

# Quality of Infertility Care Services and Emotional Health of South Asian Women

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**Background:** Treatment tolerability and treatment environment are two major spheres of infertility care that may associate with women's emotional health and coping mechanisms.

**Aim:** The present study aimed at assessing the relationship between infertility treatment quality and various aspects of emotion-focus coping, problem-focus coping, and avoidance coping mechanisms.

**Method:** The study was completed by using standardized tools and data from this descriptive, cross-sectional, correlational study were collected from 350 women undergoing infertility treatments in private reproductive healthcare centers in Quetta, Pakistan.

**Findings:** Treatment tolerability was found to be positively associated with positive reframing ( $p < 0.02$ ) and negatively associated with the use of emotional support ( $p < 0.03$ ); acceptance ( $p < 0.01$ ); humor ( $p < 0.03$ ); behavioral disengagement ( $p < 0.01$ ) and venting ( $p < 0.01$ ). The quality of the treatment environment demonstrated a negative correlation between religious coping ( $p < 0.02$ ) and behavioral disengagement ( $p < 0.01$ ), whereas it showed a positive correlation with active coping ( $p < 0.03$ ) and planning ( $p < 0.02$ ). The linear regression analysis demonstrated that treatment tolerability significantly increased with positive reframing ( $R^2 = 0.118$ ,  $F(304) = 2.22$ ,  $p < 0.03$ ). Behavioral disengagement significantly decreased with better treatment environment ( $R^2 = 0.111$ ,  $F(304) = 2.09$ ,  $p < 0.02$ ).

**Discussion:** We discussed the findings keeping in view the role of social, cultural, and economic factors related to infertility care in the context South-Asian culture, and recommendations are made to promote women's mental health and coping by improving some specific aspects of infertility treatment quality.

**Conclusions:** High treatment tolerability may associate with some useful aspects of emotion-focus coping, such as positive reframing, whereas low treatment tolerability may associate with avoidance coping, such as behavioral disengagement and venting. Besides, the quality of the infertility treatment environment enables women to use problem-focus coping mechanisms, such as planning and active coping.

**Keywords:** infertility, treatment quality, FertiQol, coping mechanisms, mental health, reproductive healthcare, treatment tolerability, treatment environment, psychological well-being

## Introduction

Infertility is recognized as one of the leading reproductive health problems in various regions of the world. According to World Health Organization (WHO), globally around 48 million couples and 186 million individuals have infertility. A systematic review of studies from various regions of the world reported the highest prevalence of infertility in South Asia countries followed by Sub-Saharan Africa, the Middle East, Eastern Europe, and Central Asia among women of age between 20 and 44 years with rates of primary infertility (1.9%) and secondary infertility (10.5%).<sup>1</sup> According to the

latest estimates for Asian countries, the age-standardized global prevalence rate of infertility raised by 0.37% per year for females and 0.29% per year for males.<sup>2</sup> Thus, infertility significantly contributes to the global disease burden.

Infertility has a significant toll on the overall well-being of married individuals as a recent study mentioned that 15% of couples worldwide are at increased risk of poor reproductive health and mental health due to infertility and invasive treatments.<sup>3</sup> Although infertility problems are related to both marital partners, in most traditional societies women are known to bear the blame and burden of difficulties associated with infertility.<sup>4</sup> Previous research has shown the increased vulnerability of women to experience poor quality of life due to infertility.<sup>5,6</sup> Women suffering from infertility disorders develop symptoms of depression, anxiety, feelings of inferiority, inadequacy, and complications in interpersonal relationships.<sup>7</sup> When couples experience infertility by either male or female factors of infertility; women have been seen to show more depressive symptoms and less psychological flexibility, low self-acceptance, and decreased self-compassion.<sup>8</sup> Studies from various Muslim countries such as Iraq, Egypt, and Turkey reported higher rates of depression and anxiety symptoms in women with infertility.<sup>9–11</sup> Research from non-Muslim communities also validates that women with infertility are more likely to suffer poor emotional outcomes on their health including increased levels of stress, anxiety, and depression symptoms.<sup>12</sup>

Social, cultural, and religious factors profoundly influence women's experiences of infertility during reproductive age and its impact on their lives.<sup>13,14</sup> In societies where patriarchy is the norm, women are held primarily responsible for their infertility status and therefore, become the target of discrimination and abuse.<sup>15</sup> Reviews of available literature on socio-psychological factors of infertility demonstrated that in developing countries women with primary infertility face reduced social status and are at increased risk to experience intimate partner violence.<sup>16</sup> A study investigated mental health predictors in a sample of Bhutanese refugees in the US and findings demonstrated that female respondents are at increased risk to suffer from psychological distress, suicidal ideation, and post-trauma symptoms.<sup>17,18</sup> The deep-rooted cultural and social practices challenge the childless women's worth and identity in these societies. Couples and very often women alone, waste the most productive years of their lives and invest immense resources in experimenting with traditional fertility treatments.<sup>19</sup>

Depressive reactions such as feelings of failure and reduced self-esteem are more common among infertile couples.<sup>20</sup> Psychological dysfunction is more commonly experienced by couples who have prolonged infertility for unknown medical reasons.<sup>21</sup> The problem of infertility, its consequences on couples' relationships, and women's health cannot be overlooked. Paying no attention to this issue often results in prolonged suffering which indirectly increases the burden on our health care system.<sup>22</sup> Women undergoing advanced infertility treatments experience repercussions on their physical, reproductive, and mental health of women at the same time increasing the economic burden for the whole family.<sup>23</sup> The diagnosis of infertility and its related social and economic experiences have serious repercussions on the physical, psychological, and social domains of a couple's health.<sup>24</sup> The intensity of such influences is profound for female partners as some studies report 30–40% of the women with infertility difficulties meet the diagnostic criteria for psychiatric disorders including stress disorders, dysthymia, and major depressive disorder.<sup>25</sup> Infertility is, therefore, recognized as a serious women's health issue affecting various domains of women's physical health and mental well-being.

