

Effects of Exercise Causality Orientations and Behaviour Regulation on Mental, Physical and Spiritual Well-Being in Pakistani Adults: Mediation of Health Promoting

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ABSTRACT

Objective: The study aims to explore the effects of exercise causality orientations and behaviour regulation on mental, physical and spiritual well-being in Pakistani adults. The goal is to investigate the health-promoting lifestyle pattern in the community to compare cross-country results in future cross-sectional studies.

Method: A quantitative cross-sectional correlational study was conducted through a purposive sample. A total of 184 adults (males=122, females=62), with the age range between 18 up to 72) were taken from educational and sports institutes in Pakistan. Valid and reliable instruments were used to conduct descriptive and inferential statistics through IBM SPSS v.25. The instruments of Effects of Exercise Causality Orientations [1] Behaviour Regulation [2], Mental, Physical and Spiritual Well-Being [3]. Only English-proficient adults were included in the study. Pearson product moment correlation was used. Multiple linear regression was used to test the effects. Mediation was testing through Hayes Process Macro. Multivariate analysis of variance was used to test the impact of age and gender on the constructs.

Results: The analysis shows that the constructs robustly correlate. the constructs robustly association along. Multiple regression analysis shows that the Effects of exercise, causality orientations, and behaviour regulation significantly affect mental, physical and spiritual well-being in adults. Hayes Process Macro mediation analysis shows that health-promoting lifestyle and sub-dimensions have a significant effect on lifestyle in terms of health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations and stress management and on behaviour regulation and overall well-being.

Conclusions: The induction of physical and cultural promotion is integral in Pakistani educational and sports systems. It is important to inculcate psychological tailored therapies for the sports persons across all age groups. Moreover, there is underrepresentation of Central Asian countries in the global sports spheres. Sports must be presented as a universal pivot of cultural interaction, global connection and for intra personal well-being too.

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Introduction

Themes in sports psychology are under-researched in Pakistan. It is important to understand athletic and sports dynamics in the culture to promote beneficial interventions. Sports promotion is a common element in Central Asian culture and countries. The aim is to focus on the psychological constructs' impact on the Pakistani population, and whether that can be replicated in the South Western Asian, Central, North Asian and broad Eurasian regions' sample the aim of the study is that whether exercise equally effects mental and physical well-being in relation to spiritual well-being.

The South Asian community, particularly females, suffer from chronic metabolic disorders due to low physical activity [4]. The prior study mentioned is slightly similar in context to a Russian study, where medical students find it difficult to manage sports with an academic load that ultimately leads to less motivation [5]. Consistent with the same reasons, Pakistani students report busy schedules along with job and study burdens as antecedents to physical inactivity [6]. Social and cultural norms affect the lifestyle of women to focus on their exercise regimen. First-generation Pakistani women do not have an active sport-oriented life due to social integration and socio-economic limitations [7]. Muslim females also have religious restrictions on sports participation, which becomes a hindrance to embracing sports [8], [9] [10]. Eating behaviour is also linked to behaviour regulation and exercise quality, in which nutrition is important for training motivation for overall well-being [11]. In Russia, the government has focused strictly on the population's health, which has improved over time as compared to Europe

[12]. Moreover, an increase in health-promoting lifestyles can contribute towards an increase in life expectancy. This study is based on the Four Domains Model [13]. It relates to health as a multi-dimensional construct that encompasses physical and mental health, and includes spiritual well-being. It includes the personal domain, communal domain, environmental domain and transcendental domain. The personal domain relates to behaviour management, communal domain relates to social well-being that can be fostered through collective exercise regimes, an environmental domain that can harness outdoor activity and transcendent domain that links to spiritual wellbeing.

Hence, by studying the constructs related to sports in South Asian sample; there can be robust indication if these constructs can interplay in different samples across Central Asian, North Asia and South Western Asian sample.

