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# ORIGINAL

## PROGRESS OF PSYCHOLOGICAL STATUS AND TARGETED NURSING INTERVENTION IN ASSISTED REPRODUCTIVE TECHNOLOGY ASSISTED PREGNANCY POPULATION IN FEMALE ATHLETE PATIENTS

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### ABSTRACT

**Objective:** To investigate the current psychological status and the impact of a focused nursing intervention in the population of women who have undergone an assisted reproductive technology pregnancy. **Methods:** As the targeted group, 100 infertile female athlete patients who underwent assisted reproductive technology (ART) in our hospital between March 2018 and June 2021 were chosen. Using a random number system, they were divided into two groups of 50 cases each: the routine group received routine nursing care, while the targeted group received targeted nursing care depending on the female athlete patients' psychological conditions; The conventional group was chosen from 50 additional cases of naturally conceived pregnant women who had standard prenatal testing at our institution during the same time frame. The results of the self-rating symptom scale (SCL-91) for the targeted group and the conventional group were compared; Pregnancy rate, SCL-90 ratings before and after the intervention, and satisfaction with the intervention were compared between the typical group and the targeted group. **Results:** Comparing the targeted group to the conventional group, the SCL-90 score of the targeted group significantly rose (P <0.05); Following the intervention, both the routine group's and the targeted group's SCL-90 scores were significantly lower than they had been (P<0.05), with the targeted group's scores being significantly lower than the routine group's; The pregnancy rate of the targeted group (50.00%) was substantially higher (P<0.05) compared to the conventional group (32.00%) ; The pregnancy rate in the targeted group (92.00%) was

considerably higher (P<0.05) than in the conventional group (76.00%). **Conclusion:** The majority of people who use ART have some sort of mental health issue, such as psychosis, paranoia, terror, anger, anxiety, sadness, interpersonal sensitivity, obsessive-compulsive symptoms, somatization. Careful nursing interventions have been proven to significantly enhance the mental health of female athlete patients, improve the success rate of pregnancy, and improve patient satisfaction.

**Keywords** Assisted reproductive technology; Assisted pregnancy; Psychological status; Medical Applications; Targeted nursing intervention

Infertility refers to the failure to use contraception and the unsuccessful pregnancy lasting for more than one year under the normal sexual life (L. Zhang et al., 2021). Infertility can be divided into secondary infertility and primary infertility in clinical practices. The former refers to the infertility caused by pregnancy experience, and the later refers to the infertility caused by no pregnancy. According to relevant research reports, it has affected 10%–15% of couples of childbearing age (Kopp, Pinborg, Glazer, & Magyari, 2022). In recent years, due to the influence of environmental factors, living habits, psychological factors, physiological diseases, the incidence of infertility is still rising, which should cause great attention in clinical (Lv et al., 2021). With the advancement of science and technology, as well as the improvement of medical level, the clinical treatment methods for infertility are constantly updated(Zeng et al., 2022). assisted reproductive technology (ART) refers to the technology to promote pregnancy through medical aids, including artificial insemination and in vitro fertilization-embryo transplantation and derivative technologies, which brings good news to infertile couples (Penova-Veselinovic et al., 2021). However, ART is very expensive and the success rate is only about 30%, which often requires repeated attempts. Female Athlete Patients need to bear the pressure of economy, drugs, surgery, examination, uncertainty of pregnancy and other aspects. In addition, some female athlete patients will have a sense of shame during the treatment(Liu, Hu, & Li, 2021). In addition, due to infertility, the female athlete patients are extremely sensitive in heart, and thus it is easy to produce adverse psychology, which may affect the treatment results (Casu et al., 2018). Clinical research has shown that appropriate nursing intervention for female athlete patients has a positive significance for pregnancy outcome (Zhou et al., 2018), so active and effective targeted measures can be taken through the analysis of female athlete patients' psychological state. Fewer studies have looked into the mental health of pregnant women who are on ART, however, and fewer nursing interventions have been developed to address these issues (Luo, Wen, Qin, Gao, & He, 2020). This study aims to explore the mental health of pregnant women receiving assisted reproductive technology (ART) and the influence of specialized nursing care to further inform the therapeutic usage of ART.