The literature on "Stress and Coping" mechanisms in adults has described coping as "thoughts and behaviors used to manage the internal and external demands of situations that are appraised as stressful" (p. 1).<sup>26</sup> To explain the individual differences in coping, the psychological literature points toward some factors such as personality and childhood developmental experiences, and culture.<sup>27,28</sup> The contemporary literature on coping also emphasized understanding the wider contextual conditions when analyzing people's coping responses.<sup>29</sup> Additionally, the literature portrays coping as a gateway for interventions due to its ability to activate various cognitive and behavioral processes.<sup>26</sup>

Lazarus's theory on "Stress and Coping" explains the significance of cognitive appraisal in determining the individual's emotional response in stressful situations.<sup>30,31</sup> According to "information processing theory", individual perceptions (cognitions) about stressors and interpretations about the impact of these stressors on an individual's life significantly determine the 'emotional outcomes'.<sup>30</sup> Previous research shows that women experience greater levels of infertility-related stress than men which is attributable to women's interpretation of the impact of infertility on their identity as women and social status.<sup>32</sup> Furthermore, women are less likely to employ positive coping styles in the context of infertility and scored high on external shame, internal shame, and

self-judgment, and scored lower in self-compassion.<sup>33</sup> However, women who experience self-compassion can cope with internal shame, whereas for men, self-judgment mediates the effect of shame on infertility-related stress. A recent study explored infertility difficulties and coping in a sample of women from Romania.<sup>12</sup> Findings demonstrated that women experienced high levels of anxiety regardless of sociodemographic background and infertility period. Additionally, women were found to employ few adaptive coping mechanisms which is a significant risk to poor mental well-being in infertile women. Coping with infertility is an important psychological phenomenon and determines the psychological well-being of individuals.<sup>34,35</sup>

Previous research recommended that future studies should further inspect these dynamics to better explain such associations by including other psychological variables such as fertility quality of life.<sup>12</sup> Fertility quality of life is an important health construct that identifies the impacts of infertility on various domains of women's quality of life with infertility disorders.<sup>36,37</sup> FertiQol is a known measure to assess the impacts of infertility on various domains of quality of life of women including physical, emotional, social, and relational.<sup>36</sup> It also assesses the quality of fertility treatment through treatment environment and treatment tolerability in women undergoing infertility treatments. Treatment tolerability refers to the patient's tolerability for the likely impacts of fertility treatment on daily life and the patient's emotions/moods.<sup>36</sup> Treatment environment refers to the overall experience of patients with medical staff, access to good quality healthcare services, and smooth interactions with the healthcare staff.<sup>36</sup> Both these factors have a significant role in handling difficulties associated with infertility problems. For instance, one study demonstrated that good rapport with physicians, patients' access to their electronic health records, consultation with experienced and well-trained fertility nurses were positively associated with the permanence of fertility care.<sup>38</sup> Quality of fertility treatment and its tolerability are determinants of patient satisfaction and willingness to carry on the treatment.<sup>39,40</sup>

The review of the above studies highlights existing gaps in understanding various factors including social, economic, cultural, and technological advancements in infertility treatments that may influence women's health in developing countries.<sup>41</sup> There is a need for more research to understand how tolerability for fertility treatments and treatment environmental factors may influence women's coping with infertility and their emotional health. Such research will be useful to complement the adoption of a holistic approach to infertility treatments and improve the efficiency of reproductive healthcare services. Therefore, the current study aims at assessing the relationship between two aspects of fertility treatment quality (treatment tolerability and treatment environment) with coping strategies in women with infertility disorders. Besides, it assesses differences in coping strategies across background variables such as duration of the marriage, type of infertility, duration of infertility treatments, exposure to physical abuse due to infertility, and empowerment.

## Materials and Methods

### Study Design and Sample Selection

A descriptive, research design and data were collected using standardized tools. The study sample comprised 350 women of reproductive age who were undergoing infertility treatments in authorized reproductive healthcare centers in Quetta, Pakistan. Following the inclusion criterion, women with conditions of primary and secondary infertility were included in this study sample. Primary infertility is the state in which the pregnancy has never been achieved by the woman, and secondary infertility is a condition when at least one prior pregnancy has been completed in form of giving birth to child.<sup>42</sup> Women with a history of a major psychiatric illness or currently on treatment for any major psychiatric disorder were not included in the study.

### Measures/Tools

The data related to demographic variables, marital characteristics, and women's empowerment status was collected by an author-constructed questionnaire. This section included questions about the participant's age, levels of education, employment status, living place status (shared vs independent), years of marriage, whether the participant is the husband's second wife, the reason for the husband's second marriage, duration of infertility treatments, exposure to physical abuse due to infertility and participation in household decision-making. The empowerment status of women is

indicated by women's levels of education, employment status, exposure to abuse due to infertility, and decision-making in household matters.

The fertility treatment quality was assessed by using the 10-item treatment module on the FertiQol tool.<sup>36</sup> A complete FertiQol questionnaire is a standardized tool used in the assessment of the quality of life of patients with infertility.<sup>36</sup> For this analysis, we used the responses on the second part of the FertiQol questionnaire which is referred to as Treatment FertiQol. There are two subscales in this module (1) Treatment Environment comprises 6 items, and (2) Treatment Tolerability which consists of 4 items. The sample item on Treatment Environment of FertiQol is "Do you feel the fertility staff understand what you are going through?" A score on this scale indicates the patient's evaluation regarding access to appropriate and good-quality infertility treatment. The sample item on Treatment Tolerability of FertiQol is "Are you bothered by the physical side effects of fertility medications and treatment?" Each item is the score on a 5-point Likert rating scale and higher scores indicate good fertility treatment quality. We used the Urdu version of this measure which has also been used in previous research.<sup>43,44</sup> The Cronbach's Alpha values for Treatment Environment and Treatment Tolerability were 0.78 and 0.81, respectively.

