Supporting the adolescent mother-infant relationship: Preliminary trial of a brief perinatal attachment intervention

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Introduction

There is great diversity among adolescent mothers and their families (Wakschlag & Hans, 2000). Overall, however, adolescent mothers and their infants are at increased risk of attachment relationship difficulties and an adverse developmental trajectory, compared with adult mother-infant populations (Berlin, Brady-Smith, & Brooks-Gunn, 2002; Hubbs-Tait, Osofsky, Hann, & McDonald Culp, 1994; Lounds, Borkowski, Whitman, Maxwell, & Weed, 2005). Developmental and contextual features of adolescent motherhood influence the quality of relationship that adolescent mothers are able to form with their infant (Berlin, et al., 2002; Hubbs-Tait, et al., 1994; Lounds, et al., 2005; Osofsky, Hann, & Peebles, 1993). Features that adversely affect the adolescent mother-infant relationship, such as poverty, educational attainment and poor social support, may not be easily directly addressed. However, attachment interventions can support the mother-infant relationship, infant attachment and child development in vulnerable populations and even brief, preventive interventions can be effective (Berlin, et al., 2008; Cicchetti, Rogosch, & Toth, 2000; Cicchetti, Rogosch, & Toth, 2006; Cooper, et al., 2009; Juffer, Bakermans-Kranenburg, & van IJzendoorn, 2007; van den Boom, 1994).

Although pregnant and parenting adolescents are difficult to engage and to retain in research (Hans, 2005; Kaiser & Hays, 2006; Logsdon & Gohmann, 2008; Osofsky, Culp, & Ware, 1988; Raphael-Leff, 2012), attachment interventions have been successfully tested in adolescent motherhood and shown to influence the mother-infant relationship, infant attachment and child development (Field, Widmayer, Stringer, & Ignatoff, 1980; Mahoney, Boyce, Fewell, Spiker, & Wheeden, 1998; Mayers, Hager-Budny, & Buckner, 2008; Moran, Pederson, & Krupka, 2005). Their acceptability appears enhanced if they are opportunistic and tailored to the particular ecology of becoming a mother in adolescence (Black & Teti, 1997; Cardone, Gilkerson, & Wechsler, 2008; Raphael-Leff, 2012). Effective programs have been home-based, school based or designed to fit with existing service use (Field, et al., 2000; Koniak-Griffin, et al., 1992; Mayers, et al., 2008; Moran, et al., 2005; Widmayer & Field, 1980).

A small research base suggests adolescent mothers may accept, and benefit from, a brief intervention with a mother-infant relationship focus as part of their perinatal care, although evidence is limited to mostly short-term studies in small populations (Black & Teti, 1997; Field, et al., 2000; Hart, Field, & Nearing, 1998; Koniak-Griffin, Verzemnieks, & Cahill, 1992; Widmayer & Field, 1980). With this small, positive evidence base in mind, the two-session AMPLE (Adolescent Mothers' Program: Let's meet your baby as a person) intervention was developed for pregnant adolescents attending maternity care (Thomson-Salo, 2013 in press). The current study used the AMPLE intervention to address the following question: might a brief attachment intervention, added to routine hospital maternity care,

assist with the transition to motherhood for pregnant adolescents by improving the quality of the relationship they are able to form with their infant? This question had not previously been addressed in an Australian population.

Methods

Research Design

The study used a pre test-post test, control group design. Usual maternity care plus a mother-infant relationship focus (the AMPLE Intervention) in an intervention group was tested against usual care in an age-matched control group.

Participants and procedures

Participants were pregnant adolescents recruited from the Young Women's Program (YWP) at the Royal Women's Hospital (RWH) in Melbourne, Australia. The hospital is a tertiary maternity and university teaching hospital with 7000 births per year. The multi-disciplinary YWP cares for 120 pregnant adolescents per year, aged 19 or less at enrolment. Participants were a convenience sample, recruited and assigned sequentially to the intervention or control group from October 2009-February 2011. The control group was recruited first, with a 4-month washout period before intervention group recruitment to avoid control group contamination by the intervention group.

Eligible adolescents had a viable pregnancy and were deemed mature minors by the YWP manager, competent to give informed consent and able to complete a questionnaire in English. Participants were recruited by interview in the YWP clinic, following NHMRC guidelines for ethical recruitment of mature minors in research (NHMRC, 2007; Sanci, Sawyer, Weller, Bond, & Patton, 2004). Informed consent was obtained and baseline data collected at recruitment.

