

The Effects of Pregnancy-Adaptation Training on Maternal-Fetal Attachment and Adaptation in Pregnant Women With a History of Baby Loss

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Abstract

Background: Studies have shown that educating mothers can improve their adaptation to pregnancy and motherhood roles. There are also studies that have investigated the effects of certain interventions on maternal-fetal attachment. However, studies on the effects of maternal adaptation training on maternal-fetal attachment in mothers with a history of fetal or baby loss are rare.

Objectives: The aim of this study was to determine the effects of a pregnancy adaptation training package on maternal-fetal attachment in pregnant women with a history of baby loss.

Patients and Methods: This quasi-experimental study was conducted on 60 pregnant women with previous fetal or neonatal death in 2014. The women were randomly divided into an experimental group (n=30) and a control group (n=30). The pregnant women in the experimental group received routine prenatal education in addition to four sessions of a pregnancy adaptation training package. The control group received only routine prenatal education. The data were collected using a demographic questionnaire, Cranley's maternal-fetal attachment scale, and a prenatal self-evaluation questionnaire at the beginning and at the end of the study. The data analysis was conducted using the Mann-Whitney U, Wilcoxon, chi-square, Fisher's exact, and spearman correlation coefficient tests.

Results: Before the intervention, there were no statistically significant differences between the study and control groups in terms of maternal-fetal attachment (P = 0.280) and adaptation to pregnancy (P = 0.883). However, following the intervention, the mean score of the maternal-fetal attachment was significantly higher in the experimental group, when compared with the control (77.57 ± 7.23 vs. 61.53 ± 2.62; P = 0.001). In addition, the mean post-intervention adaptation to pregnancy score was significantly lower in the experimental group than in the control group (118.89 ± 8.12 vs. 126.38 ± 4.17; P = 0.001).

Conclusions: The pregnancy adaptation training package increased the adaptation and maternal-fetal attachment scores in pregnant women with a history of baby loss.

Keywords: Adaptation, Attachment, Baby Loss, Educational Package

1. Background

Although pregnancy is a normal physiological event, it signifies important changes in a woman's life, and necessitates her adaptation to these changes (1). According to Kiehl et al. women's adaptation to motherhood roles during pregnancy positively affects their self-confidence and life satisfaction in the postpartum period (2). A mother's adaptation to pregnancy occurs through several stages, helping not only the mother to accept the pregnancy and its roles (3), but also strengthening the maternal-fetal attachment, which is important during both during pregnancy and in the postpartum period (4).

Maternal-fetal attachment can increase a mother's healthy behaviors with regard to nutrition, appropriate maternal care, and a desire to know about the fetus (5,

6). These behaviors lead to satisfaction with the pregnancy outcome, and promotion of the mother's and infant's health (7-10). According to the attachment theory, maternal-newborn attachment does not form after delivery, but occurs through pregnancy (7, 11-14).

Previous studies have shown that maternal-fetal attachment is influenced by a number of factors, such as maternal age and self-concept, available social support, and a history of baby loss (15-17). Several studies have reported that mothers with a history of fetal or infant death show resistance to a new pregnancy (18), and have less or delayed attachment behaviors (7, 15, 18, 19). In addition, it has been shown that the psychological symptoms of fetus or infant death remain at least for 12 months, and may even last for years or decades (20). Some of the studies conducted in

western countries have shown that educating mothers can improve their adaptation to pregnancy and motherhood (3, 21-23); however, Arcamone (21) and Hamilton-Dodd et al. (24) found no effect of education on the prenatal and postpartum adaptations of pregnant women (21, 24). Nonetheless, none of the aforementioned studies included mothers with histories of fetal or baby loss. Some studies in Iran have investigated the effects of interventions, such as attachment behavior education or fetal movement counting, on maternal-fetal attachment (17, 25, 26) and reported positive effects. However, Saastad et al. reported that fetal movement counting had no effect on maternal-fetal attachment (27).

Presently, some educational classes are routinely held for all pregnant Iranian mothers (28), with a specific focus on women with a history of baby loss. However, there are limited studies on maternal-fetal attachment among those mothers with a history of baby loss, while the necessity for such a study is obvious (17). Considering the abovementioned arguments and lack of studies on the effects of pregnancy adaptation education on mothers with a history of baby loss, especially in Iran, it is still questionable whether pregnancy adaptation education can affect maternal-fetal attachment in pregnant women with a history of baby loss.