## 1 METHODS AND MATERIAL

### 1.1 General material

The targeted group consisted of 100 infertile female athlete patients who had ART treatment at our institution between March 2018 and June 2021. The female athlete patients' ages ranged from 23 to 39 years old, with an average age of (33.66 ± 3.42) years. With an average of 7.65 ± 1.91 years, the marriage age varied from 2 to 12 years. The random number table approach was used to separate the targeted groups into a conventional group (50 cases) and a targeted group (50 cases). Female Athlete Patients in the conventional group received standard nursing care, while those in the targeted group received care that was more tailored to their needs, taking into account factors including their level of psychological distress. At addition, 50 pregnant women who had a normal pregnancy test in our hospital during the same time period and had a natural conception were chosen as the conventional group. These women ranged in age from 24 to 36, with an average age of (32.83±3.54) years old. The average marital age was 6.83 ± 1.72 years, with a range of 1 to 10 years. The research project was given the go light by the hospital's ethics board. Age, marriage age, infertility type, and level of education were all similar across the control and experimental groups (Table 1), suggesting that these factors did not play a role in the study's results.

**Tab. 1** Comparison of general data

| General material | | Conventional group (n=50) | Targeted group (n=50) | $t/\chi^2$ value | *P* value |
|---|---|---|---|---|---|
| Average age（years） | | 33.16±3.62 | 33.88±3.19 | 0.372 | 0.708 |
| Average marriage age（years） | | 8.14±1.62 | 7.40±1.57 | 0.459 | 0.639 |
| Infertility type [ n (%) ] | Primary | 40（80.00） | 38（76.00） | 0.473 | 0.492 |
| | Secondary | 10（20.00） | 12（24.00） | | |
| Education level [ n (%) ] | Junior and above | 14（28.00） | 14（28.00） | 0.454 | 0.501 |
| | Senior and secondary school | 24（48.00） | 23（46.00） | | |
| | University and above | 12（24.00） | 13（26.00） | | |

### 1.2 Criteria of inclusion and exclusion

Inclusion criteria: ① Female Athlete Patients with normal cognitive function and spirit; ② Female Athlete Patients with normal heart, liver and kidney functions; ③ The informed consent form was signed by the subject or his/her family members.

Exclusion criteria: ① Female Athlete Patients with severe physical disease; ②Female Athlete Patients with hearing impairment; ③ Female Athlete Patients with very poor clinical compliance.

### 1.3 Research methods

#### 1.3.1 Investigation on psychological status

Both the targeted and control groups' mental health were evaluated using the 90-item symptom check list (SCL-90)(Tunçel et al., 2020), which is divided into 9 categories (psychosis, paranoia, phobia, hostility, anxiety, depression, interpersonal sensitivity, obsessive-compulsive symptoms, and somatization) and scored on a 1-5 scale. The scale of 1 is nil and the one is conscious of no symptom. 2 points mean mild, consciously with symptoms, but without obvious effect or slight effect; 3 points for moderate, consciously have symptoms, and affected by a certain degree; 4 points mean that the insured was overweight, consciously had symptoms, and was affected to a considerable extent; 5 points for severe, consciously have serious frequency, intensity symptoms, and seriously affected.

#### 1.3.2 Nursing intervention method

In the regular group, female athlete patients received standard nursing care, which included advice on how to have a healthy lifestyle (such as cutting back on smoking and alcohol use, not overworking oneself, maintaining a positive outlook, etc.) and how to communicate with one another. Health education to explain the disease and treatment related knowledge to the female athlete patients and their families to reverse their wrong understanding; Condition monitoring, to closely monitor the female athlete patient's basal body temperature, ovulation, etc.; Pay close attention to the psychological status of female athlete patients and give some psychological intervention, etc.

Targeted group was given targeted nursing intervention based on the routine group and female athlete patients' psychological status: ① Cognitive intervention: The female athlete patients could be taught about infertility and ART in an organized and planned way through visual materials such as pictures and videos, especially the psychological effects, to explain the currently accepted treatment methods, taboos and problems need to be noticed in detail to female athlete patients, in order to improve their treatment compliance and change their previous misconceptions about the disease, thereby reducing the generation of bad psychology. ② subconscious therapy: before receiving ART therapy, the female athlete patient was firstly placed in a quiet and tidy environment with soft light, and allowed to lean on the chair or sofa, with eyes closed. the nursing staff paid attention to communicating with the female athlete patient in a low voice and mild tone. then, consciousness control promoted the muscle relaxation and relieved the tension of the female athlete patient, so as to achieve a relaxed psychological state. The female athlete patient was instructed to receive ART in peace and to have sex in its most natural form, instead of having sex for