Of 117 eligible adolescents, 97 agreed to participate (response rate 82.9%) and 73 completed the study (retention rate 75.3%). Completion rates were similar in control and intervention groups. Eligible adolescents who refused to participate (n=20) were likely to be from a culturally and linguistically diverse background (n=12). There were no significant differences between study completers and study non-completers across demographic, psychosocial or birth outcome variables. The flow of participants through the study is shown in Figure 1.

Figure 1

Participants completed a questionnaire at baseline (antenatal recruitment) and endpoint (home-visit at infant age 4 months). Participants were filmed with their infant at the study endpoint.

To promote retention, several contact details were collected at baseline. Recruits were contacted 2 monthly to check details and to organise the endpoint visit, with a text reminder. Recruits received two \$20AUD vouchers (post-birth and post-assessment), photographs and an edited DVD showing moments of mutual mother-infant enjoyment with background music. Retention incentives were based on previous studies with adolescent mothers. One study without incentives had high attrition that compromised assessment of the intervention (Drummond, et al., 2008). Another that offered toys and McDonald's vouchers achieved zero attrition apart from recruits who moved suburb (Mayers, et al., 2008).

Control Group Condition

Control group participants received YWP 'usual care': a psychiatric referral tool (Laios, Steele, & Judd, 2010) and an adolescent risk assessment (HEADss) (Goldenring & Rosen, 2004) are completed during a midwife consultation to determine psychosocial service needs, followed by consultation with an obstetrician. Visits are then monthly till 30 weeks, fortnightly till 36 weeks and weekly from 36 weeks. Continuity of carer is a priority. Additional visits and referrals (eg social work, psychiatry, infant mental health, dietitian, fetal-maternal medicine) are organised as required. Childbirth education is offered in groups and individually. Post-birth, visits are organised with a hospital midwife, Maternal and Child Health Nurse (MCHN) and general practitioner. Usual care and associated referrals were unaffected by participation in the study. Additional time-equivalent sessions to match the intervention group sessions were not provided, nor was it possible to offer the AMPLE intervention at completion of the study.

Intervention Group Condition

Intervention group participants received the 2-episode AMPLE intervention in addition to usual care, in late pregnancy and just after birth in hospital.

The AMPLE intervention is elaborated elsewhere (Thomson-Salo, 2013 in press). In brief, the intervention is founded in attachment theory and aims to influence the quality of mothers' interaction with their baby by helping them to see their baby as a person with social capacities and experiences from the beginning. It was developed for adolescents in consultation with a peer support worker, to fit with routine maternity visits, to be deliberately brief, informal rather than didactic, and to have a simple message. It was not pre-tested in a

pilot study. The intervention was provided by an infant mental health clinician and general practitioner. It can be offered by a variety of maternity professionals after brief training.

The antenatal episode involves a 45-60 minute small group session to watch and discuss six brief video clips focussing on the social capacities of newborn infants, their urge to connect, the importance of comforting a crying baby, negative feelings that may arise with a crying baby and how to handle these feelings. The neonatal episode is a 30-60 minute individual session that builds on the antenatal session by exploring their own infant's social capacity and urge to connect with them through witnessing this and talking about it.

The two sessions are interactive. Participants are welcome to invite partners and support persons, as in routine maternity care, but the intervention focus is the mother's relationship with her baby.

Measures

Data were collected from the medical record and self-administered questionnaire:

Demographics

Baseline age, country of birth, cultural identity, religious identity, partner status, living arrangements, occupational status for self and partner, highest year of school completed, income and benefit status.

Psychosocial history

Baseline data (YWP psychiatric referral tool responses on mental health issues, abuse, alcohol and substance use, stressors in past year, family history of mental health issues, perception of social support from partner and others, and history of Child Protection in childhood, living arrangements of parents during childhood, age when parents separated if relevant, main mother figure in childhood), and neonatal data (referral to the Victorian government's two-tiered service for vulnerable infants: 'Childfirst' or Child Protection Service (CPS) (State Government of Victoria, 2011).

Obstetric outcomes

Parity, gestation at first hospital visit, baby gender, birth-weight, gestation at birth, mode of delivery and infant feeding method on discharge.