2. Objectives

This study aimed to determine the effects of a pregnancy-adaptation training package on adaptation and maternal-fetal attachment in pregnant women with a history of baby loss.

3. Patients and Methods

This quasi-experimental study was conducted on 60 pregnant women with histories of fetal or infant death referred to four healthcare centers in Mashhad city, Iran, between September and February of 2014. The inclusion criteria were: Iranian nationality, willingness to participate in the study, age range between 18 and 35 years old, writing and reading literacy, gestational age of 14 to 20 weeks, experiencing a fetal or infant death in the last five years, no addictions, no medical problems during pregnancy (such as diabetes and hypertension), no severe family conflict, and no live childbirths after the baby loss. The women were excluded in cases of physiological crises (such as divorce or a relative's death during the study), if they decided to withdraw from the study, or if they were absent for more than one educational session.

The sample size was calculated based on a previous study by Akbarzadeh et al. who investigated the effects of

learning attachment behaviors on anxiety and maternal fetal attachment in primiparous pregnant women, and reported that after the intervention, the mean and standard deviation of the maternal-fetal attachment in the control and the intervention groups were 64.6 ± 3.5 and 61.1 ± 5.1 , respectively (25). Then, considering $\beta = 0.10$, $\alpha = 0.01$, $\mu_1 = 64.6$, $\mu_2 = 61.1$, $S_1 = 3.5$, and $S_2 = 5.1$, a total of 25 subjects were estimated to be needed in each group. However, we recruited 30 subjects in each group to compensate for possible attrition.

A two-stage sampling method was performed to select the required subjects. First, a list of healthcare centers in Mashhad city was prepared ($n = 40$), and using a random numbers tabulation, four centers were randomly selected. These centers were from different regions in the city and covered people from various socio-economical levels. The researcher wrote the names of the centers on cards, and two centers were randomly allocated to either the control or the intervention groups. Then, all of the files of the pregnant women with histories of fetal or infant death in each healthcare center were reviewed to find women with inclusion criteria. In each center, 15 pregnant women were conveniently selected and, through telephone calls, were invited to the clinic for an eligibility assessment. If a woman did not agree to participate in the study, another eligible one was chosen. Those women who did agree to take part in the study were briefed about the study structure, completed the study questionnaires, and were informed that they would be in the study for about three months. They were told that they would be asked to answer the study questionnaires twice during the study, and that after a short time, they would be invited to attend a few educational sessions.

3.1. Study Instrument

A three-part instrument was used in this study. The first part of the instrument included a demographic and pregnancy information form, including questions about the subject's age, educational level, job, socio-economical level, gravidity, parity, number of abortions or fetal deaths, gestational age, and the spouse's educational level and job. Cranley's maternal-fetal attachment scale (CMFAS) and a prenatal self-evaluation questionnaire (PSEQ) were used as the second and the third parts of the study instrument.

The CMFAS is composed of 24 items, and each item is scored by a five-point Likert scale ranging from 1 (definitely no) to 5 (definitely yes). This scale measures the extent to which the mother-to-be is engaged in a behavior which is expressing a sense of belonging and interaction with the development of the pregnancy. The total score is between 24 and 120, with the higher scores showing more

attachment (29). This scale was translated to Farsi by Kho-ramrody, and its validity and reliability were confirmed through content validity and test-retest methods ($r = 0.85$) (30).

The PSEQ is composed of 79 items on seven dimensions of adaptation, including the mother's and infant's well-being, acceptance of pregnancy, identification of a motherhood role, preparation for labor, help and control, relationship with the mother, and relationship with the husband or the partner. All of the items were responded using a four-point Likert scale, including "Very much," "Average," "Somehow," and "Never" that are scored from 1 to 4. The total score was between 79 and 316, with a lower score indicating a mother's better adaptation (3). In this study, two experienced Iranian healthcare professionals, bilingual in the Farsi and English languages, independently translated the English version of the PSEQ into Farsi. Then, the two translations were consolidated and another bilingual professional translator did the backward translation; the result was compared with the English version and they were consistent. Afterward, the Farsi PSEQ was piloted on 10 pregnant women to assess the clarity of the items. The validity of the Farsi version of the PSEQ was established through content validity (CVR: 0.67, CVI: 0.83) and a qualitative procedure by academic members of the Mashhad University of Medical Sciences. The reliability of this scale was also established by applying the internal consistency method, and Cronbach's alpha was 0.87.