the purpose of pregnancy. ③ Affective support: A female athlete patient-centered affection support system supported by society, family and hospital was maintained and established. They maintained daily in-depth communication with the female athlete patients and communicated with them with cordial and mild words and sincere and true attitude to obtain their trust, which in turn prompted them to tell the true feelings in their hearts, increased the nurses' understanding of the patients and mastered their psychological status and change process, and then provided targeted psychological support to reduce or even eliminate adverse psychology, establish a healthy mentality, and increase confidence in treatment. In addition, some work can be done for families to explain the importance of family support, especially the female athlete patient's spouse should give the female athlete patient more support, encouragement and warmth, maintain a good family atmosphere, and promote the female athlete patient to maintain a good state of mind in the face of ART treatment. ④ Behavioral therapy: The interests and hobbies of the female athlete patients were understood, and corresponding exercise plans were formulated for them, such as yoga, dance, and gymnastics. Every morning and evening, the female athlete patients took half an hour of exercise. The nursing staff supervised and guided the female athlete patients from their side, urging them to maintain an optimistic and active attitude towards life, and encouraging them to participate in social activities, so as to disperse their energy into other things. In their spare time, they could also do some interesting things, thus playing a role in self-psychological adjustment.

Two groups were intervened continuously for 4 weeks.

### 1.4 Observational index

① Comparison of conventional and targeted groups' SCL-90 scores, reflecting the current psychological state; ② Prior to and during intervention, female athlete patients in the regular group and the targeted group's mental health were evaluated using the Structured Clinical Interview for DSM-IV-TR (SCL-90); ③ Pregnancy rate: The rates of successful pregnancies in the regular group and the targeted group were compared; ④ In order to gather the female athlete patients' opinions on the nursing care provided to the routine group and the targeted group, a self-made satisfaction questionnaire was employed. The evaluation levels were very satisfied, general and unsatisfactory, with total satisfaction = very satisfied+general satisfied.

### 1.5 Statistical methods

The statistical work was done in SPSS 18.0. For statistical analysis, we used the t-test on data presented as mean standard deviation ($\bar{x} \pm s$); Counting information was represented as numbers of instances (N) or percentages (%),

and a χ2 test was executed. P<0.05 indicated that the difference had statistical significance.

## 2 OUTCOME

### 2.1 Comparison of SCL-90 score between conventional group and targeted group

According to Table 2 and figure 1, the scores on the SCL-90 in the targeted group were statistically different from those in the conventional group and were higher (P<0.05).

**Tab. 2** Comparison of SCL-90 score between conventional group and targeted group（±s，score）

| Items | Conventional group (n=50) | Targeted group (n=50) | *t* value | *P* value |
|---|---|---|---|---|
| 2.82. | 1.21±0.34 | 2.89±0.67 | 9.526 | 0.000 |
| Stubborn | 1.36±0.45 | 3.15±0.70 | 10.972 | 0.000 |
| Terrified | 1.25±0.42 | 2.68±0.56 | 6.384 | 0.000 |
| Hostile | 1.40±0.47 | 2.95±0.67 | 7.510 | 0.000 |
| Anxious | 1.36±0.39 | 3.25±0.61 | 14.331 | 0.000 |
| Depressed | 1.46±0.55 | 2.95±0.58 | 7.331 | 0.000 |
| Interpersonal sensitivity | 1.61±0.59 | 3.21±0.75 | 8.934 | 0.000 |
| Obsessive-compulsive symptoms | 1.61±0.56 | 3.24±0.79 | 7.452 | 0.000 |
| Somatization | 1.33±0.45 | 2.65±0.64 | 6.874 | 0.000 |