Depression symptoms

At baseline, the Centre for Epidemiological Studies Depression Inventory (CES-D) screened for depressive symptoms (Radloff, 1977). The CES-D has 20 items, each scored on a 4-point scale (0 = rarely or none of the time to 3 = most or all of the time). Four items are reverse scored. Scores range from 0 to 60. Reliability and validity are acceptable across a range of demographic characteristics, including adolescence (Radloff, 1977; Radloff, 1991).

Cronbach's alpha in the current study was .83 for the pre-test CES-D and .88 for the post-test CES-D.

Parental bonding style in childhood

At baseline, the Parental Bonding Instrument (PBI) assessed the parental bonding style experienced by participants during childhood (Parker, et al., 1979). This Likert scale has two sub-scales, 'care' (C) and 'overprotection' (O). Items are scored 0-3, with 12 items on the C subscale and 13 items on the O subscale. The PBI has good reliability and validity; it has acceptable test-retest reliability and is independent of mood effects (Black Dog Institute, 2011). This study used the grandmother C subscale score, as previously used with adolescent mothers (Easterbrooks, et al., 2005). Higher C subscale scores indicate a more optimal parental bonding history. The scale for grandfathers could not be analysed due to missing data. Cronbach's alpha in the current study was .90 on the C subscale.

Mother-infant interaction

At endpoint, the Emotional Availability Scales (EAS) 4th Edition assessed mother-infant interaction at home. These validated, global scales allow assessment in varied settings and cultures, by coding 20 minutes filmed interaction (Biringen, 2005, 2008; Biringen, Robinson, & Emde, 2000; Bornstein, et al., 2006; Easterbrooks, et al., 2005; Biringen & Easterbrooks, 2009). The scales assess six dimensions of Emotional Availability (EA) in the relationship: four for the adult (sensitivity, structuring, non-intrusiveness, and non-hostility), and two for the child (responsiveness to adult and involvement of adult). EA relates to infant attachment security (Biringen, et al., 2005). A direct score on a Likert scale of 1-7 for each dimension was used for data analysis.

Video data was generated as follows. Twenty minutes free play was recorded, followed immediately, where possible, by a five-minute separation-reunion episode (total 25 minutes). Mothers were invited to 'be, play and talk as usual with their baby', as if they had 20 minutes spare. They were given three toys they might use. Family members were asked not to take part. The researcher left the room during filming. If baby was not distressed after 20 minutes, the mother also left the room 'as if she had to go and do a brief job'. She returned to her baby after 2 minutes, or sooner if distressed. Three minutes later, the researcher entered and switched off the camera.

An EAS expert in the United States coded the video data, blind to intervention or control group. The coder coded '20-minutes play' initially, before observing the separation-reunion episode. The coder then generated a second coding for '20 minutes play plus brief separation-reunion episode'. A small number of videos were checked for inter-rater reliability.

Power Calculations and Sample Size

Sample Power version 2 in SPSS was used for sample size and power calculations, using a 2-sided t-test framework for the detection of a difference between independent groups with 1:1 allocation between groups. With alpha set at 0.05, a sample size of 70 (35 in each group) offered .82 power to detect a 0.7SD difference in the key outcome of Emotional Availability subscale scores between control and intervention groups, corresponding to a clinically meaningful medium (0.5) to large (0.8) effect size. The study therefore aimed to recruit 90-100 participants, anticipating attrition of 20–30% from other studies, including one at the YWP (Leitch, 1999; Quinlivan, et al., 2004).

Statistical analyses

Control group recruits who gave birth at the hospital and completed endpoint assessment were classified as study completers. Intervention group recruits were completers if they received both intervention sessions and the endpoint assessment.

SPSS 19.0 was used (IBM, 2010). All statistical significance tests were two-tailed. Categorical data were summarised using frequencies and percentages. Continuous variables were inspected for departures from normality. Responses to a validated scale were considered incomplete if they had 15% or more missing values and were excluded from statistical analyses. For a small number of complete responses with missing data, values were imputed using missing data analysis.

One-sample t-tests compared mean scores in continuous psychosocial measures with other study populations. Independent samples t tests for continuous variables, and Chi Square analyses for categorical variables (or Fisher's exact test where the expected cell count was <5), examined for between group differences in study completers vs. non-completers. These tests also examined for pre-test between-group differences in intervention and control groups across demographic, psychosocial, and obstetric variables. Independent samples t-tests provided between-groups, post-test comparisons of mother-infant interaction (assessed using EAS direct subscale scores for 'free play only' and for 'free-play-plus-brief-separation-reunion'). Multivariate Analyses of Variance (MANOVA) examined for between groups differences in overall Emotional Availability.