3.2. The Intervention

After allocating the participants and performing the pretests, both the intervention and control groups participated in eight one hour weekly routine sessions of prenatal educational classes that were held in the healthcare centers (Table 1). In each center, all of the subjects were educated as a group, and all of the routine educational sessions in the four healthcare centers were delivered and facilitated by a midwife. In addition to the routine classes, the intervention group participated in four 60-minute sessions on adaptation to pregnancy. These sessions were facilitated by the researcher who was also a midwife. Moreover, the subjects in the experimental group were given an educational booklet and a CD concerning the outline of the education (Table 2). The researcher called the mothers weekly to remind them to study the booklet and watch the CD. Immediately after the last educational session in the intervention group, all of the participants in both groups were invited to answer the study instruments (i.e. the CM-FAS and PSEQ) again.

Table 1. Outline of the Routine Education

Session No.	Outline
1	Number of routine prenatal care appointments, intake of complements during pregnancy, and how to contact healthcare center if needed
2	Personal hygiene
3	Diet, food groups, and how to use all food groups in each food portion
4	Familiarization with warning signs in pregnancy
5	Advantages of natural delivery, stages of natural delivery and cesarean section, and preparation for delivery
6	Changes in menstruation cycle and associated care
7	Advantages of mother's milk, the importance of breast feeding and early feeding of the infant with breast milk, and educating the mother on breast feeding
8	Infant's care and vaccination

Table 2. Outline of the Pregnancy-Adaptation Training Package

Session No.	Outline
1	-Greeting, introducing the sessions' facilitator and the students to each other; -anatomy and physiology of female reproductive system, fertilization, fetal growth and development stages
2	-Encouraging the women to discuss their husbands' and families' feelings about their pregnancy, pregnancy exercises, body image, physical and mental relaxation techniques; -question and answer on the participants and their families' problems regarding the pregnancy
3	-Group discussion on pregnancy adaptation problems; -question and answer and counseling facilitated by a psychologist
4	- Physical and psychological changes due to pregnancy and the ways to adapt to them; -group discussion about mothers' concerns regarding fetal health; -techniques of creating relationships with the husband and the family, and the strategies to deal with interpersonal problems

3.3. Ethical consideration

The study protocol and its ethical considerations were approved by the vice-research chancellor and the research ethics committee of the Mashhad University of Medical Sciences (grant No. 920196, ethical approval code: IR.MUMS.REC.1392.122). The purpose of the study was explained to all of the participants, and all of them signed a written informed consent before participation in the study. It was emphasized that the subjects' participation was voluntary, and all of the subjects were assured of the confidentiality and anonymity of the data. Additionally, at the end of the study, an educational booklet and a CD were given to the mothers in the control group.

3.4. Data Analysis

The data were analyzed using SPSS version 11.5 (SPSS Inc. Chicago, IL, USA), and the Kolmogorov-Smirnov test was used to examine the normal distribution of the variables. The chi-square and Fisher's exact tests were used to test the homogeneity of the two groups in terms of the educational level, job, monthly income, and spouse's job and educational level. Since the distribution of the ages was not normal, the Mann-Whitney U test was used to compare the ages, as well as the ages of the spouses of the two groups. The Wilcoxon test was also used to compare the maternal-fetal attachment scores and the scores of the adaptation to pregnancy in each group at the beginning and at the end of the study. Moreover, the Mann-Whitney U test was performed to compare the two groups in terms of the mean attachment and adaptation scores. The Spearman correlation coefficient was used to investigate the association between the personal characteristics and maternal-fetal attachment and adaptation scores. A P value < 0.05 was considered to be significant in all of the tests.

4. Results

In total, 28 subjects in the intervention group and 27 in the control group completed the study (Figure 1). No significant differences were observed between the two groups in terms of their demographic and clinical characteristics (Table 3). Before the intervention, no significant difference was found between the mean/median maternal-fetal attachment scores of the two groups ($P = 0.280$). However, at the end of the study, the mean/median maternal-fetal score was significantly increased in the intervention group ($P = 0.001$), while it did not significantly change in the control group ($P = 0.231$). A significant difference was also observed between the two groups in terms of the mean/median maternal-fetal attachment scores after the intervention ($P = 0.003$) (Table 4).