The COPE Inventory was originally developed by Carver to assess a broad range of coping responses, several of which had an explicit basis in theory.<sup>45</sup> Since then, the tool has been extensively used in research which also validates its construct validity.<sup>46</sup> The Brief COPE is an abbreviated version of the COPE Inventory.<sup>47</sup> It is comprised of 28 items that assess fourteen different ways of coping. Each subscale comprises two items and subscales are named Positive reframing, Acceptance, Religion, Self-blame, Self-distraction, Active coping, Denial, Substance use, Use of emotional support, use of instrumental support, Behavioral disengagement, Venting, Planning, Humor. Each item on the scale is rated on a four-point scale with scoring (1 = I usually do not do this at all; 2 = I usually do this a little bit; 3 = I usually do this a medium amount; 4 = I usually do this a lot). A higher score on the various factors indicates the respondent's dominant coping style. The coping styles are also broadly categorized as problem-focus coping, emotion focus coping and avoidance/dysfunctional coping based upon a combination of subscales.<sup>48</sup> The internal reliability of all subscales was estimated by values of Cronbach's Alpha found to be in the acceptable range between 0.76 and 0.79.

## Data Analysis

IBM SPSS Statistics version 25 was used to analyze the data. Mean, S.D. and percentages are reported for descriptive findings related to background variables, coping mechanisms, and fertility treatment quality. *t*-test and ANOVA were applied to determine the significance of mean differences in coping styles across types of infertility, years of marriage, duration of infertility treatments, women's education, employment, exposure to physical abuse, and participation in household decision-making, and significance was determined at  $p < 0.05$ . Pearson correlation was calculated to assess the relationship between fertility treatment quality with a coping mechanism. Multiple linear regression analysis was applied to determine the predictive relationship between treatment tolerability and treatment environment with coping mechanisms.

## Ethical Considerations

The ethical review for the study was conducted by the Ethical Review Committee at the School of Social Sciences and Humanities, National University of Sciences and Technology (NUST), Islamabad. Participation in the study was voluntary based on informed consent. Participants who were identified with increased vulnerability for psychological distress due to poor fertility quality of life were referred to psychiatric care services. The anonymity was ensured by keeping interview forms in a secure place and personal identifiers were removed for data analysis.

## Results

A total of 350 women participated in this study. There was no missing data on any study variables because data was collected on the survey form through the interview method. Women's current age ranged from 22 to 39 years with a mean of ( $M=29.3$  years;  $S.D.=3.51$ ). A large proportion of participants (85.7%) were living in houses shared with extended family members. More information about the details on demographic characteristics of participants is reported previously elsewhere.<sup>49</sup>

## Coping Strategies Across Marital and Infertility Characteristics

The participants' age at the time of marriage ranged from 16 to 32 years with an average of (M=22.7 years; S.D.=2.72). The duration of marriage ranged from 1 to 20 years on average (M=6.5; S.D.=3.7). The rates of 'primary infertility (45.4%) and 'secondary infertility (55.6%) in this sample. The duration of fertility treatments ranged from 1 to 16 years with an average value of (M=4.1; S.D.=2.7). Percentage of women with <5 years of duration of infertility were 66.9% and >5 years (33.1%). Those women who were second wives of their husbands and the key reason for this marriage was an absence of children from the first wife (7.4%).

The descriptive data on coping strategies shows that the highest mean score is on religious coping (M=6.71; S.D.=0.85) followed by positive reframing (M=6.22; S.D.=0.99). Overall, the lowest mean score is on humor (M=2.16; S.D.=0.48) and substance abuse (M=2.11; S.D.=0.21). Within avoidance coping, the highest score is on venting (M=5.71; S.D.=0.91) followed by self-blame (M=5.23; S.D.=0.82) and denial (M=5.12; S.D.=0.81). Within problem-focus coping, the highest mean score is on the use of instrumental support (M=6.12; S.D.=1.01) followed by active coping (M=5.81; S.D.=0.78) and planning (M=5.61; S.D.=0.95).

The significance of mean differences in coping strategies across the type of infertility, years of marriage, and duration of infertility treatment are presented in (Table 1). Findings show that women with primary infertility are more like to cope through self-distraction ( $t(348) = 2.66, p < 0.01$ ), self-blame ( $t(348) = 2.12, p < 0.01$ ), and avoidance coping

**Table 1** Significance of Mean Differences in Coping Strategies Across Types of Infertility, Years of Marriage, and Duration of Infertility Treatments (N=350)