Results

The study population was characterized by demographic diversity, psychosocial vulnerability and robust obstetric outcomes.

Baseline demographics

The mean age of the study population (N=97) was 18.8 years (range 15.7–20.9). Seventy-two participants (74.2%) were born in Australia or New Zealand, of whom 2 were Aboriginal and Torres Strait Islanders (ATSI) (2.1%). The remaining 25 were born in 16 different countries. Fourteen (14.4%) were born in African countries and 7 (7.2%) in countries of the Asia-Pacific region. The proportion of births to teenage mothers who were ATSI (2.1%) was slightly lower than expected from Victorian (4.8%) and national (3.6%) data (Australian Bureau of Statistics, 2008b). The proportion of mothers born outside Australia was similar to the national figure of 25.3% for all births in 2008 (Laws, Li, & Sullivan, 2010). The distribution of mothers' ages was slightly younger than the national age distribution for teenage mothers: 55.5% participants were age 18–19, whereas 18–19 year olds accounted for 69% of teenagers giving birth nationally in 2010 (Australian Bureau of Statistics, 2010). The proportion of married participants (9.7%) was similar to the national figure of 10% for teenage mothers (de Vaus, 2004). Overall, therefore, the demographics of the study population were broadly similar to the population of adolescent mothers in Victoria and Australia.

Baseline and neonatal psychosocial characteristics.

Family of origin findings were that 58 (66.7%, n = 87) participants' parents did not live together, and 15 participants (15.5%, n = 97) had been under a Child Protection Order at some time in childhood (up to age 16). Sixty seven (76.1%, n = 88) participants nominated their birth mother as the main mother figure in their life. Four participants nominated 'no-one'. Thirty-nine participants (45.9%, n = 85) reported a family history of mental health problems. There was a low perception of grandmothers as caring in childhood: the mean C subscale score for grandmothers' bonding style was 26.62 (± 7.81), compared with 28.5 among those aged 20 or less (n = 63) in a normative Australian community sample (N = 500) (Parker, et al., 1979), and 29.05 (± 5.14) in a US study of 80 young mothers (< age 21 at the time of birth) (Easterbrooks, et al., 2005).

Baseline responses to the YWP psychiatric screening assessment are shown in table 1. Past history of anxiety and depression were commonly reported. There was a low prevalence of alcohol and substance use, self-reported by 6 participants (6.9%), as seen in previous studies of pregnant adolescents and interpreted as reflecting a combination of under-reporting, relatively low-risk adolescent population characteristics and a desire to avoid risks to the infant (East & Felice, 1996a). Perceptions of social support were positive overall: forty-four mothers (57.1%) reported a high level of perceived emotional support from both partner and others and only 3 (3.6%) reported no emotional support. The mean CES-D score at baseline (n = 91) was 15.46 (± 8.21).

Twenty-nine babies (30.5%) were identified as vulnerable or at risk and were referred to the two-tier system for at-risk families in Victoria: either notification to CPS (20%) or referral to Child FIRST (10.5%) for additional support (State Government of Victoria, 2011). No Victorian or national data were available for comparison.

Table 1. Psychiatric referral tool responses of the study population (N = 97).

Variable	n (%)
Positive response to psychiatric screening assessment question on:	
Past history of depression (n = 88)	36 (40.9)
Past history of anxiety (n = 87)	17 (19.5)
Past history of self harm or suicide attempt (n = 88)	23 (26.1)
Past or current abuse (physical, emotional, sexual or verbal) (n = 80)	37 (46.3)
Major stressors in preceding year (n = 87)	43 (49.4)
Current alcohol or substance use (n = 87)	6 (6.9)
Feeling anxious lately (n = 88)	29 (33.0)
Perception of emotional social support	
High support (from partner and others) (n = 77)	44 (57.1)
Medium support (from partner and others) (n = 77)	29 (37.7)
No support (from a partner or others) (n = 77)	4 (5.2)

Note. Some data were missing. Actual n values are shown for each variable in brackets. Data are presented as numbers with valid percentages in brackets.

Obstetric outcomes.