Additionally, no significant difference was found between the mean/median adaptation scores in the two groups before the intervention ($P = 0.833$). However, the mean post-intervention maternal adaptation score was significantly lower in the intervention group than in the control group ($P < 0.001$) (Table 4). As presented in Table 4, the mean/median maternal adaptation scores were significantly decreased in both groups; however, the decrease was more considerable in the intervention group.

Table 5 presents the mean differences of the pre and post-intervention maternal-fetal attachment and adaptation scores, and shows that the mean differences in the scores of the maternal-fetal attachment and adaptation in the experimental group were significantly greater than in the control group.

Table 3. Demographic and Clinical Characteristics and Their Comparison Between the Two Groups^a

Variable	Experimental Group	Control Group	P Value
Age, y	27.19 ± 4.05	25.86 ± 3.55	0.601 ^b
Husbands' age, y	30.36 ± 4.60	31.39 ± 5.32	0.278 ^b
Time passed after baby loss, m	15.22 ± 12.94	16.11 ± 11.78	0.881 ^b
Number of gravidities	2.93 ± 0.78	2.71 ± 0.71	0.310 ^b
Number of parities	0.78 ± 0.75	0.79 ± 0.79	0.980 ^b
Educational level			0.445 ^c
Primary	10 (35.71)	12 (44.44)	
Guidance school	12 (42.86)	11 (40.74)	
Diploma	6 (21.43)	4 (14.81)	
Spouse's educational level			0.958 ^c
Less than diploma	12 (42.86)	10 (37.04)	
Diploma	10 (35.71)	13 (48.15)	
University	6 (21.43)	4 (14.81)	
Job			0.998 ^d
Employee	3 (10.71)	2 (7.41)	
Homemaker	25 (89.29)	25 (92.59)	
Spouse's job			0.988 ^b
Unemployed	7 (25.00)	5 (18.52)	
Employee	6 (21.43)	4 (14.81)	
Self-employed	15 (53.57)	18 (66.67)	
Monthly income			0.842 ^c
Sufficient	12 (42.86)	10 (37.04)	
Insufficient	16 (57.14)	17 (62.96)	

^aAll data are presented as mean ± SD or N (%).

^bMann-Whitney U test.

^cChi-square test.

^dFisher's exact test.

A significant correlation was found between the women's age and adaptation ($P = 0.003$), and the attachment scores ($P = 0.002$). However, no significant association was observed between the adaptation and the attachment scores and other variables, such as the spouse's age, education level, income, parity, and gravidity (Table 6). The Mann-Whitney U test also showed no significant association between the mother's and spouse's employment status and adaptation ($P = 0.06$ and $P = 0.198$, respectively) and attachment ($P = 0.769$ and $P = 0.798$, respectively) scores.