Coping Strategies	Type of Infertility		Years of Marriage		Duration of Infertility Treatments	
	Primary	Secondary	[1–7 Yrs.]	[8–20 Yrs.]	< 5 Yrs.]	>5 Yrs.]
	Mean (S.D)	Mean (S.D)	Mean (S.D)	Mean (S.D)	Mean (S.D)	Mean (S.D)
Positive reframing	6.22 (1.01)	6.22 (0.98)	6.25 (1.06)	6.15 (0.97)	6.23 (0.98)	6.18 (1.02)
Use of emotional support	5.23 (0.91)	5.20 (0.85)	5.26 (0.88)	5.14 (0.86)	5.24 (0.89)	5.17 (0.84)
Acceptance	6.07 (0.91)	5.91 (0.89)	6.01 (0.88)	5.94 (0.94)	6.02 (0.89)	5.92 (0.93)
Religion	6.83 (0.81)	6.71 (0.89)	6.76 (0.91)	6.75 (0.76)	6.76 (0.91)	6.75 (0.72)
Humor	2.13 (0.47)	2.19 (0.51)	2.16 (0.48)	2.18 (0.51)	2.15 (0.46)	2.19 (0.53)
Use of instrumental support	6.16 (0.95)	6.14 (1.02)	6.15 (0.96)	6.15 (1.07)	6.14 (0.99)	6.16 (1.02)
Active coping	5.91 (0.77)	5.85 (0.81)	5.84 (0.79)	5.95 (0.77)	5.82 (0.77)	6.00* (0.81)
Planning	5.56 (0.93)	5.62 (0.97)	5.54 (0.95)	5.70 (0.94)	5.55 (0.93)	5.66 (0.98)
Self-distraction	4.46** (1.02)	4.17 (1.01)	4.36 (0.99)	4.18 (1.03)	4.37 (1.02)	4.16 (1.02)
Behavioral disengagement	4.64 (0.87)	4.61 (0.83)	4.63 (0.87)	4.62 (0.81)	4.61 (0.84)	4.65 (0.86)
Denial	5.20 (0.83)	5.15 (0.77)	5.17 (0.81)	5.18 (0.78)	5.14 (0.78)	5.24 (0.84)
Venting	5.76 (0.86)	5.76 (0.95)	5.73 (0.89)	5.78 (0.93)	5.78 (0.93)	5.72 (0.86)
Self-blame	5. (0.62)	5.22 (0.32)	5.35 (0.72)	5.31 (0.67)	5.22 (0.79)	5.24 (0.77)
Substance abuse	2.00 (0.00)	2.00 (0.00)	2.00 (0.00)	2.00 (0.00)	2.00 (0.00)	2.00 (0.00)
Emotion-focus coping	26.5 (1.92)	26.2 (1.95)	26.4 (2.04)	26.1 (1.72)	26.4 (1.96)	26.2 (1.91)
Problem-focus coping	17.6 (1.63)	17.6 (1.55)	17.5 (1.53)	17.7 (1.66)	17.5 (1.59)	17.7 (1.56)
Avoidance coping	22.1* (1.71)	21.7 (1.73)	21.9 (1.71)	21.7 (1.77)	21.9 (1.81)	21.7 (1.57)

**Note:** p-value significance; \*\*p<0.01; \*p<0.05.

**Abbreviation:** S.D., standard deviation.

( $t(348) = 1.92, p < 0.05$ ) in comparison to women with secondary infertility. There is a non-significant difference in coping strategies between women with (1–7 years) of marriage and (8–20 years) of marriage. Furthermore, analysis reveals women with >5 years of infertility are more likely to employ “active coping” in comparison to women with <5 years of infertility ( $t(348) = 2.01, p < 0.05$ ).

## Coping Strategies Across Women’s Empowerment Status

The descriptive analysis shows that majority of women in this study sample were non-working (81.1%). Women who had no formal education were 3.97%; women who studied up to high school were 16.0%; those who completed college education were 32.3% and those who completed university studies were 42%. In this sample, 46.9% said they were usually not included in household decision-making. There were 7.1% of women who reported experiencing physical abuse by husbands due to infertility disorder. Table 2 presents the significance of mean differences in coping strategies across women’s employment status, education, participation in decision-making, and experience of physical abuse/violence. Findings show that non-working women were more likely to use behavioral disengagement as a coping method to deal with the stress of infertility ( $t(348) = 2.11, p < 0.05$ ), whereas women in employment had a significantly higher mean on a scale measuring self-distraction ( $t(348) = 1.91, p < 0.05$ ). Furthermore, findings reveal that women who reported exposure to physical abuse due to infertility are less likely to use active coping strategies ( $t(348) = 2.21, p < 0.05$ ).

## Relationship of Fertility Treatment Quality with Coping Strategies

(Table 3) shows that treatment tolerability significantly positively associates with positive reframing ( $r=0.118; p<0.05$ ). The treatment tolerability was significantly negative associated with use of emotional support ( $r= -0.117; p<0.05$ ); acceptance ( $r= -0.131; p<0.01$ ); humor ( $r= -0.090; p<0.05$ ); behavioral disengagement ( $r= -0.127; p<0.01$ ) and venting ( $r= -0.138; p<0.01$ ). Tolerability for dealing with complicated treatment procedures significantly positively associates with religious coping ( $r=0.113; p<0.05$ ). Women who reported infertility treatment does not impact the mood and women who reported they are not bothered by the side effects of infertility treatments are likely to employ planning mechanism of coping ( $r=0.120; p<0.05$ ) and ( $r=0.123; p<0.05$ ), respectively. Tolerability for complications of infertility treatment procedures and tolerability for the side effects of fertility treatments significantly negatively associate with use of instrumental support ( $r= -0.089; p<0.05$ ) and ( $r= -0.173; p<0.01$ ), respectively. Tolerability for the side effects of infertility treatments significantly negative associates with problem-focus coping ( $r= -0.117; p<0.05$ ). Tolerability for the impact of fertility treatment on mood negatively associates with behavioral disengagement ( $r= -0.170; p<0.01$ ), whereas it positively associates with denial ( $r=0.177; p<0.01$ ). Tolerability for complicated treatment procedures and medications significantly negatively associate with behavioral disengagement ( $r= -0.120; p<0.05$ ); venting ( $r= -0.154; p<0.01$ ) and with overall avoidance coping ( $r= -0.111; p<0.01$ ).

(Table 4) shows the results of correlational analysis between treatment environment and coping strategies. Analysis revealed that the empathic response of fertility staff significantly positively associates with positive reframing ( $r=0.094; p<0.05$ ) and active coping ( $r= 0.123; p<0.05$ ). Availability of adequate information related to infertility treatment significantly positively associate with positive reframing ( $r=0.153; p<0.01$ ) and negatively associate with self-distraction ( $r= -0.113; p<0.05$ ) and behavioral disengagement ( $r= -0.107; p<0.05$ ). Overall treatment environment demonstrates a negative association with religious coping ( $r=-.105; p<0.05$ ). However, the availability of appropriate medical services was positively associated with religious coping ( $r=0.090; p<0.05$ ) and use of instrumental support ( $r=0.130; p<0.001$ ), and active coping ( $r=0.130; p<0.01$ ). Satisfaction with the quality of services to address the emotional needs of infertile women was significantly positively associated with humor ( $r=0.098; p<0.05$ ). The overall quality of the fertility treatment environment was significantly positively associated with planning ( $r=0.196; p<0.05$ ), quality of interactions with the medical staff was positively associated with planning ( $r=0.128; p<0.05$ ). Overall good quality treatment environment was negatively associated with behavioral disengagement ( $r= -0.139; p<0.01$ ).

