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Development and Validation of the Australian Preschool Attachment Scales

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Abstract

Objective: We aimed to develop and validate Australian guidelines to support accurate assessment of preschool attachment by researchers and by child clinical psychologists and allied pracitioners. **Method:** The Australian Preschool Attachment Scales (APAS) were developed through grounded item generation and validated with data from 121 Australian preschool child and parent dyads, for whom we compared codes assigned by certified researchers and naïve clinical coders. **Results:** APAS scores from reliable and naïve coders were highly correlated (r = 0.52 - 0.79). Accuracy of organised attachment classifications using the APAS was high for both reliable and naïve coders (κ = 0.89), and for identification of disorganised attachment (κ = 0.71). **Conclusions:** This pilot study supports use of the APAS to facilitate training in observation and interpretation of attachment behaviours by clinicians. Further research to improve the alignment between the APAS and the PACS is discussed.

Keywords

Attachment, Pre-School Children, Validity, Rating Scales, Assessment

Key Points

1) What is already known about this topic:

a) Preschool attachment security is a prognostic marker of later social-emotional well-being. Its accurate assessment is key to both developmental research and clinical intervention.

b) The existing method for assessing preschool attachment, the Preschool Attachment Classification System (PACS; Cassidy & Marvin, 1992), was designed for research settings only.

c) Training and certification in this method is expensive and lengthy.

2) What this topic adds:

a) The Australian Preschool Attachment Scales (APAS) was developed with data from Australian preschool child and parent dyads, and validated for certified researchers and naïve clinical coders.

b) This pilot study suggests the APAS may be a valid support for training in observation and interpretation of attachment behaviours by researchers and clinicians.

c) While the classification of preschool attachment for research purposes will always require certified reliability processes, the APAS may provide a cost-efficient, readily taught template for clinicians new to attachment assessment, to assist the recognition of key attachment behaviours in the preschool period.

1. Introduction

Attachment security in early childhood has established associations with positive social-emotional development trajectories, including fewer internalizing/externalizing problems, and lower emotional reactivity later in life (Granqvist et al., 2017; Groh et al., 2017). In the clinical context, assessment of attachment in early childhood is central to identification of risk and appropriate triage to prevention and intervention. In the preschool years, as with infancy, reliable attachment assessment depends on observation and coding of parent-child interaction under set conditions (McIntosh, Olsson, Schuijers et al., 2021). Several methods of preschool attachment assessments have been developed; one of the most widely used being the Cassidy and Marvin (1992) Preschool Attachment Classification System (PACS). This method has been largely confined to developmental research, with limited application to clinical practice, due to the resource-intensive nature of training in micro-coding of observed attachment behaviours.

This pilot study sought to address this gap by providing a means for clinicians with experience in child development but without formal attachment coding training to accurately record and recognise attachment-based interactions in parent-preschooler dyads. We report here on the structure and reliability of the Preschool Attachment Scales (APAS; McIntosh et al., 2017), and validation against the PACS, for reliable (i.e., certified) coders. We then examine accuracy

of prediction of attachment classifications by naïve (i.e., uncertified) coders when using the APAS.

1.1. The Measurement of Attachment in the Preschool Years

To date, the gold standard method for assessing attachment in infants is the Strange Situation Procedure (SSP) using the Ainsworth scales for coding organised attachment (Ainsworth et al., 1978) and the Main and Solomon (1990) indices for disorganisation and disorientation. Attachment behaviours in the preschool period present differently from those in infancy, necessitating assessment through a modified method (Cassidy & Marvin, 1992). At four years of age, language capabilities, perspective-taking abilities and goal-corrected behaviours are well developed, together with some degree of self-regulation (Conti-Ramsden & Durkin, 2012; Marvin, 1977). Language is often used by the preschooler in place of physical proximity-seeking to re-establish psychological connection with their caregiver following separation. Avoidance is more subtle and nuanced in the preschooler, reflecting learned representations of social norms (e.g., that ignoring an adult is socially inappropriate). By four years of age, disorganised attachment behaviours predominantly shift to controlling forms of behaviour, maintaining a lack of coherence characteristic of infant attachment disorganisation. These changes add significant complexity to the assessment of attachment in the preschool years. As a result, the gold-standard Ainsworth infant coding system and the Main and Solomon (1990) disorganised index no longer apply for preschoolers.

Three validated methods of classifying preschool attachment have predominated the literature to date: the Attachment Q-Sort (Waters & Deane, 1985), the Preschool Assessment of Attachment (Crittenden, 1992), and the Preschool Attachment Classification System (Cassidy & Marvin, 1992). Of these, the PACS remains the gold-standard assessment for preschool attachment classification, and is utilized by trained and reliable coders, based on a modified SSP. For each, an attachment classification is determined: Secure (B), Avoidant (A), Ambivalent/Resistant (C), Disorganised (D), and Insecure/Other (I/O).

The coding of attachment behaviours using the PACS involves careful attention to behavioural markers such as proximity and contact, body orientation, verbal conversation/discourse, gaze, and affect. Coders note such behavioural markers demonstrated by the child during the SSP toward their attachment figure with specific attention to the two reunion episodes, then compare their formulations to qualitative descriptions of each attachment classification (and sub-classification) in the PACS manual (Cassidy & Marvin, 1992).