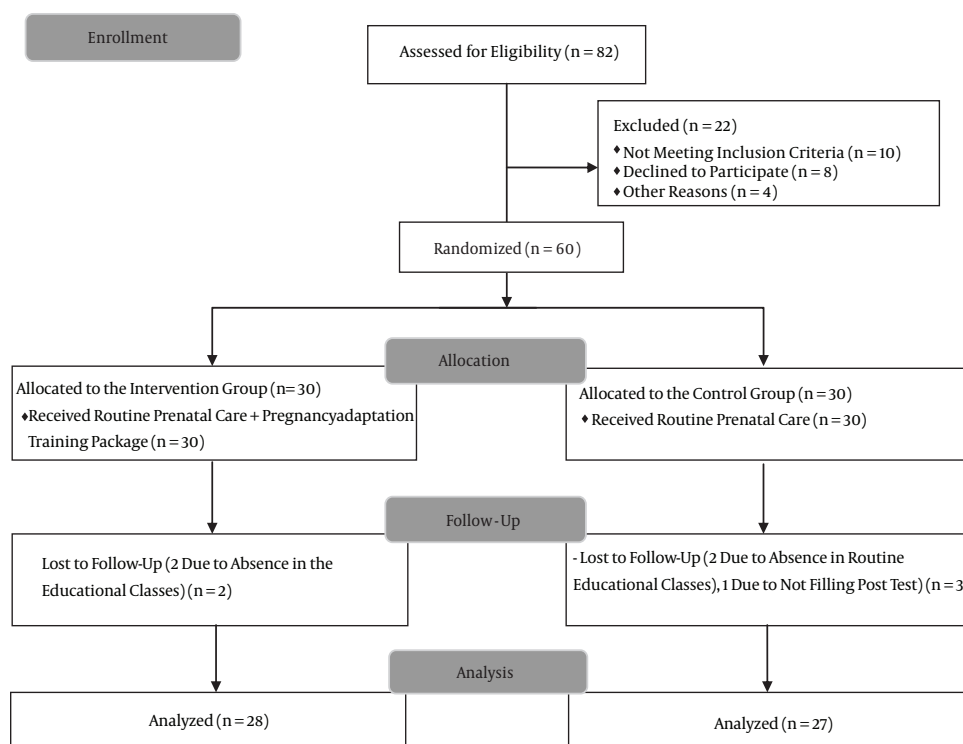


Figure 1. The Study Flow Diagram

Table 4. Comparison of Maternal-Fetal Attachment and Adaptation to Pregnancy Scores Between the Intervention and Control Groups Before and After the Intervention

Variable	Intervention Group		Control Group		P Value ^a
	Mean ± SD	Median (Q3 - Q1)	Mean ± SD	Median (Q3 - Q1)	
Maternal-fetal attachment score					
Pre-intervention	66.25 ± 15.33	70 (66 - 74)	59.93 ± 22.13	69 (65 - 74)	0.280
Post-intervention	75.75 ± 14.40	83 (70 - 89)	60.81 ± 15.95	69.52 (68 - 75)	0.003
P value ^b	< 0.001		0.231		
Adaptation to pregnancy score					
Pre-intervention	126.21 ± 3.36	125 (124 - 129.75)	126.30 ± 3.39	125 (124 - 130)	0.883
Post-intervention	118.89 ± 3.84	119 (115 - 121.50)	123.63 ± 4.32	123 (120 - 130)	< 0.001
P value ^b	< 0.001		0.007		

^aMann-Whitney U test.

^bWilcoxon test.

5. Discussion

The educational program in the present study could increase women's pregnancy adaptation score, which is consistent with the results of Sercekus and Mete, from a study in Turkey (23). However, Hamilton-Dodd et al. (24), Arcamone (21), Barclay et al. (31), Nichols (32), and Ho and

Holroyd (33) studied the effects of maternal antenatal education programs, or the women's experience of such programs, and reported that education had no impact on the women's prenatal or postpartum adaptation, or in preparing them for motherhood roles. It seems that these studies suffered from some weaknesses in their methodologies. For instance, Hamilton-Dodd et al. (24) implemented their

Table 5. Comparison of Maternal-Fetal Attachment and Adaptation Mean Difference Scores Before and After Intervention in the Two Groups^a

Variable	Intervention Group	Control Group	P Value ^b
Maternal fetal attachment score	9.32 ± 0.93	0.88 ± 6.54	< 0.001
Adaptation with pregnancy score	-5.76 ± 3.23	-2.07 ± 3.51	< 0.001

^avalues are expressed as mean ± SD.

^bMann-Whitney U test.

six-hour intervention one month before delivery. During that time, the mother's focus is mostly on labor and delivery, not on pregnancy adaptation. Barclay et al. (31) also focused mostly on the delivery stages and the ways to face them. It is clear that such an intervention might not affect the motherhood roles in the postpartum period. However, the intervention in the present study was longer than the previous studies, started earlier in the pregnancy, and focused mostly on adaptation to pregnancy. In addition to the methodological differences, some of the controversies might also be attributed to the socio-cultural factors affecting the participants in the different studies.

The current study also showed a significant increase in the adaptation mean score in the control group. The reason might be attributed to the fact that relatively long-term routine training was conducted for both groups. Moreover, the passing of time might also significantly increase the women's adaptation. Furthermore, information related to pregnancy and childbirth is freely available for all individuals through the internet, books, mass media, and families and friends.

