contrast with the current findings supports the idea that searching for meaning holds an important cognitive role in eventually finding meaning, and could further play a role in the eventual experience of PTG.

Last, we explored if LOC served as a moderator between meaning and PTG. In our sample, an internal LOC significantly moderated the relationship between meaning presence and PTG. In other words, the effect of meaning presence on ones perceived experience of PTG is tied to their level of internalized LOC. Said differently; level of internal LOC affects the strength of the relationship between meaning presence and PTG. Given the strong empirical support of meaning presence serving as a predictor of PTG, internal LOC successfully moderating this connection brings important insight into this relationship. Findings further indicate that the less internal LOC participants reported, the larger effect meaning presence played on their perceived PTG. Thus, clients with a stronger internal LOC may be better able to reach PTG, regardless of any meaning they have yet been able to assign to their trauma experiences.



### **Counseling Implications**

The results of this study provide information on how professional counselors can better work with clients who have experienced trauma. First, it is important that counselors be aware of the concept of PTG, and see it as a realistic outcome for their trauma clients. In addition to working towards alleviating trauma clients' feelings of distress and pain, with a knowledge of PTG, professional counselors can also work towards facilitating PTG in their trauma survivor clients (Joseph & Linley, 2006). It is worth noting that facilitating PTG in trauma clients does not preclude symptoms of traumatic stress, but rather both experiences (posttraumatic stress and PTG) can exist simultaneously (Zeligman, Bialo, Brack, & Kearney, 2016). In facilitating such an experience, professional counselors might work to explore meaning in a client's life, including meaning that may exist from trauma.

Meaning making is often brought about through social interactions- making the interpersonal connection between client and counselor a unique opportunity to connect, process, and explore the topic of meaning. More specifically, counselors might further help support social interactions with their clients, and therefore promote PTG, through encouraging self-disclosure, and facilitating support groups (LeBarre & Riding-Malon, 2017; Levi-Belz, 2019). A safe space to connect with fellow trauma survivors (i.e., support, processing, or psychoeducational counseling groups) may be even more important in the facilitation of PTG in trauma survivors, as feelings of relatedness can help to facilitate growth, and promote healthy coping (Yeung, Lu, Wong, & Huynh, 2016).

Given the role an internal LOC has in experiencing PTG, as well as a number of other mental health benefits, professional counselors must consider clients' perceptions of control when attempting to case conceptualize trauma clients. In fully understanding a client's worldview, and including their perceptions of control, counselors should consider how clients take responsibility in their lives, as well as how they perceive obstacles and stressors. It is further worth noting that LOC can be impacted by cultural factors, including age and race (Radcliff, Ghriwati, Derlan, Velazquez, & Halfond, 2018). These differences may be impacted by religion, as people of color and older adults are often more likely to acknowledge external control through a higher power (Lachman, 1986). Paradoxically,

turning power over to God may also enable individuals to increase their internal LOC, suggesting religion and spirituality may have a role in assisting individuals to maintain control in their lives (Fiori, Brown, Cortina, & Antonucci, 2006). In fully gaining benefits associated with an internal LOC, professional counselors might also work with trauma clients to develop their own internal LOC.

With trauma survivors already often experiencing feelings of a loss of control, counselors might first work to increase client perceptions of control, rather than any tangible control over circumstances. Self-perception of control in itself may help trauma survivors to cope with trauma, including intrusion symptoms (Tedeschi & Calhoun, 1995). Acceptance-based behavioral therapy (see Roemer & Orsillo, 2009 for details on this treatment approach) may have a role in increasing perceived client control, as well as helping with emotional regulation, and decreasing client distress (Treanor, Erisman, Salters-Pedneault, Roemer, & Orsillo, 2011). Cognitive-behavioral techniques, including shifting negative self-talk, dysfunctional cognitions, and self-blame might have a place in beginning to shift client's LOC to an internal space (Böttche et al., 2016). Clients with lower PTG and lower internal LOC may be particularly in need of trauma-focused cognitive-behavioral therapy, although clients with higher PTG and a greater internal LOC may see faster benefits (Kleim et al., 2013).

### **Limitations and Directions for Future Research**

There are some limitations to consider when interpreting the results of this study. Data was collected from one southeastern university, which limits the generalizability of the results. Although this sample was diverse in terms of race, there are other cultural identities that may not be fully represented in this sample, further affecting the studies generalizability. Future studies might pull a more diverse sample by expanding data collection geographically, and including participants outside of a university setting. With this study being one of the first of its kind including these variables, future studies might also look at more specific samples, including samples experiencing a shared trauma type, or specifically looking at the experiences of certain cultural groups (e.g., women, participants of color).

This study also relied on cross-sectional data, which limits us from fully exploring anything outside of relationships. Future research that employs more longitudinal approaches would provide more meaningful results, and demonstrate how PTG may change over time in relation to these variables. Last, this study utilized self-report measures, which means the sample may have been influenced by social desirability- or participants answering items in a way they felt made them seem more favorable to the research team. Although this survey approach is common in research, future research could also employ perceptions from friends, family members, and observations, to gain additional insight into participants' levels of PTG, LOC, or meaning.

### **Conclusion**

This study serves as one of the first exploring relationships between PTG, LOC, and meaning in trauma survivors. Results support that PTG is a possible outcome for those who have experienced trauma, and that such an outcome has a relationship with meaning aspects, both meaning making and the search for meaning, as well as an internal LOC. Findings also suggest that an internal LOC moderates the relationship between meaning presence and PTG. With these findings in mind, professional counselors have an opportunity to facilitate personal growth in their trauma clients. Professional counselors might work towards this by exploring topics of meaning, as well as increasing clients' self-perceptions of control in their lives.

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