The linear regression analysis demonstrated, treatment tolerability significantly increases with positive reframing ( $R^2 = 0.118, F(304) = 2.22, p = 0.027$ ) (Table 5). Behavioral disengagement significantly decreases with better treatment environment ( $R^2 = 0.111, F(304) = 2.09, p = 0.037$ ) (Table 6).

**Table 2** Mean Differences in Coping Strategies Across Empowerment Status and Experience of Physical Abuse Due to Infertility Disorder (N=350)

Coping Strategies	Employment		College/University Education		Participation in Household Decision Making		Experience of Physical Abuse Due to Infertility	
	No	Yes	No	Yes	No	Yes	No	Yes
	Mean (S.D)	Mean (S.D)	Mean (S.D)	Mean (S.D)	Mean (S.D)	Mean (S.D)	Mean (S.D)	Mean (S.D)
Positive reframing	6.19 (0.99)	6.33 (0.98)	6.11 (0.97)	6.26 (0.99)	6.24 (1.06)	6.20 (0.98)	6.22 (0.99)	6.22 (1.02)
Use of emotional support	5.21 (0.86)	5.27 (0.95)	5.18 (0.91)	5.23 (0.86)	5.26 (0.90)	5.18 (0.85)	5.21 (0.89)	5.25 (0.71)
Acceptance	5.96 (0.91)	6.07 (0.93)	5.86 (0.97)	6.03 (0.88)	5.98 (0.93)	5.99 (0.88)	5.98 (0.91)	6.00 (1.00)
Religion	6.74 (0.84)	6.81 (0.92)	6.78 (0.91)	6.75 (0.83)	6.76 (0.85)	6.75 (0.85)	6.76 (0.85)	6.92 (0.82)
Humor	2.16 (0.48)	2.19 (0.51)	2.23 (0.58)	2.14 (0.44)	2.10 (0.39)	2.22*(0.55)	2.17 (0.48)	2.14 (0.53)
Use of instrumental support	6.15 (1.01)	6.16 (0.95)	6.05 (1.09)	6.18 (0.96)	6.08 (1.01)	6.21 (0.98)	6.14 (1.01)	6.22 (1.01)
Active coping	5.88 (0.79)	5.87 (0.75)	5.87 (0.77)	5.89 (0.79)	5.86 (0.87)	5.80 (0.76)	5.88*(0.81)	5.71 (0.62)
Planning	5.63 (0.95)	5.43 (0.94)	5.71 (0.93)	5.56 (0.97)	5.60 (0.92)	5.59 (0.98)	5.60 (0.95)	5.55 (0.95)
Self-distraction	4.25 (0.94)	4.54*(1.15)	4.28 (1.04)	4.31 (1.01)	4.30 (1.00)	4.30 (1.05)	4.29 (1.03)	4.48 (1.22)
Behavioral disengagement	4.67*(0.85)	4.41 (0.81)	4.64 (0.85)	4.62 (0.85)	4.64 (0.86)	4.61 (0.81)	4.61 (0.84)	4.77 (0.64)
Denial	5.18 (0.81)	5.15 (0.78)	5.07 (0.83)	5.12 (0.81)	5.1 (0.81)	5.18 (0.78)	5.17 (0.81)	5.14 (0.76)
Venting	5.77 (0.91)	5.71 (0.92)	5.68 (0.84)	5.67 (0.86)	5.84 (0.95)	5.78 (0.93)	5.78 (0.93)	5.48 (0.96)
Self-blame	5.23 (0.82)	5.22 (0.32)	5.35 (0.72)	5.31 (0.67)	5.22 (0.79)	5.24 (0.77)	5.39 (0.72)	5.34 (0.86)
Substance abuse	2.00 (0.00)	2.00 (0.00)	2.00 (0.00)	2.00 (0.00)	2.00 (0.00)	2.00 (0.00)	2.00 (0.00)	2.00 (0.00)
Emotion-focus coping	26.28(1.91)	26.69(2.06)	26.17(1.82)	26.35(1.57)	26.36(1.94)	26.1 (1.72)	26.34(1.96)	26.5 (1.73)
Problem-focus coping	17.66(1.58)	17.48(1.59)	17.64(1.53)	17.65(1.65)	17.6(1.57)	17.7 (1.66)	17.6 (1.59)	17.5 (1.55)
Avoidance coping	21.88(1.73)	21.81(1.75)	21.70(1.84)	21.73(1.82)	21.99(1.65)	21.7 (1.77)	21.8 (1.74)	21.8 (1.62)

**Note:** p-value significance; \*p<0.05.

**Abbreviation:** S.D., standard deviation.

**Table 3** Correlations Between Treatment Tolerability (FertiQoI) and Coping Strategies (N=350)

	Coping Strategies														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Aspects of treatment tolerability	r(a)	r (a)	r (a)	r (a)	r (a)	r(a)	r (a)	r (a)	r (a)	r (a)	r(a)	r (a)	r (a)	r (a)	r (a)
Tolerability for impact on mood	0.121*	-0.073	-0.094*	0.070	0.017	0.026	-0.054	0.120*	-0.030	-0.170**	0.177**	-0.118*	0.015	0.035	-0.036
Tolerability for complications of fertility treatment procedure and medication	-0.070	-0.013	-0.116*	0.113*	-0.033	-0.089*	0.043	0.073	-0.042	-0.120*	-0.040	-0.154**	-0.086	-0.027	-0.111*
Tolerability for the impact of the infertility treatment on daily life	0.123*	-0.098*	-0.001	0.038	-0.146**	0.041	-0.009	0.054	0.103*	-0.026	0.037	-0.108*	0.048	0.049	-0.021
Tolerability for the side effects of fertility medications/treatment.	0.092*	-0.084	-0.091*	0.008	-0.092*	-0.173**	0.052	0.123*	0.024	-0.015	0.019	0.015	0.005	-0.117*	0.023
Overall treatment tolerability	0.118*	-0.117*	-0.131**	0.066	-0.090*	-0.057	0.012	0.056	0.018	-0.127**	0.078	-0.138**	-0.007	-0.024	-0.062

**Notes:** 1. Positive reframing; 2. use of emotional support; 3. acceptance; 4. religious coping; 5. humor; 6. use of instrumental support; 7. active coping; 8. planning; 9. self-distraction; 10. behavioral disengagement; 11. denial; 12. venting; 13. emotion-focus coping; 14. problem-focus coping; 15. avoidance coping; (a) one-tailed test of significance \*\*p<0.01; \*p<0.05.