A set of continuous rating scales based on the PACS was proposed by Moss and colleagues (2015) in the Preschool Attachment Rating Scales (PARS). The PARS was found to be a reliable and valid tool for the assessment of preschool attachment, demonstrating good convergent validity with independently coded categorical attachment (Deneault et al., 2020). However, as with the PACS, the

PARS is a similarly challenging and resource-intensive method to learn and employ, and founded on USA data.

1.2. Obstacles to Uptake of Attachment Methods in Clinical Settings

Use of formal attachment assessment methods is predominantly confined to developmental research settings. Obstacles are many, and include the time and expense of obtaining reliability in the PACS. New coders are typically required to undertake a two-week training program with a certified trainer, followed by successful completion of multiple preschool attachment cases, involving at minimum 80% match to the trainer's codes. Coding workshops are not frequently offered and involve travel and extended time away. Unlike the infant attachment coding system (Ainsworth et al., 1978), preschool coders must distinguish qualitative differences between attachment groups, increasing the likelihood of misclassification. Finally, the validity of scales such as the PARS has only been assessed among reliable coders. Their validity for clinician use remains untested, and fit for purpose with Australian data is unestablished. To address these limitations, the APAS (McIntosh et al., 2017) was developed to 1) facilitate a large research task in the Australian Temperament Project of classifying preschool attachment organisation in our Generation 3 study (see Method for details), and 2) assist trainee clinicians in our lab, in the accurate observation of relevant attachment behavioural patterns. Below we report on first validation data of the tool for these purposes.

1.3. The Current Study

The specific aims of the study were threefold: 1) to examine the reliability and validity of the APAS compared to the PACS when both were assessed by certified coders; 2) to compare attachment classification results on the APAS between certified coders of preschool attachment and clinical psychologists previously naïve to preschool attachment classification, and 3) to discuss the implications of findings for enhancing clinical assessment of attachment security in the preschool years.

2. Method

2.1. Sample

Participants were 121 four-year-old child-parent dyads drawn from a nested observational study of attachment, completed at four years of age, within a larger Australian intergenerational study of social and emotional development, The Australian Temperament Project Generation 3 Study. The cohort commenced in 1983 with recruitment through geographically distributed maternal and child health centres in the state of Victoria. Generation 1 (G1) parents were approached for participation four to eight months after the birth of the study child (Generation 2: G2). The study has since tracked the social-emotional develop-

ment of the main G2 cohort across 38 years. The initial cohort comprised 2443 G2 infants from urban and rural areas of Victoria, Australia. Details on recruitment strategy, sampling and sample characteristics are provided elsewhere (Prior, Sanson, Smart, & Oberklaid 2000). Attrition in the cohort has been approximately 1% per annum (Letcher et al., 2012).

Since 2011, over 1100 Generation 3 (G3) offspring born to G2 participants have been identified through a systematic screening process and assessed in pregnancy, at 10 weeks postpartum, and at 1 and 4 years of age. A nested sample within the Generation 3 cohort participated in two observations of attachment and caregiving when the G3 child was one and four years of age (Life@1 and Life@4 assessments respectively). The current study comprises all cases available during the study window, namely the first 121 G2/G3 child-parent dyads who participated in the Life@4 observational study of attachment. Specifically, 98 families including 23 couples (32 fathers and 89 mothers) participated with a total of 109 children (48 boys and 61 girls; 57% first born), 12 children participated with both father and mother. At the time of the SSP assessment, the average age of children was 4.31 years (SD = 0.18). All parents in this study were born in Australia. Of the 121 parents, 64% were from born from two Australian parents, and 36% had mixed ancestry.

2.2. Procedure

G2 participants in the ATP-G3 study were invited to a play session within two months of their G3 child's fourth birthday (Life@4). Filmed observations of child-parent dyads were conducted using the Cassidy and Marvin (1992) modified SSP for preschoolers. Each Life@4 SSP video recording was analyzed by staff in the ATP-G3 Melbourne Attachment and Caregiving (MAC) Lab and coded using the purpose-designed APAS coding sheet. Staff comprised two groups: reliable coders trained by Professor Emeritus Robert Marvin and certified in the PACS (Cassidy & Marvin, 1992), and naïve coders who were clinical psychology postgraduate students, trained in the general concepts of attachment theory and observations, but not certified in observational attachment assessment. APAS cases included in this pilot study were independently coded by naïve and reliable coders (the latter including authors, ET, AB, JO and JM). All coders viewed the full SSP recording at least once before assigning scores on the APAS. Emphasis for scoring was placed on the two reunion episodes, although indicators of disorganisation or disorientation were coded based on any instance during the SSP where the child was with their parent. Following completion of the APAS, reliable coders assigned an attachment classification (and sub-classification) based on the Cassidy and Marvin (1992) PACS.

2.3. Measures

2.3.1. Cassidy-Marvin (1992) Modified SSP for Preschoolers

The modified preschool Strange Situation Procedure (SSP) consisted of seven

episodes: *Episode* (1) introduction to the play room; Episode (2) free-play between child and parent (3 minutes); Episode (3) stranger enters the room and converses with parent, followed by interaction between child and stranger (3 minutes); Episode (4) the first separation, parent leaves child with stranger (3 minutes or less); Episode (5) the first reunion, parent re-enters room and stranger leaves (3 minutes); Episode (6) the second separation, parent leaves child on their own (3 minutes or less); and Episode (7) the second reunion, parent re-enters room (3 minutes). Separations were shortened if the child is distressed. Sessions were video recorded.