In the present study, the mother's baseline mean adaptation score was lower than that reported by Sercekus and Mete, who studied a group of mothers in Turkey (23). This is probably due to the differences in either the study populations or in the approaches to maternity care in Turkey and Iran (23).

The mean maternal-fetal attachment scores in the present study were not significantly different in the two groups; however, at the end of the study, a significant difference was found between the two groups in this regard. This findings shows the effectiveness of the pregnancy adaptation training in improving the interactions between the mother and the fetus. There is limited research on the effects of pregnancy adaptation training on the maternal-fetal attachment; although several interventional investigations are available on maternal-fetal attachment. For instance, Abasi and Tafazoli (17) and Akbarzadeh et al. (25) have studied the effects of training attachment behaviors on maternal-fetal attachment, and reported that

the interventions were effective (17, 25). Several other studies also reported that interventions, such as the mother talking with the fetus and encouraging mothers to count the fetal movements, can improve the maternal-fetal attachment (34, 35). However, Saastad et al. have reported that fetal movement counting was not effective for increasing the maternal-fetal attachment (27). This inconsistency might be attributed to the fact that the latter study was conducted within the 35th to 38th weeks of gestation, which is close to delivery, and mothers are under pressure and anxious about the labor events. Moreover, a majority of the participants in the latter study had a low socio-economic status, were jobless, and lived alone, and these factors might affect their maternal-fetal attachment (27).

In the present research, an inverse association was observed between the mother's age and their maternal-fetal attachment and adaptation scores. This finding was consistent with that reported by Ustunsoz et al. (7); however, some other studies could not find an association between these two variables (36, 37). Moreover, Kiehl and White showed that younger Swedish mothers reported more feelings of wellbeing and adaptation (38). The inverse correlation between the maternal age and the adaptation score is possibly due to the fact that older mothers have more routines and fixed principles in their lives, making the adaptation to pregnancy and having an infant so difficult. In addition, the number of children increases with age, which could be a reason for the decreased maternal-fetal attachment in mothers with higher ages.

In the present study, no significant association was found between the attachment or adaptation scores and the mothers or their spouses' education level, mothers' job, income, and number of pregnancies and deliveries. These findings are in line with previous studies by Abasi et al. (36) and Lindgren (6). However, Kwon and Bang (39) and Taffazoli et al. (40) reported that women with less education had lower maternal-fetal attachment (39, 40). These inconsistencies might be due to differences in the characteristics of the populations studied in the different studies.

In conclusion, the present study showed that the educational package for pregnancy adaptation improved both the maternal-fetal attachment and the mothers' adaptation to pregnancy. With regard to the importance of the mother's psychological and mental changes during pregnancy, and since a history of fetal or infant death can destructively affect the mother's psychological condition, the application of similar prenatal educational interventions is recommended for these mothers. Through such programs, healthcare providers can play an important role in improving pregnant women's mental and physical health, and preparing them for their motherhood roles.

The findings of the present study need to be consid-

Table 6. Association Between Women's Demographic Characteristics Variables, and Maternal-Fetal Attachment and Adaptation Mean Scores Before the Intervention

Variable	Adaptation to Pregnancy		Maternal Fetal Attachment	
	r	P	r	P
Age	-0.388	0.003	-0.413	0.002
Husbands' age	-0.006	0.968	-0.016	0.907
Mothers' educational level	-0.175	0.205	-0.187	0.172
Spouse's educational level	-0.113	0.413	-0.204	0.136
Monthly income	0.019	0.892	0.144	0.295
Number of gravidities	-0.161	0.239	0.574	0.725
Number of parities	0.407	0.422	-0.262	0.053

ered in light of several methodological limitations. In this study, a convenience sampling method was used to recruit the pregnant women who had experiences of baby loss; therefore, the findings may not be generalized to other populations. Replicating the study with a random sample, in other populations with different cultures, and in women without a history of baby loss is recommended. Moreover, we conducted the posttest immediately after ending the educational sessions. Therefore, further studies with postponed and repeated posttests are suggested; then, the longevity of the effects can be investigated.

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Footnotes

Authors' Contribution: Elahe Sadeghi Sahebzad designed the research, performed the data analysis, and prepared the first draft of the manuscript. Nasrin Baghdari and Masoomeh Kheirkhah supervised the study. Elham Azmoude contributed to the data analysis and representing the findings. In addition, she helped in the language part of the study.

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