**Table 4** Correlations Between Treatment Environment (FertiQoI) and Coping Strategies (N=350)

	Coping Strategies														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Aspects of treatment environment	r(a)	r (a)	r (a)	r (a)	r (a)	r(a)	r (a)	r (a)	r (a)	r (a)	r(a)	r (a)	r (a)	r (a)	r (a)
Available of fertility medical services	0.070	-0.003	0.034	0.090*	-0.056	0.126**	0.130**	0.029	0.030	-0.187**	-0.080	-0.072	-0.006	0.078	0.035
Fertility staff understand women's difficulties.	0.094*	-0.015	-0.038	-0.088*	-0.038	0.058	0.123*	0.047	-0.036	-0.189**	-0.024	0.039	-0.056	0.013	0.024
Satisfaction with services to address the emotional needs.	0.075	0.083	0.030	-0.031	0.098*	0.013	0.028	0.031	-0.010	-0.123*	-0.029	0.086	0.039	-0.015	0.086
Satisfaction with the surgery and/or medical treatment(s)	0.021	-0.044	-0.055	0.011	-0.053	-0.016	0.016	0.101*	-0.041	-0.009	-0.018	0.032	-0.052	-0.073	-0.006
Satisfaction with the quality of information about medication, surgery and/or medical treatment.	0.153**	0.036	-0.015	-0.078	-0.012	-0.009	0.015	0.062	-0.113*	-0.107*	0.026	-0.007	0.028	0.026	-0.056
Satisfaction with interactions with medical staff	0.010	-0.053	-0.009	-0.034	-0.044	0.041	0.020	0.128*	0.042	-0.049	0.080	-0.017	-0.033	0.045	0.029
Overall treatment environment	0.044	0.006	-0.022	-0.105*	-0.056	0.088*	0.142*	0.196*	-0.030	-0.139**	-0.012	-0.028	-0.032	0.029	0.046

**Notes:** 1. Positive reframing; 2. use of emotional support; 3. acceptance; 4. religious coping; 5. humor; 6. use of instrumental support; 7. active coping; 8. planning; 9. self-distraction; 10. behavioral disengagement; 11. denial; 12. venting; 13. emotion-focus coping; 14. problem-focus coping; 15. avoidance coping; (a) one-tailed test of significance. \*\*p<0.01; \*p<0.05.

**Table 5** Linear Regression Analysis to Determine the Relationship of Treatment Tolerability with Various Coping Mechanisms (N=350)

	$\beta$	t	95% Confidence Interval for $\beta$	
			Lower Bound	Upper Bound
Positive reframing	0.118	2.224*	0.009	0.140
Use of emotional support	-0.031	-0.578	-0.076	0.041
Acceptance	-0.033	-0.625	0.533	-0.080
Religion	-0.046	-0.856	-0.082	0.032
Humor	-0.069	-1.286	-0.054	0.011
Use of instrumental support	-0.057	-1.074	-0.103	0.030
Active coping	0.012	0.221	-0.047	0.058
Planning	0.010	0.183	-0.058	0.070
Self-distraction	0.002	0.033	-0.067	0.070
Behavioral disengagement	-0.056	-1.044	-0.087	0.027
Denial	0.078	1.468	-0.014	0.093
Venting	-0.138	-2.592	-0.139	-0.019
Self-blame	-0.057	-1.074	-0.103	0.030

**Note:** Level of significance: \* $p < 0.05$ .

**Table 6** Linear Regression Analysis to Determine the Relationship of Treatment Environment with Various Coping Mechanisms (N=350)

	$\beta$	t	95% Confidence Interval for $\beta$	
			Lower Bound	Upper Bound
Positive reframing	-0.008	-0.144	-0.071	0.061
Use of emotional support	0.006	0.107	-0.055	0.062
Acceptance	-0.022	-0.409	-0.073	0.048
Religion	-0.014	-0.267	-0.065	0.049
Humor	-0.056	-1.054	-0.050	0.015
Use of instrumental support	0.050	0.942	-0.035	0.099
Active coping	-0.025	-0.467	-0.065	0.040
Planning	0.016	0.297	-0.054	0.074
Self-distraction	-0.030	-0.569	-0.089	0.049
Behavioral disengagement	-0.111	-2.091*	-0.004	-0.117
Denial	-0.012	-0.218	-0.060	0.048
Venting	0.028	0.529	-0.044	0.077
Self-blame	0.050	0.942	-0.035	0.099

**Note:** Level of significance: \* $p < 0.05$ .

## Discussion

Women with infertility disorders are the frequent consumers of healthcare services in developing countries.<sup>50,51</sup> In traditional societies, women with infertility problems are often exposed to extreme social pressures, discrimination, and abuse due to infertility which increased their vulnerability to poor mental and emotional health.<sup>52</sup> Previous research showed these women experience poor quality of life in various domains including their physical, mental/emotional, intimate relationships, and social life.<sup>49</sup>