2.3.2. Preschool Attachment Scales (APAS)

The structure of the APAS mimics the domains in the PACS, and all items are drawn directly from descriptions in the PACS manual. Wording and weighting of scale items were refined over a two-year period by the preschool coding team of the ATP-G3 MAC Lab, through collaborative micro-analysis of videos of preschool SSPs by four reliable coders of preschool attachment trained by Professor Emeritus Robert Marvin (i.e., ET, AB, JO and JM).

The APAS comprises two primary scales: 1) the BAC (Secure/Avoidant/Ambivalent) Scale (38 items) which assists with classification of the organised attachment groups, and 2) the D/IO (Disorganised/Insecure-Other) Index (22 items), which assists with the classification of disorganised attachment groups. The BAC Scale is further categorized into five subscales: Proximity and Contact (nine items), Body Orientation (seven items), Speech (eight items), Gaze (four items), and Affect (ten items).

On the BAC Scale, coders rate items on a 5-point scale (1 = not at all like this child to 5 = very much like this child) based on the extent to which a given attachment behaviour is demonstrated by a child. The BAC Scale produces 38 scores for each item which are compared against proto-typical scores for each attachment classification (Secure/Avoidant/Ambivalent) which were pre-determined through expert consultation with four reliable coders. On completion of ratings on the BAC Scale, correlations for each scale were calculated by comparing coder-assigned APAS scores of a dyad with these pre-determined scores of proto-typical dyads. Higher BAC scores (i.e., correlations) indicate better fit with the respective attachment classification.

Similar to the infant attachment classification system, the APAS also employs a separate rating scale for assessing disorganised attachment. The D/IO Index was derived from Main and Solomon's (1990) indices of infant disorganisation and disorientation and Cassidy and Marvin's (1992) descriptions of Disorganised and Insecure-Other attachment classifications. Items on the D/IO Index were binary (0 = not observed, 1 = observed), and scores were summed to generate a total D/IO Index score. For examples of the APAS scales for a case classified "Secure" on the Excel template, see **Supplementary Figure S1** and **Figure S2**.

To assess inter-coder reliability using Cassidy & Marvin's (1992) PACS, 85 of the 121 SSP videos (70.2%) were double coded by reliable coders, and disagree-

ments were resolved by conferencing or by referral to an expert (i.e., Professor Emeritus Robert Marvin). Inter-coder reliability was 83.5% (κ = 0.65) for the two-way (Secure/Insecure) classification, and 80.0% (κ = 0.72) for the four-way (ABCD) classification.

2.3.3. Analytic Plan

Data were analyzed using Stata 15.0 (StataCorp, 2019). Internal reliability of APAS subscales was examined using Cronbach's alpha. To ensure sufficient power for analysis, we aimed to include approximately equal proportions of each of the four attachment classifications in thie study however proportions were constrained by the natural distribution of attachment classifications. This corresponds with the proportions reported in a meta-analysis by Verhage et al. (2016), where 48.3% of children were classified Secure, 13.6% classified Avoidant, 9.2% classified Ambivalent-Resistant, and 21.5% classified Disorganised. Pearson correlations were used to determine the associations between reliable and naïve coders' scores on the five BAC subscales and the BAC Total scale (item level descriptives were reported in **Table S1**). Criterion validity was assessed by comparing APAS BAC Subscale scores (with each attachment prototype) across Secure, Avoidant and Ambivalent-Resistant classifications. To do so, linear regression analyses estimated via Generalized Estimating Equations were used to account for clustering within individuals (i.e., each individual has a score for each subscale and total score). Specifically, APAS scores were regressed onto PACS classification and a categorical variable indicating APAS measurement, and the interaction of the two. Results were visualized for both reliable and naïve coders separately.

To identify the D/IO Index cut-off score that distinguished a D/IO attachment classification from an organised attachment classification, we utilized a receiver operating characteristic (ROC) curve analysis using the Youden Index which provides equal weighting to both specificity and sensitivity (Ruopp et al., 2008; Youden, 1950). This was conducted on all cases coded by a reliable coder.

To ascertain estimated attachment classification using the APAS scales, the highest APAS BAC Total Scale score was used to assign the organised attachment classification (i.e., Secure, Avoidant, or Ambivalent-Resistant). Assignment of a D/IO attachment classification on the APAS D/IO Index based on the cut-off score would override assignment of an organised attachment classification on the BAC Total Scale. Following this, the Cohen's Kappa statistic was used to determine the accuracy of the attachment classification assigned from the APAS Scales compared to attachment classification assigned by reliable coders using the Cassidy and Marvin (1992) system. These comparisons were conducted two ways: 1) organised attachment classifications only, excluding known D/IO attachment classifications; and 2) all attachment classifications, including D/IO attachment classifications. These were conducted separately for reliable coders using the APAS Scales and naïve coders.

3. Results

3.1. Descriptives

Of the 121 child-parent dyads, 38.8% were classified Secure (n = 47), 26.5% Avoidant (n = 32), 13.2% Ambivalent-Resistant (n = 16), and 21.5% Disorganised/Insecure-Other (n = 26) on the PACS. Attachment classification distributions did not differ for mother-child and father-child dyads, χ^2 (3) = 3.24, p = 0.524, or by child gender χ^2 (3) = 2.95, p = 0.399.