Obstetric data were available for 95 participants. Mean gestation at first hospital antenatal visit was 15.6 weeks (range 7–35 weeks). Seventy-four participants (76.3%) had their first visit before 20 weeks gestation. All pregnancies were singleton. The proportion of babies born at term (37–41 weeks gestation) was 91.6%, comparing favourably with the national figure of 90.9% across all age groups (Australian Bureau of Statistics, 2010). The proportion of low birth weight babies (< 2.5 kg) was 4.2% compared with 8% nationally across all age groups (Australian Bureau of Statistics, 2010). Fifty three % babies were female and 47% male. The Caesarean section rate (16.9%) was the same as the national rate for teenage mothers in 2008 (16.7%). Rates of breastfeeding initiation were the same as nationally (92%) and the rate of exclusive breastfeeding on discharge from hospital (78.8%)

was similar to the national rate of 80% at infant age 1 week (Australian Government Department of Health and Ageing, 2009).

Pre-test Comparison of Study Completers in Control and Intervention Groups (n = 73)

Baseline and obstetric data were examined for significant pre-test differences between control and intervention groups across a broad array of variables of interest. Table 2 shows t-test results for continuous variables and table 3 shows Chi-Square test (or Fisher Exact test) results for dichotomous variables for study completers. Since African American adolescent mothers have been the subject of scrutiny in many studies in the USA and have been considered to be at greater risk than other ethnic groups, the number of mothers born in Africa (n = 13) or not (n = 60) was compared in the two groups as well as the numbers of mothers born in Australia/New Zealand or not. In Australia, ATSI mothers and their infants are viewed as particularly vulnerable. One of two ATSI participants completed the study so no statistical between group comparison was performed. No significant pre-test or pregnancy outcome differences were found between the two groups.

Table 2. Pre-Test Comparison of Control and Intervention Groups, T-Test Results (n = 73).

Variable	Control (n = 38) Mean $\pm$ SD	Intervention (n = 35) Mean $\pm$ SD	t (df)	Sig. (p) (2 tailed)
Age of mother at birth of baby	18.88 $\pm$ 1.16	18.90 $\pm$ 1.22	-.07 (71)	.95
Years of schooling completed	10.55 $\pm$ 1.20	10.45 $\pm$ 1.15	.35 (69)	.73
CES-D at baseline	14.82 $\pm$ 8.42	17.42 $\pm$ 7.48 (n = 33)	-1.37 (69)	.18
Gestation at first antenatal visit	15.66 $\pm$ 6.99	16.37 $\pm$ 5.45	-.48 (71)	.63
Gestation at birth	39.55 $\pm$ 1.54	38.77 $\pm$ 2.49	1.63 (71)	.108
Baby birth-weight (kg)	3.35 $\pm$.55	3.27 $\pm$.64	.59 (71)	.56

Note. CES-D = Centre for Epidemiological Studies Depression Inventory. Some data were missing. Where relevant, actual n values are shown in brackets.

Table 3. Pre-Test Comparison of Control and Intervention Groups (study completers), Chi-Square tests (or Fisher Exact tests) (n = 73).

Variable	Chi-Square Value ^a	df	Asymp. Sig (2 sided) (p)
Country of birth (Australia/NZ, other)	2.34	1	.13
Born in Africa	.60	1	.44
Partner status	.822	1	.36
Homeless in pregnancy	1.1	1	.29
High emotional social support	.13	1	.72
Positive response to psychiatric screening assessment question on:			
Past depression	.73	1	.39
Past anxiety	.13	1	.72
Past self harm or suicide attempt	.29	1	.59
Past abuse	.26	1	.61
Stressors in previous year	.72	1	.40
Current alcohol or substance use ^b			1.00 (Exact Sig)
Feeling anxious lately	.25	1	.62
Parity ^b (zero/other)			1.00 (Exact Sig)
Mode of birth (vaginal/ caesarian)	2.13	1	.15
Baby gender	1.07	1	.30
Infant identified as vulnerable	.00	1	1.00
Baby breast fed exclusively on discharge (n = 61)	.82	1	.37

Note. a = Pearson Chi-Square values are shown with Yates Continuity Correction for a 2 by 2 table; b = At least 1 cell (25%) with an expected cell count of less than 5. Two-tailed Fisher's Exact Test p value reported.