The current study aimed at investigating the relationship between fertility treatment quality and coping mechanisms adopted by women to deal with infertility difficulties. We obtained some very interesting findings which are discussed below keeping in view the infertile women's vulnerability to experiencing poor mental health due to a myriad of social, cultural, and economic factors in traditional societies. Few recent studies assessed mental problems among Bhutanese refugees by employing a culturally adapted version of a Hopkins Symptom Checklist-25 (HSCL-25) reported women are at increased risk to experience poor mental health attributed to several social and cultural factors.<sup>17,18</sup> Our findings certainly validate the significant amount of pressure experienced by women to bear children. Childbearing is an important identifier of social status for women both at the familial and societal levels in pronatalist cultures. Motherhood is a primary role of women in most traditional patriarchal societies thus women put all their efforts to achieve this position and role soon after marriage.<sup>53</sup> These pressures are not only faced by women with primary infertility but women with secondary infertility also endure social pressures such as increasing family size and giving birth to male child.<sup>7</sup> In developing countries, infertility and maternal depression be significantly associated with maternal morbidity.<sup>54</sup>

The literature thus points towards various direct and indirect sources of stress borne by women with primary and secondary infertility. In this scenario, the current analysis was rightly needed to assess the coping strategies adopted by women to deal with infertility stressors and their relationship with fertility treatment quality which is the focus of the subsequent discussion.

Coping is a psychological process sometimes associated with the behavioral response of individuals towards unpleasant situations and life circumstances as an attempt to mitigate the perceived negative impacts on their lives. Our study findings demonstrated that religious coping was the most dominant coping strategy adopted by women which aligns with previous studies from Muslim communities.<sup>34,55</sup> People who adhere to religious beliefs such as "God has better plans" and "there is always some good reason behind God's decisions" gain internal strength and a sense of control.<sup>56</sup> Studies showed that connections with faith/religion help women to neutralize the impact of social pressures, develop a positive attitude towards fertility hazards and cope with the emotional impacts of infertility.<sup>11-34</sup> Our study findings also show that tolerability for complex infertility treatment procedures and administration of medication was significantly associated with religious coping. The findings are comparable with a previous study that assessed employing religion to deal with infertility problems in a sample of Muslim and Christian women. In both groups, women who had a strong orientation towards religious and spiritual practices employed positive emotions like hope, inner peace, and better self-esteem to have a bright outlook on life and that helped them to cope with the emotional burden of infertility. The current findings align with previous evidence which illustrates that using religious and spiritual connections equips women to cope with the negative emotional toll of infertility.<sup>57</sup> Nonetheless, sometimes women with infertility difficulties are also stuck into less effective coping responses such as self-blame, denial, lack of acceptance, avoidance, social isolation, and internalizing the distress as supported by current study findings. These maladaptive coping styles may increase their vulnerability to have poor health and quality of life.<sup>58</sup> We also found that women with primary infertility had significantly higher mean scores on self-blame, self-distraction, and avoidance coping in comparison to women with secondary infertility. Findings also validate those women with poor empowerment status may use less adaptive coping mechanisms, for instance, non-working women are more likely to employ behavioral disengagement, which refers to a coping mechanism where the person gives up the attempt to reach the goal. Additionally, women who experienced abuse due to infertility are less likely to employ active coping, which relates to taking direct action to solve the problem.

Our study findings show that among emotion-focus coping, positive reframing was the second most preferred coping strategy adopted by women. Positive reframing refers to the positive interpretation of events and using the stressful

experiences to grow out as a person. The treatment tolerability was thus found to be significantly positively associated with positive reframing. Two aspects of the treatment environment fertility staff understanding of women's perspectives and satisfaction with the information received by women about their fertility treatment details were positively associated with positive reframing. These findings have significant implications and suggest that women's positive coping can be improved by focusing on these aspects of fertility treatments. Training opportunities be offered to medical staff to enhance their empathic communication skills. Empathic communication between women and medical staff has a significant role in the adoption of positive coping strategies thus enhancing mental well-being in these women. Along with workshops, professional seminars and social meetings are good platforms to help medical staff reflect upon their interactions and communication experiences with these vulnerable populations. Improving women's trust through emotional connection can prevent the emotional toll associated with infertility difficulties.<sup>12</sup>

We found that within problem-focus coping strategies, the use of instrumental social support was the most preferred strategy adopted by women. This aspect of coping focuses on seeking help from others either in form of advice or actual contribution to problem-solving. These findings are contingent on the scenario of the collectivist culture of traditional communities where people are more likely to connect, share their difficulties as well as seek help to solve their problems. In a qualitative study from Jordan, women appreciated the instrumental social support they received from the family in form of money to bear the expenses of infertility treatments.<sup>59</sup> Our findings show that tolerability for complications of infertility treatment procedures and tolerability for the side effects of fertility treatments are significantly negatively associated with the use of instrumental support. Whereas overall treatment environment and satisfaction with the availability of medical services are positively associated with the use of instrumental support. These findings suggest that by improving fertility treatment quality, the women become more effective in using appropriate social support to deal with their infertility problems. The social support system has been found a protective factor in the emotional health of women with infertility problems.<sup>60</sup>

The use of emotional support is an emotion-focus coping strategy, which means that women share their concerns and apprehensions related to infertility with their friends and family members and sought relief through supportive talk and sharing of feelings. We found that the treatment tolerability was significantly negatively associated with the use of emotional support, which suggests that women who were more able to tolerate various impacts of fertility treatment on daily life and emotional health are less likely to share their concerns and apprehensions with other family members. However, we did not find a significant association between the treatment environment with this coping mechanism. These aspects, however, warrant further investigation through a qualitative research approach.

The descriptive data on coping mechanisms show that mean scores on avoidance coping mechanisms such as behavioral disengagement, self-distraction, and substance abuse were in the low range. Also, among emotion-focus coping the lowest score was on humor. These findings are interpretable keeping in view the struggles and difficulties of women seeking infertility treatments. Women with primary infertility disorders are usually desperate to have successful outcomes of fertility treatments, thus they are less likely to cope with behavioral disengagement, self-distraction, and humor. The use of substance abuse in women is considered a big taboo in traditional societies. Therefore, women in this sample did not report it as a strategy to cope with infertility stress.