3.2. Internal Reliability of the BAC Subscales

Table 1 presents the Cronbach's alpha and inter-item correlation coefficients of the five BAC Subscales (Proximity and Contact, Body Orientation, Speech, Gaze, and Affect) and the BAC Total scale for reliable and naïve coders. All Cronbach's alpha values were acceptable (i.e., α > 0.70 as recommended by McCrae et al., 2011). Inter-item correlation coefficients were largely within the acceptable range (i.e., r = 0.15 - 0.50 as recommended by Clark & Watson, 1995). The Body Orientation subscale was just out of this range (r = 0.52 for both reliable and naïve coders). The Gaze subscale was above the recommended range (r = 0.74 for reliable coders, and 0.70 for naïve coders), potentially indicating item redundancy within this subscale.

3.3. Associations between Reliable and Naïve Coder Scores on the APAS BAC Subscales

Table 2 presents the Pearson correlation coefficients comparing reliable and naïve coders' scores for each APAS BAC subscale in each attachment classification (i.e., Secure, Avoidant, and Ambivalent-Resistant). BAC scores were highly correlated (r = 0.52 - 0.79), with the exception of the Gaze subscale for Ambivalent-Resistant attachment at .18. This indicates strong alignment between reliable and naïve coders.

3.4. BAC Subscales: Pattern for Organised Attachment Classifications

Figure 1 presents the results of the linear regression analyses illustrating differences

Table 1. Internal reliability of APAS B/A/C Subscales.

APAS B/A/C Subscales	No. of items	α		Inter-item Correlation Coefficients	
		Reliable	Naïve	Reliable	Naïve
Proximity and Contact	9	0.70	0.77	0.21	0.28
Body Orientation	7	0.89	0.88	0.52	0.52
Speech	8	0.78	0.83	0.31	0.37
Gaze	4	0.92	0.90	0.74	0.70
Affect	10	0.89	0.89	0.44	0.44
Total	38	0.95	0.96	0.36	0.39

Table 2. Alignment between reliable and naïve coders.

APAS B/A/C Subscales	Correlation between Reliable and Naïve Coders			ICC between Reliable and Naïve Coders		
	Secure	Avoidant	Ambivalent	Secure	Avoidant	Ambivalent
Proximity and Contact	0.60	0.76	0.71	0.60	0.75	0.70
Body Orientation	0.69	0.71	0.18	0.69	0.71	0.17
Speech	0.63	0.69	0.76	0.63	0.68	0.76
Gaze	0.67	0.67	0.52	0.67	0.67	0.52
Affect	0.63	0.66	0.69	0.62	0.63	0.68
Total	0.68	0.73	0.79	0.68	0.73	0.78

Note. $p < 0.05$ for all correlations reported.

between BAC scores (determined by non-overlapping confidence intervals) across the formal PACS attachment classifications. The mean BAC score refers to the correlation with the proto-typical item scores given by reliable coders to each of the Secure, Avoidant, and Ambivalent-Resistant categories. The corresponding 95% confidence intervals were plotted for the five BAC subscales and the BAC Total scale.

We found that all BAC subscale and Total scores with the Secure attachment prototype were highest in children classified as Secure by the PACS method. Similarly, all BAC subscales and Total scores with the Avoidant attachment prototype were highest for children classified Avoidant in the PACS method. Patterns were slightly less consistent for BAC scores with the Ambivalent-Resistant attachment prototype. Specifically, three of the five subscales (i.e., Proximity and Contact, Speech, Affect) and Total scores with the Ambivalent-Resistant attachment prototype were highest for children with ambivalent-resistant attachment. The Body Orientation and Gaze subscale scores did not clearly distinguish children with ambivalent-resistant attachment from children with secure or avoidant attachments. Overall, results were consistent across both reliable and naïve coders.

3.5. Identification of Cut-Off Value for D/IO Index

The Youden index from the ROC curve analysis indicated that a score of 4 or above distinguished Organised from Disorganised and Insecure-Other (D/IO) attachments (AUC = 0.81 [95% CI 0.71 - 0.90], sensitivity = 0.72, specificity = 0.74).

3.6. Accuracy of the Attachment Classification Assigned from the APAS Rating Scales

The organised attachment classifications assigned from the APAS rating scales by reliable and naïve coders are presented in Table 3 (i.e., excluding D/IO attachment classifications), and in Table 4 for all attachment classifications (i.e.,