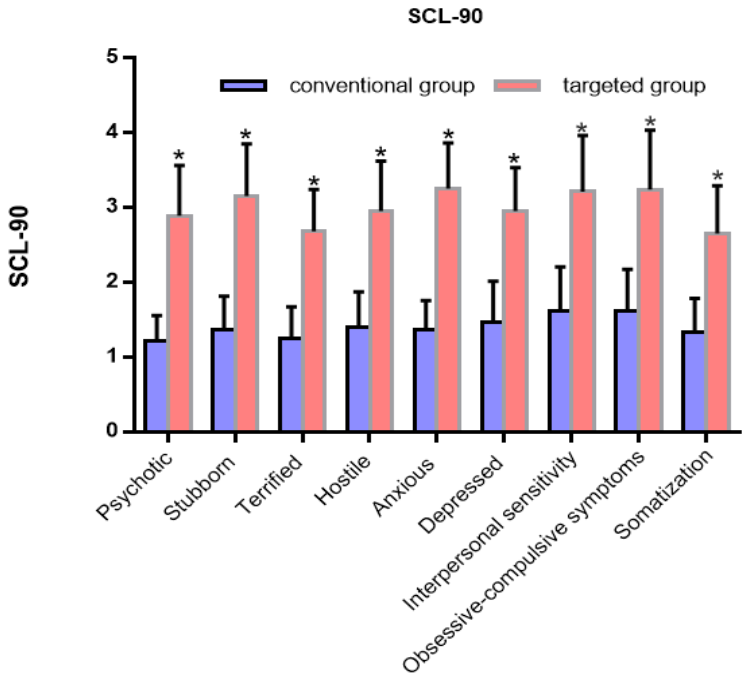


**Figure 1** comparison of SCL-90 score between conventional group and targeted group

* *P*<0.05 versus conventional group

## 2.2 Comparison of SCL-90 score

Prior to intervention, there was no discernible change between the regular group and the targeted group's SCL-90 ratings (P > 0.05). Following intervention, SCL-90 scores in both the routine and targeted groups were dramatically lowered, with SCL-90 scores in the targeted group significantly lower than those in the routine group, and the difference was statistically significant (P<0.05), as shown in Table 3 and figure 2.

Tab. 3 Comparison of SCL-90 score

| Items | | Conventional group | Targeted group |
|---|---|---|---|
| Psychotic | Before intervention | 2.81±0.70 | 2.91±0.71 |
| | After intervention | 2.26±0.53* | 1.66±0.44*# |
| Stubborn | Before intervention | 3.05±0.66 | 3.23±0.69 |
| | After intervention | 2.53±0.47* | 1.70±0.49*# |
| Horrified | Before intervention | 2.79±0.63 | 2.60±0.51 |
| | After intervention | 2.09±0.51* | 1.61±0.53*# |
| Hostile | Before intervention | 3.07±0.69 | 2.87±0.59 |
| | After intervention | 2.23±0.55* | 1.77±0.49*# |
| Anxious | Before intervention | 3.32±0.64 | 3.21±0.61 |
| | After intervention | 2.70±0.50* | 1.93±0.34*# |
| Depressed | Before intervention | 2.89±0.59 | 3.00±0.63 |
| | After intervention | 2.47±0.49* | 1.92±0.42*# |
| Interpersonal sensitivity | Before intervention | 3.39±0.82 | 3.27±0.87 |
| | After intervention | 2.64±0.63* | 1.74±0.49*# |
| Obsessive-compulsive symptoms | Before intervention | 3.14±0.81 | 3.28±0.85 |
| | After intervention | 2.62±0.67* | 1.84±0.60*# |
| Somatization | Before intervention | 2.73±0.79 | 2.61±0.70 |
| | After intervention | 2.41±0.56* | 1.72±0.22*# |