Post-test Comparison of Study Completers in Control and Intervention Groups (n = 73)

Control and intervention groups were compared on Emotional Availability in the mother-infant relationship at infant age 4 months. To examine the overall impact of the intervention on EA, MANOVA were conducted. There was an overall effect of the intervention on EA, as assessed in the 20 minute play-only episode, $F(6,65) = 5.05$, $p < .01$, partial $\eta^2 = .32$. There was also an overall effect of the intervention on EA, as assessed in the 25 minute play-plus-separation-reunion episode, $F(6,48) = 2.72$, $p = .02$, partial $\eta^2 = .25$. Independent samples t-test results for EA subscales are shown in Table 4. Significant post-test differences were found between the intervention and control groups. The intervention group scored significantly better in two subscales (maternal non intrusiveness and maternal non-hostility) when a 20-minute episode of play alone was observed and coded for Emotional Availability ($n = 73$). Effect sizes were medium to large (Cohen's $d = .66$ and 1.06 respectively) (Cohen, 1988). When a 25-minute episode of play-plus-brief-separation-reunion was observed and coded ($n = 55$), the intervention group scored significantly better in three EA subscales (maternal sensitivity plus maternal non intrusiveness and maternal non-hostility). Again, effect sizes were medium to large (Cohen's $d = .66$, $.66$ and $.85$ respectively).

Table 4. Emotional Availability (EA) Subscales, t-Test Results (n = 73)

Variable	Mean ($\pm$ SD) Control (n = 38)	Mean ($\pm$ SD) Intervention (n = 35)	Difference Mean (SE)	95% CI	t	df	P	Effect size Cohen's d
<u>20 mins play only (n = 73)</u>								
Maternal sensitivity	4.71 $\pm$ 1.03	5.13 $\pm$.99	.42 (.24)	-.06 to .89	-1.77	71	.08	.42
Maternal structuring	4.90 $\pm$.71	4.64 $\pm$.75	-.25 (.17)	-.59 to .90	1.47	71	.15	-.36
Maternal non-intrusiveness	5.57 $\pm$.70	6.20 $\pm$.46	.63 (.14)	.36 to .91	-4.62*	64.2	.00	1.06
Maternal non-hostility	5.94 $\pm$.80	6.41 $\pm$.61	.48 (.17)	.14 to .81	-2.84	70	.01	.66
Child responsiveness	4.66 $\pm$.86	4.74 $\pm$.77	.09 (.19)	-.30 to .47	-.45	71	.66	.10
Child involvement	3.91 $\pm$.87	4.10 $\pm$.79	.19 (.19)	-.20 to .58	-.98	71	.33	.23
<u>25 mins play-plus-separation-reunion (n = 55)</u>								
Maternal sensitivity	4.58 $\pm$ 1.09	5.24 $\pm$.90	.66 (.27)	.12 to 1.20	-2.45	53	.02	.66
Maternal structuring	4.85 $\pm$.80	4.69 $\pm$.68	-.16 (.20)	-.56 to .24	.80	53	.43	-.22
Maternal non-intrusiveness	5.77 $\pm$.63	6.23 $\pm$.43	.46 (.15)	.15 to .76	-3.06*	38.6	.00	.85
Maternal non-hostility	6.02 $\pm$.79	6.48 $\pm$.60	.46 (.19)	.09 to .84	-2.48	1	.02	.66
Child responsiveness	4.54 $\pm$.87	4.76 $\pm$.78	.22 (.22)	-.23 to .67	-.97	53	.34	.27
Child involvement	3.96 $\pm$.95	4.22 $\pm$.74	.27 (.23)	-.19 to .72	-1.17	53	.25	.31

Note. * Equal variances not assumed. Non-parametric testing of all variables (using the Independent Samples Mann-Whitney U Test) confirmed a significant difference ($p < .05$) in the distribution of each of the variables above found to have a p value $< .05$ using the Independent Samples T-Test. Some data were missing. Actual n values shown in brackets.

Discussion and Conclusion

This study sought to determine whether a two-session perinatal attachment intervention could support the transition to motherhood by improving the quality of relationship adolescent mothers were able to form with their infant. The study established a positive relationship between receipt of the intervention and mother-infant relationship quality, in a real world setting and in a population that is hard to reach. The intervention was acceptable to culturally diverse pregnant adolescents. AMPLE intervention recipients had significantly better Emotional Availability (EA) than control group participants. EA subscale scores were significantly better in both reduced negative maternal behaviours (hostility and intrusiveness) and increased positive maternal behaviours (sensitivity). Inclusion of a very brief separation-reunion episode at the end of twenty minutes of free play enhanced discrimination between control and intervention groups. The effect sizes suggest the differences were clinically

valuable, not just statistically significant. All remaining subscale scores, apart from maternal structuring, were better for the intervention group but the differences were not significant.