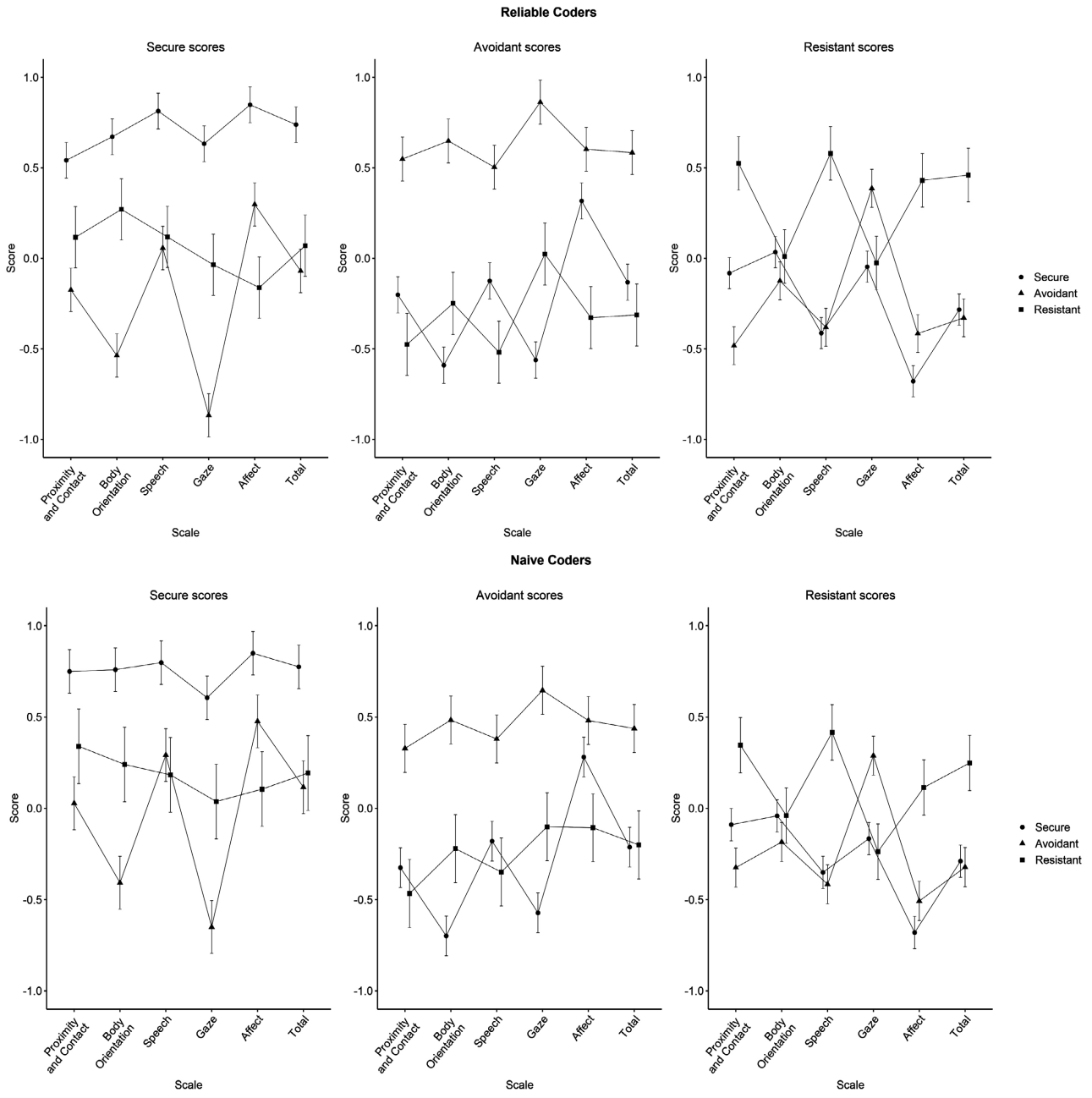

Figure 1. Differences between attachment classifications and BAC scores for reliable and naïve coders.

including D/IO attachment classifications). Each table presents findings separately for reliable coders and naïve coders on the APAS, for accuracy of the APAS derived classification with that of the reliable coder's derived classification in the PACS method.

Using Cohen's suggestions for interpretation of the Kappa statistic (Cohen, 1960; McHugh, 2012), the assignment of organised attachment classifications from the APAS rating scales by reliable coders had almost perfect accuracy: κ = 0.89 with 93.68% agreement. Naïve coders had high accuracy in assigning the correct attachment: κ = 0.71 with 83.16% agreement. Accuracy was lower when

Table 3. Cross-tabulation of 3-way PACS attachment classification by reliable coder with 3-way attachment classification from the APAS Total Scale, as completed by reliable and naïve coders separately.

		PACS Attachment Classification (reliable coder)			
		Secure	Avoidant	Ambivalent	Total
APAS Total Scale (Reliable coders)	Secure	47	1	4	52
	Avoidant	0	30	0	30
	Ambivalent	0	1	12	13
	Total	47	32	16	95
APAS Total Scale (Naïve coders)	Secure	45	7	6	58
	Avoidant	2	24	0	26
	Ambivalent	0	1	10	11
	Total	47	32	16	95

Table 4. Cross-tabulation of 4-way PACS attachment classifications by reliable coder with 4-way attachment classification from the APAS Total Scale, as completed by reliable and naïve coders separately.

		PACS Attachment Classification (reliable coder)				
		Secure	Avoidant	Ambivalent	Disorganised	Total
APAS Total Scale (Reliable coders)	Secure	42	1	4	5	52
	Avoidant	0	19	0	2	21
	Ambivalent	0	1	8	0	9
	Disorganised	5	11	4	19	39
	Total	47	32	16	26	121
APAS Total Scale (Naïve coders)	Secure	41	4	4	10	59
	Avoidant	1	18	0	2	21
	Ambivalent	0	0	9	0	3
	Disorganised	5	10	3	14	38
	Total	47	32	16	26	121

incorporating D/IO attachment classifications. Accuracy was in the moderate-to-substantial range for reliable coders ($\kappa = 0.61$ with 72.73% agreement), and in the low-to-moderate range for naïve coders ($\kappa = 0.46$ with 62.81% agreement).