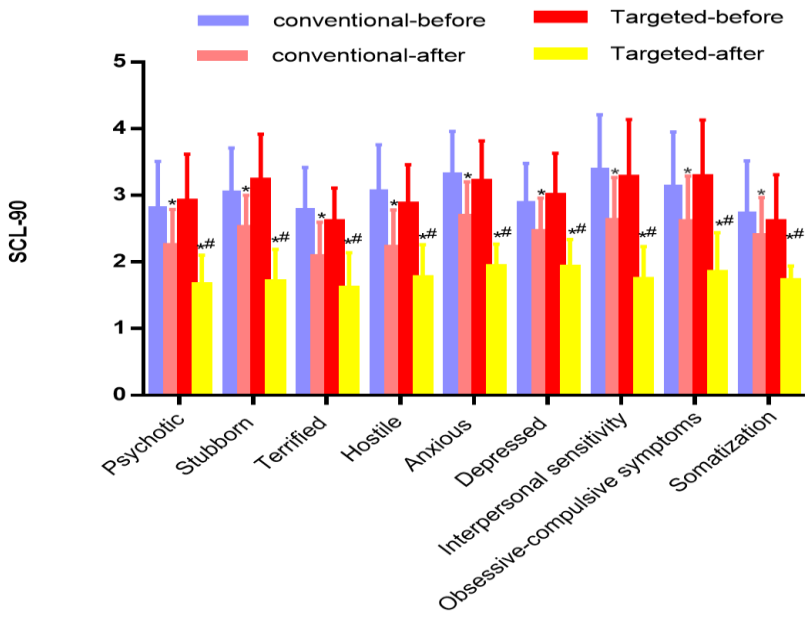


**Figure 2** comparison of SCL-90 score

* *P*<0.05 versus conventional group of before intervention，# *P*<0.05 versus conventional group of after intervention

### 2.3 Comparison of pregnancy rate

As indicated in Table 4, the pregnancy rate in the targeted group was considerably greater than that in the conventional group (P<0.05).

Tab. 4 Comparison of pregnancy rate

| Pregnant situation | Conventional group (n=50) | Targeted group (n=50) | $\chi^2$ value | *P* value |
|---|---|---|---|---|
| Pregnant successfully (n) | 16 | 25 | 5.920 | 0.011 |
| Pregnancy rate (%) | 32.00 | 50.00 | | |

### 2.4 Comparison of Intervention Satisfaction Between Conventional Group and Targeted Group

The targeted group's level of intervention satisfaction was statistically greater than the conventional group's, and the difference was significant (P <0.05), as indicated in Table 5 and figure 3.

Tab. 5 Comparison of Intervention Satisfa [ n (%) ]

| Satisfaction situation | Conventional group (n=50) | Targeted group (n=50) | $\chi^2$ value | *P* value |
|---|---|---|---|---|
| Very satisfied | 23（46.00） | 33（66.00） | - | - |
| General satisfied | 15（30.00） | 13（26.00） | - | - |
| Unsatisfied | 12（24.00） | 4（8.00） | - | - |
| Total satisfaction | 38（76.00） | 46（92.00） | 5.726 | 0.013 |

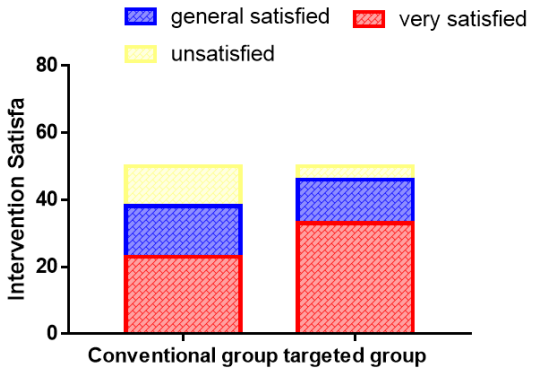


**Figure 3** Comparison of Intervention Satisfa

## 3 DISCUSSION

The pregnancy process is relatively complex, including the production, combination, implantation, development and maturation of normal eggs and sperm, and infertility can occur when any link has problems (Papadakis et al., 2020). As a common multiple disease in clinical gynecology, infertility is a difficult disease attracting worldwide attention(Z. Zhang et al., 2020). There are

currently between 50 and 80 million infertility female athlete patients globally, and this number is continuing to climb, which has negatively impacted female athlete patients' quality of life and mood (Sunkara, Antonisamy, Redla, & Kamath, 2021). ART is becoming more mature and widely used in clinical practice, which can treat infertile couples to a certain extent to achieve the purpose of fertility (Qu et al., 2021). However, patients undergoing ART assisted pregnancy may easily suffer from adverse psychological reactions due to various factors, which in turn may have adverse effects on the therapeutic effect and pregnancy outcome (Mol et al., 2021). Nursing intervention has a positive effect on improving the pregnancy rate (Ha & Ban, 2021). Conventional nursing intervention has a series of problems such as incoherent time, single model, inappropriate methods, etc., which is difficult to meet the actual needs of female athlete patients. Targeted nursing intervention involves social, physiological and psychological aspects, and has high requirements on nursing technology and quality, which can provide a good treatment environment for female athlete patients and effectively improve the clinical treatment effect (Wilson et al., 2021). Therefore, targeted nursing intervention should be given according to the actual situation of female athlete patients. However, there are few studies exploring the status quo of psychological status of ART pregnant women and targeted nursing intervention. The results of this study showed that there were more adverse psychological problems in the population assisted by ART. After targeted nursing intervention, the psychological status, pregnancy rate and intervention satisfaction of female athlete patients were significantly improved. The reasons are now analyzed as follows.