Our study findings demonstrated that among aspects of the treatment environment, satisfaction with the quality of services to deal with the emotional needs of women was positively associated with humor. This shows that women who received emphatic care from staff can help women to see the pleasant side of life rather than being engrossed with infertility stress. Findings also show that treatment tolerability was negatively associated with humor, which is likely to be due to the extreme commitment of women with invasive fertility treatments which leave less room to see any fun in this situation. These findings are explainable considering previous literature which showed that infertile women are exposed to various difficulties in intimate relations and social pressure which increased their risk for high levels of anxiety regardless of their age, educational status, and duration of infertility. These difficulties may cause low self-esteem, negative perceptions about their life situation as well as poor intimate relationship.<sup>12</sup>

Our study findings also show that three aspects of treatment tolerability (i) fertility treatment do not influence my mood negatively, (ii) treatment procedures and medications are not complicated for me, and (iii) the patient is not bothered by the influence of fertility treatment on everyday life negatively associate with venting. Venting refers to

experiencing severe emotional distress and expressing those feelings a lot. Tolerability for the complexity of fertility treatment procedures and medication administration is negatively associated with avoidance coping. These findings support that quality of fertility treatment can reduce the use of less adaptive coping strategies such as venting, self-blame, and behavioral disengagement.

Some of the other significant findings of the study are related to the use of planning and active coping. Both aspects relate to problem-focus coping. We found that women who experienced physical abuse had significantly lower mean scores on active coping in comparison to women who did not face abuse. Two aspects of the treatment environment, availability of fertility medical services and empathy shown by staff positively associate with active coping. We now know that in the case of fertility treatments, the medical staff is involved in the promotion of information related to fertility treatments thus more compassionate behavior of staff can enable women to make use of active coping.<sup>61</sup> Both treatment tolerability and treatment environment demonstrated a positive relationship with planning. Planning refers to the coping strategy where a person engages in developing a strategy to cope with the situation. Poor relationships with healthcare providers and lack of access to sufficient information about treatment procedures may cause low levels of satisfaction in couples seeking infertility treatments.<sup>62</sup> One important study finding is related to the negative relationship of a good treatment environment with religious coping. Though religious coping is an important aspect of coping, it is known to be employed by women with infertility disorders to gain a sense of control.<sup>57</sup> It is quite probable that women experiencing a better treatment environment have an improved sense of control as indicated by the positive association of the treatment environment with problem-focus coping, which enables them to make use of various other positive coping strategies along with religious coping. Previous literature has also pointed out the protective role of religious coping in depression among Muslim women with infertility disorders.<sup>63</sup>

Current findings support the adoption of a holistic perspective in infertility care. The implications of the study findings on infertility care are obvious. Findings underscore the significant relationship of various aspects of fertility treatment quality with coping mechanisms, which creates an opportunity to improve infertile women's mental and emotional health. Overall findings suggest that improving women's tolerability for the impact of fertility treatments on mood and daily life as well improving the quality of interactions between medical staff and patients can help women to adopt problem-focus coping. The use of appropriate coping mechanisms significantly predicts better mental health and positive emotional experiences during fertility care. There is a piece of evidence that coping training can enhance women's well-being undergoing infertility treatments.<sup>64</sup>

The study has several strengths as it contributes to filling the potential gap identified by previous research<sup>12</sup> to assess the relationship of quality of life with coping mechanisms adopted by women with infertility problems. Additionally, the findings have useful implications to focus on various aspects of improving fertility treatment quality such as improving the content and processes of information sharing during fertility treatments, which can help women to make use of positive reframing. Additionally, a good treatment environment assists women to plan and less use of avoidance coping mechanisms. Women's tolerability for fertility treatment promotes them to see the positive side of these experiences through positive reframing and these women are less likely to employ behavioral disengagement and venting which are considered maladaptive coping mechanisms. The use of adaptive coping strategies has positive implications for women's mental health and well-being. Some of the study limitations relate with small sample size as we collected the data from a sample of 350 women seeking infertility treatments in one city in Pakistan, which limits the generalizability of findings. However, the background characteristics of these women match with the broader socio-economic and cultural context of various other traditional societies, thus findings have wider implications for fertility care and women's mental health. The current analysis focuses on only two aspects of fertility treatment quality, future research should investigate various other emerging bioethical issues in connection with rapid advancements and the use of invasive technological procedures infertility treatment. Future research should also include data on couples rather than women only, as women coping processes likely to be influenced by their partner's ways to deal with infertility difficulties and their partner's perceptions about fertility treatment quality.

## Conclusion

The insight from the present study expands the existing understanding of women coping with infertility problems. Current findings illustrate that coping methods are significantly associated with fertility treatment tolerability and it can be inferred that enabling women to use positive coping methods has positive outcomes on fertility treatment tolerability. Equipping women to use positive reframing will be effective in increasing the treatment tolerability with a minimal toll on the emotional health of women. The use of adaptive coping strategies has positive implications for women's mental health and well-being. The role of religious coping should be further explored as a protective factor because our findings demonstrated that tolerability for complications of fertility procedures is positively associated with religious coping; however, it demonstrated a negative relationship with the overall fertility treatment environment. A good quality fertility treatment environment is helpful to let women employ other coping mechanisms such as planning and active coping or some other factors. Additionally, the treatment compliance can be improved by coping training because the use of maladaptive coping methods such as behavioral disengagement and venting has negative consequences on emotional health as well as treatment outcomes. Overall, study findings suggest various aspects of treatment tolerability and treatment environment can be utilized to help women better cope with infertility difficulties and thus promote emotional/mental health for these vulnerable populations of women.

## Institutional Review Board Statement

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of the School of Social Sciences and Humanities, National University of Sciences and Technology (NUST) (protocol code (NA) dated 30/05/2016 and approval for this analysis was issued on 30/07/2018).

## Informed Consent Statement

Written informed consent was obtained from all subjects involved in the study and confidentiality of any information which may reveal the personal identification of patients, or their medical records was ensured in all stages of the research process.

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