4. Discussion

Current methods for assessing preschool attachment are resource-intensive and often impractical for implementation within either research and clinical settings. This study presents a novel set of quantitative rating scales, the Australian Preschool Attachment Scales (APAS), designed to augment formal classification

tools for research purposes, and to support accuracy of observation of attachment by clinicians without attachment coding training. The APAS demonstrates strong validity and high inter-rater reliability at two levels. First, the APAS shows strong concordance between coders certified in the Cassidy-Marvin (1992) PACS method. Second, and importantly for potential application in clinical settings, the APAS shows strong correspondence between certified coders and naïve coders trained in clinical psychology but not trained in the PACS method.

For both reliable and naïve coders, the APAS three-way Secure-Insecure (BAC) subscale scores were highly associated with the PACS attachment classification (i.e., Secure, Avoidant, Ambivalent-Resistant). Ratings were less consistent with regard to the Body Orientation and Gaze subscales for classification of Ambivalent-Resistant attachment compared to Secure and Avoidant attachments. This is clinically consistent with the contradictory approach and avoids use of body and gaze by infants in this category, as discussed below. Accuracy of assignment of disorganised attachment classifications was also sound although lower than for the organised groups, for both types of coders.

4.1. Psychometric Properties of the APAS

The five BAC subscales (i.e., Proximity and Contact, Body Orientation, Speech, Gaze, and Affect) demonstrated strong internal consistency. The inter-item correlation coefficients for the five BAC subscales were within acceptable range, except for the Body Orientation and Gaze subscales. This suggests item redundancy within these subscales. Further item refinement using a larger sample may be possible, to accurately capture the distinguishing behaviours.

4.2. Distinction between the Three Organised Attachment Classifications

The APAS demonstrated sound discriminant ability, with all coders (with or without certification in the formal classification system) accurately distinguishing the patterns of behaviours associated with secure, avoidant and ambivalent/resistant attachment classifications. Findings suggest that the APAS BAC subscales are particularly useful in identifying attachment behaviours relevant for secure and avoidant classifications. Our results show that accurate identification of ambivalent-resistant attachments rests heavily on the Proximity, Speech and Affect subscales. Increased weighting on these three BAC subscales may be warranted, given lower differentiation on the Body Orientation and Gaze subscales.

This finding aligns with the classification dilemmas faced using other coding methods, given children with ambivalent-resistant attachments prototypically demonstrate a mix of approach and avoidance/resistance to their caregiver when in need. Scoring these conflicting behaviours may prove challenging, even for reliable coders, and attention to the patterning of behaviours across all subscales is

ultimately needed in the PACS as well as the APAS.

4.3. Accuracy of Organised/Disorganised Attachment Distinctions

Using the APAS "BAC Total score", findings showed accurate assignment of organised three-way attachment classifications for both reliable and naïve coders. Combining the APAS BAC and D/IO Index, the accuracy of assignment of disorganised attachment classifications remained in the moderate range, but was slightly lower. This may be due to the piloted scoring approach of the D/IO Index, where each item was assigned a binary score. We have since modified this approach to a 5-point scale which provides more nuanced ratings of each item on the D/IO Index.

4.4. Strengths and Limitations

The study has a number of strengths. First, the APAS is theoretically and empirically based on the current gold-standard observational assessment of preschool attachment, the Cassidy & Marvin (1992) PACS. Second, the independent completion of the APAS by reliable and naïve coders allowed for comparison of scores and strengthens the potential clinical utility of this new instrument. Third, the naïve coders were postgraduate students in training to be clinicians. The findings from our study therefore suggest the potential of the APAS to refine clinicians' assessment of preschool attachment. In the first place, becoming familiar with the items and sub-scales in **Supplementary** Figure S1 and Figure S2 may enhance the clinician's focus on relevant behaviours within an observation of child-parent interaction. Care must be taken to establish the observational conditions under which attachment behaviours are elicited, as per the conditions of the pre-school SSP.

However, there are important limitations to note. All items are behaviourally specific, rated for the extent to which they were present. The inclusion of items aiding appraisal of the coherence and timing of certain behaviours may assist identification of Ambivalent-Resistant and Disorganised attachment groups. Our naïve coders were all clinical psychology postgraduate students and our findings may not apply to other fields of training. We emphasise that clinical reasoning remains central in the classification of complex attachment presentations, and this is predicated on clinical training and expertise in socio-emotional development. Until replication studies are completed in outer social science and therapeutic disciplines, caution is warranted in the use of the APAS. Further, assigning formal classifications for any legal or statutory purpose through the APAS alone is not supported. The APAS was designed to enable better recognition of key attachment behaviours; use for clinical diagnosis of attachment-related disorders or neurodevelopmental disorders is neither conceptually nor empirically supported at this time.