Mahadeen et al. (Mahadeen, Hamdan-Mansour, Habashneh, & Dardas, 2020) found an adverse psychological condition such as depression and stress for infertile couples. In this research, the targeted group showed substantially higher SCL-90 scores for nine symptom categories compared to the control group: psychosis, paranoia, phobia, hostility, anxiety, sadness, interpersonal sensitivity, obsessive-compulsive symptoms, and somatization. By summarizing the results of the Mahadeen study, it was shown that the population assisted by ART had a variety of adverse psychological conditions, and the reasons were analyzed. First of all, infertility had adverse effects to different degrees on the female athlete patient's self-esteem, marriage, interpersonal relationship, and life (Taebi, Kariman, Montazeri, & Majd, 2020). After female athlete patients begin to receive ART treatment, various examinations, uncertainty of results, failure outcome and high cost brought by more treatment can cause patient pressure and thus generate bad psychology (Kim, Moon, & Kim, 2020). In addition, family complaints, acquaintances' comments, physical burden caused by the failure of ART treatment, and social stigma make it difficult for patients to avoid having adverse psychological conditions(Mareckova, Marecek, Andryskova, Brazdil, & Nikolova, 2020).

Bad psychology not only breaks the balance of the human

neuropsychological system and then affects the secretion of hypothalamic-pituitary-adrenal axis (HPA), but also reduces the release of sex hormones by the body, thus affecting pregnancy (Raad et al., 2021). Casale et al. (Casale & Carlqvist, 2021) have shown that social support for IVF female athlete patients can promote their mental health and increase the success rate. This study found that both the regular group and the targeted group had reduced SCL-90 scores following the intervention. However, the targeted group had a lower SCL-90 score than the routine group, and the pregnancy rate and satisfaction with the intervention in the targeted group were much greater than those in the routine group, which is broadly in line with the results of the Casale trial. It indicated that the targeted nursing intervention for the psychological status of ART pregnant women could effectively improve their psychological status, increase the pregnancy rate and satisfaction with the intervention. Analysis of the causes: Targeted care emphasizes the people-oriented, which is the corresponding and scientific care developed according to the specific conditions of female athlete patients and combining with previous clinical experience, and combines the targeted concept to implement multi-faceted and meticulous care for female athlete patients, thus meeting the needs of patients to the maximum; In addition, nursing staff strictly monitored and summarized the specific conditions of female athlete patients, so as to provide necessary health recommendations for them. Targeted nursing interventions were carried out for the psychological status of ART pregnant women, including cognitive intervention, subconscious therapy, emotional support, and behavioral therapy. Different intervention methods can have different effects. For example, cognitive intervention means to explain the disease and ART treatment related knowledge to female athlete patients, increase their mastery of the related knowledge, and correct the wrong cognition, so that they can receive treatment in a peaceful state of mind. Subconscious therapy keeps female athlete patients in a comfortable environment and promotes them to be in a relaxed state in a short time through consciousness guidance. Emotional support means keeping in-depth communication with female athlete patients, promoting them to express their feelings by increasing the degree of trust, and then giving targeted psychological support, and guiding their families to give female athlete patients more warmth, care and support. Behavioral therapy enables female athlete patients to participate in sports and social activities that they are interested in. It not only can enhance their physique, but also can transfer their attention and effectively reduce the generation of bad psychology.

The study was limited by the small sample size that was chosen, which might have caused the data in the findings to deviate from the real values. As a result, the sample size should be increased later to conduct more verification research.

In conclusion, ART is used to treat a wide range of psychiatric disorders in the population, including psychosis, paranoia, fear, aggression, anxiety,

sadness, interpersonal sensitivity, and somatization. After targeted nursing intervention, the adverse psychological status of female athlete patients is significantly alleviated, and the pregnancy rate and satisfaction degree to intervention are significantly increased, which is worthy of clinical reference.

**Declaration of conflict of interest**: None.

**Data Availability Statement:** The data used to support the findings of this study are available from the corresponding author upon request.

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