The study has several strengths. The high recruitment and retention rates were impressive and provide support for modest retention incentives. Previous projects with pregnant and parenting adolescents have experienced such high attrition rates they have been unable to answer the research question (Drummond, et al., 2008; Letourneau, 2001). Other studies of brief, relationship-focused interventions with adolescent mothers have assessed intervention effects close to the intervention, making it difficult to interpret their enduring impact or clinical value (Leitch, 1999; Black & Teti, 1997; Hart et al, 1998). This study delayed outcome assessment for four-months and used a well-established, reliable measure. Analysis of mother-infant interaction was blind to group and was completed by an EAS coding expert in the USA.

There are three main study limitations. The two-group, pre-post, convenience-sample study design avoided contamination of the control group at the single participating hospital. The observed relationship between intervention and mother-infant relationship quality appears causal but this is not proven. Nonetheless, recruitment of the convenience sample over a short timeframe minimises the chance the intervention effect was attributable to changes in clinical practice at the hospital. Secondly, it was beyond the study scope to follow participants to infant age one year, to examine the duration of intervention effects on EA and to examine for effects on infant attachment. Thirdly, the intervention elements and population characteristics linked to change in the mother-infant relationship cannot be determined. Whilst multi-disciplinary professionals can provide the AMPLE intervention after brief training, the fact that an infant mental health expert provided the intervention may have been critical to its success. The therapeutic relationship may have been important even though AMPLE lasts only two-sessions. As one participant put it “I liked that, even when everything else was scary”. The importance of the therapeutic relationship over type of approach used has been previously emphasised, but usually in reference to longer-term preventive or psychotherapeutic interventions (Stern, 1998). The population may also have been particularly susceptible to brief intervention since attachment interventions are more effective in vulnerable populations and pregnant adolescents are in a neuroplastic developmental phase (Dahl, 2004; Berlin, et al., 2008).

The obvious next step is a cluster-randomised controlled trial (RCT) to replicate the findings, confirm causality and assess intervention elements effecting change. A future trial should extend to age 12 months and assess infant attachment. Assessment of mothers’ mentalisation capacity (ability and tendency to treat their baby as a psychological agent) would be valuable (Sharp, & Fonagy, 2008). The interplay between adolescent mothers’ mentalisation about their infant, interaction quality and infant development needs further

elucidation to develop better interventions. An intervention study of the family system in adolescent motherhood would be challenging but could tease out the interplay between intervention effects, family relationships and the mother-infant relationship.

This study adds to evidence for the effectiveness of brief, preventive attachment interventions (Berlin, et al., 2008; Koniak-Griffin, et al., 1992; Moran, et al., 2005). The implication for maternity services is that incorporation of a brief, evidence-based attachment focus into routine care of young mothers has potential to influence their infants' developmental trajectory. Such a focus might act as both intervention and clinical screening tool, helping identify families needing further relationship-focussed support. Maternity hospitals could establish an 'attachment friendly' culture more broadly by implementing evidence-based routine practices to support the mother-infant relationship, just as WHO/UNICEF accredited 'Baby Friendly Hospitals' have established practices to support breast feeding (Phillipp & Merewood, 2004).

WHAT IS ALREADY KNOWN ON THIS TOPIC

Mother-infant interaction quality and infant attachment are compromised in adolescent motherhood compared with adult motherhood, with adverse consequences for child development.

Attachment interventions can improve mother-infant interaction and child development.

Pregnant and parenting adolescents can be hard to engage and retain in preventive programs.

WHAT THIS STUDY ADDS

The brief, two-session, AMPLE intervention is acceptable to pregnant adolescents.

The intervention is associated with better mother-infant interaction four months later.

Maternity hospitals may have an important and affordable role to play in supporting development of infants of young mothers.

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Contributors SN designed and conducted the study, managed data analysis and took the lead writing the paper. FT-S developed and provided the intervention. SM contributed to data management. FJ supervised the study. All authors had full access to all data in the study and can take responsibility for data integrity and the data analysis accuracy. All authors took an active role in writing the submitted paper and approved the final version. SN is the guarantor.

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