5. Conclusion

Enhancing the accessibility and accuracy of attachment assessment is important

in both research and clinical settings, for accurate identification of children at risk of socio-emotional problems. Findings from this pilot study suggest that the APAS is a valid and reliable set of scales that could support researchers in formal classification of attachment in preschoolers. Uniquely, we found the APAS has demonstrated utility for clinicians, enabling accurate observation of preschool attachment, to a level comparable with coders certified in preschool attachment assessment. The APAS may serve as a cost-efficient, readily taught template for students new to attachment assessment in the preschool period, to assist the recognition of key attachment behaviours. While the classification of preschool attachment for research purposes will always require certified reliability processes, the APAS may play a valuable role in public mental health settings in supporting focus and accuracy of behavioural observations.

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Data Availability

The authors confirm that the data supporting the findings of this study are available within the article and/or its supplementary materials.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Supplementary

	#	Item	Child's Scores (1 Not at all like this child - 5 Very much like this child)	Prototypical Scores Secure	Avoidant	Ambivalent
PROXIMITY AND CONTACT	1	Obvious increase in physical & psychological proximity at or soon after reunion	3	4	1	3
	2	Obvious increase in distance at or soon after reunion	1	1	3	2
	3	Child *initiates* physical contact that is comfortable, casual or intimate, and more than fleeting	3	4	1	3
	4	Child *comfortably* accepts parent's bids for contact or close proximity (score 3 if no bids)	4	5	1	2
	5	Child uses contact to control parent	1	1	1	4
	6	Child comes close only for "business," e.g., fixing toys, and not for play or comfort	1	1	4	1
	7	Child is rough/aggressive in contact with parent	1	1	1	4
	8	Child is ambivalent about contact (e.g. contact facing away, hanging on helplessly)	2	1	1	5
	9	Shows no interest in having close proximity to /contact with parent	2	1	4	1
BODY ORIENTATION	1	Child orients regularly and openly towards parent for play/interaction	5	5	1	2
	2	Child leans close into or towards parent	4	4	1	4
	3	Child initiates close *comfortable* face-to-face position, even briefly	3	4	1	2
	4	Child uses body orientation to *steadil* y focus away from interaction with parent	1	1	5	3
	5	Child responds easily and readily (relaxed) to P's initiation, even when oriented away from P	5	5	1	3
	6	Child displays moderate (but obvious) avoidance	1	1	5	2
	7	Child obviously declines interaction with parent, and/or does not answer parent	1	1	4	3
SPEECH	1	Child initiates verbal interchange and maintains interaction through speech	5	5	2	3
	2	Speech is personal, intimate, comfortable and fluid.	5	5	2	3
	3	Child is eager to discuss his/her activities and may invite parent to join in play	4	5	2	3
	4	Child shows interest in parent's thoughts and activities	4	5	2	3
	5	Speech is accompanied by avoidant behavior, e.g., averted eye gaze, or body	1	1	5	3
	6	"Running commentary"by child instead of reciprocal dialogue; not seeking conversation	1	1	4	2
	7	Child engages in fruitless disagreement/arguments with parent	1	1	1	5
	8	Whining, complaining	1	1	2	5
GAZE	1	Child looks more than fleetingly at parent, and without delay when reunions begin	4	5	2	3
	2	Child looks at parent readily and comfortably at appropriate times throughout the SSP	5	5	2	3
	3	Full, open, direct and/or lingering gazes	4	5	1	2
	4	Consistent lack of glances/looks at parent at times they would be expected	1	1	5	3
AFFECT	1	Child displays genuine interest in parent's return	4	5	2	3
	2	Child's affect is positive; warm smiles, appropriate laughter - relaxed pleasure	5	5	2	2
	3	Any negotiations with P are with a minimum of fuss or negative affect	4	5	4	1
	4	Affect is balanced - neither overly-bright or overly-dull	4	5	3	2
	5	If P seeks interaction, C seems uncomfortable	1	1	4	3
	6	Child is angry and argumentative	1	1	1	4
	7	Child is petulant or tantrumy	1	1	1	4
	8	False, over bright affect,"toothy" grins; false smiles	1	1	2	3
	9	Abrupt changes in expression - not smooth	1	1	2	4
	10	Child's comfort prevails	4	5	2	1
		Correlations for child's BAC scores with each organized attachment classification		**Secure**	**Avoidant**	**Ambivalent**
			Proximity & Contact	**0.925**	**-0.410**	**-0.080**
			Body Orientation	**0.980**	**-0.919**	**0.084**
			Speech	**0.980**	**-0.400**	**-0.370**
			Gaze	**0.962**	**-0.889**	**-0.192**
			Affect	**0.985**	**0.257**	**-0.794**
			Total Scale	**0.967**	**-0.386**	**-0.307**

Figure S1. Example of the BAC Scale for a case classified "Secure" on the Excel template.

	Indices of Disorganization	Child's Scores (0 Not observed, 1 Observed)
1	Whispers to self	0
2	Confusion, or apprehension with parent	0
3	Helpless, fragile	0
4	Rapid distance or hiding from parent	0
5	Affect inappropriate to context/mismatched with parent	0
6	Depressed affect - extremely disengaged	0
7	Incomplete/undirected movements	1
8	Stereotypic movements	0
9	Dazed disoriented expressions	0
10	Seems fearful of/ inhibited with parent	0
11	Other indice, unexplained by context	0
	Indices of Controlling-Punitive	**Child's Scores (0 Not observed, 1 Observed)**
1	Punitive, hostile, controlling	0
2	Refusal to interact	0
3	Demands/Commands parent to do things	0
4	Derogatory/rude to parent	0
5	Manipulates parents behaviours	0
6	Other indice, unexplained by context	0
	Indices of Controlling-Caregiving	**Child's Scores (0 Not observed, 1 Observed)**
1	Overly bright	0
2	Persistent helping/care-giving of parent	1
3	On best behaviour with parent - 'trying too hard'	0
4	Other indice, unexplained by context	0
	Insecure-Other	**Child's Scores (0 Not observed, 1 Observed)**
1	Strong avoidance & strong proximity (A/C split)	0
2	Affectively dysregulated	0
3	Fearful/Inhibited (also see disorganised indices)	0
4	Disengaged from parent (beyond avoidant)	0
5	Other indice, unexplained by context	0
	Total D/IO Index Score	**2**

Figure S2. Example of the D/IO Index for a case classified "Secure" on the Excel template.

Table S1. Item level descriptives.

		Reliable			Naïve		
		M	SD	95% CI	M	SD	95% CI
Proximity and Contact	Item 1	2.60	1.27	(2.38, 2.83)	3.13	1.27	(2.91, 3.35)
	Item 2	1.90	0.97	(1.73, 2.07)	1.57	0.97	(1.40, 1.74)
	Item 3	2.30	1.26	(2.09, 2.51)	2.45	1.26	(2.21, 2.70)
	Item 4	2.91	1.10	(2.75, 3.06)	3.14	1.10	(2.91, 3.37)
	Item 5	2.15	1.24	(1.92, 2.38)	1.69	1.24	(1.48, 1.90)
	Item 6	2.26	1.10	(2.05, 2.48)	1.70	1.10	(1.54, 1.87)
	Item 7	1.74	0.93	(1.56, 1.92)	1.38	0.93	(1.23, 1.53)
	Item 8	2.62	1.35	(2.38, 2.86)	2.12	1.35	(1.88, 2.35)
	Item 9	2.50	1.11	(2.31, 2.69)	1.96	1.11	(1.76, 2.16)
Body Orientation	Item 1	3.36	1.04	(3.19, 3.52)	3.37	1.04	(3.17, 3.58)
	Item 2	2.74	1.12	(2.56, 2.93)	2.79	1.12	(2.57, 3.00)
	Item 3	2.28	1.21	(2.07, 2.49)	2.50	1.21	(2.28, 2.73)
	Item 4	2.54	1.11	(2.35, 2.72)	2.07	1.11	(1.86, 2.27)
	Item 5	3.15	1.04	(2.99, 3.31)	3.20	1.04	(2.99, 3.41)
	Item 6	2.81	1.19	(2.61, 3.01)	2.65	1.19	(2.43, 2.88)
	Item 7	2.37	1.10	(2.19, 2.55)	2.07	1.10	(1.85, 2.28)
Speech	Item 1	3.73	1.06	(3.54, 3.91)	3.48	1.06	(3.28, 3.68)
	Item 2	3.03	1.06	(2.86, 3.21)	3.13	1.06	(2.92, 3.34)
	Item 3	3.45	1.12	(3.25, 3.64)	3.32	1.12	(3.11, 3.53)
	Item 4	3.07	1.08	(2.89, 3.26)	3.21	1.08	(3.01, 3.42)
	Item 5	3.17	1.15	(2.97, 3.36)	2.81	1.15	(2.59, 3.03)
	Item 6	2.01	0.99	(1.82, 2.20)	1.57	0.99	(1.42, 1.72)
	Item 7	2.02	1.28	(1.78, 2.25)	1.69	1.28	(1.47, 1.91)
	Item 8	2.17	1.30	(1.93, 2.40)	2.02	1.30	(1.79, 2.26)
Gaze	Item 1	3.12	1.17	(2.91, 3.32)	2.92	1.17	(2.70, 3.13)
	Item 2	2.93	1.03	(2.76, 3.11)	2.83	1.03	(2.63, 3.02)
	Item 3	2.79	1.12	(2.60, 2.98)	2.86	1.12	(2.64, 3.07)
	Item 4	2.99	1.22	(2.80, 3.18)	2.65	1.22	(2.41, 2.89)
Affect	Item 1	3.54	1.00	(3.37, 3.71)	3.78	1.00	(3.59, 3.96)
	Item 2	2.83	1.07	(2.66, 3.00)	2.97	1.07	(2.76, 3.18)
	Item 3	3.17	1.32	(2.95, 3.39)	3.29	1.32	(3.04, 3.54)
	Item 4	3.09	1.19	(2.90, 3.28)	3.12	1.19	(2.88, 3.35)
	Item 5	2.45	1.12	(2.27, 2.63)	2.11	1.12	(1.89, 2.33)
	Item 6	1.85	1.07	(1.64, 2.06)	1.41	1.07	(1.25, 1.58)
	Item 7	1.93	1.16	(1.71, 2.14)	1.65	1.16	(1.46, 1.85)
	Item 8	2.13	1.08	(1.93, 2.34)	1.64	1.08	(1.46, 1.81)
	Item 9	2.28	1.15	(2.08, 2.49)	1.83	1.15	(1.63, 2.04)
	Item 10	2.98	1.11	(2.80, 3.15)	3.36	1.11	(3.14, 3.57)