The present study postulates that there is significant association among effects of exercise, causality orientations, behaviour regulation, mental, physical and spiritual well-being. It is posited that there is significant effect of exercise causality and the sum of behavioral regulation of autonomy, control, impersonality, external regulation, introjected regulation, identified regulation and intrinsic regulation on mental, physical and spiritual well-being. Moreover, the study aims to explore that if there is a significant mediating effect of a health-promoting lifestyle in terms of health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations and stress management on behaviour regulation and overall well-being. Moreover, the study further investigates if there is an impact of age and gender on all the constructs and sub-dimensions.

Effects of Exercise Causality Orientations

According to the model of Deci and Ryan (1985), the causality theory pertains to individuality's extent to which people want autonomy in their behaviour [14]. These take the form of autonomy orientation, control orientation and impersonal orientation. With autonomy, individuals require more self-determination to regulate their actions. Control orientation posits that individuals are either extrinsically or intrinsically moved by events to regulate their behaviour. The impersonal orientation refers to a belief that events occur outside one's control. These orientations differ in different facets of life. Hence, the Deci and Ryan model can be implemented in the domain of physical activity and sports. Hence, Rose et al. (2005) assessed individuals in the exercising dimension [1]. The model does not follow a typological approach. Hence, per the stipulation of Koestner and Zuckerman (1994), the individuals are classified according to their predominant orientation [15]. It is important to note that exercise control and autonomy are important for the motivated adults in a sporting routine to work towards mental and physical well-being [16].

Behavior Regulation

Based on the model of Deci and Ryan and organismic integration theory (a subset of self-determination theory), people's behaviour is regulated according to different experiences [14],[17]. The important aspect of organismic integration theory is to behaviour can become internalised. Hence, the model is based on a continuum ranging from non-self-determination to self-determination. Hence, an individual can be amotivated when not determined, progresses towards external regulation, introjected regulation, or identified regulation; thus, it indicates increasing self-determination through integrated and intrinsic regulation. *Mental,*

Physical and Spiritual Well-Being

Sports sciences are gaining popularity in the adoption of a systemic approach to well-being studies. It is now a part of Positive Psychology that helps to advance methods and interventions [18]. Subjective well-being is noted in college students for those who are involved in physical activity, in which the negative effect is undermined [19]. Leisure is explored to be a significant moderator for spiritual well-being; however, it is important to consider psychological well-being, as spiritual well-being is a complex construct [20]. In a sample of volleyball players, spiritual well-being is sustained in unfavourable circumstances [21]. Individuals who have been regular sports attendants and were members of sports clubs scored higher in extraversion and reported mental, physical and spiritual well-being, that also attributed to lower levels of neuroticism [22]. Physical well-being is researched in depth, which is the outcome of sports and physical activities [23]; however, more research is required in the domains of mental and spiritual well-being. In adolescents, there are mental health benefits in terms of physical, social and emotional growth. They are often exposed to sport-related psychological interventions of breathing, progressive muscle relaxation and stress management skills for overall well-being [24]. Aquatic sports, such as swimming, significantly enhance mental and physical well-being [25].

Health Promoting Lifestyle

There is immense importance in low-intensity sports for health-enhancing potential [25]. Any hindrances that are there for health-promoting activities are listed as low motivation, shortage of financial resources, lack of time and perpetual fatigue [26]. Health promotion is within the domain of metabolic diseases, cardiovascular ailments, neurological health issues and musculoskeletal sicknesses [27]. Sports that

are of low to moderate intensity can help to balance post-prandial hyperglycemia [28]. For cardiovascular diseases, a lowering of blood pressure is recorded. Neuroplasticity improves after sports such as aerobic workouts [29]. Improvement in cognitive function helps to minimise stroke and also helps to calm future major to mild neurocognitive disorders of Alzheimer's and dementia [30].

Materials and Method

Participants. The present study is a correlational cross-sectional study. It is completed through STROBE checklist as per the equator network [31]. Through a purposive sample, 184 sports candidates were recruited to fill out pen-and-paper questionnaires. The inclusion criteria had the adults that visited Punjab Sports Boar of Pakistan, regularly for at least 5 years. The adults knew English language well. The exclusion criteria enlist any adult who is suffering for a mental health disorder. The written informed consent was taken from the participants. The adults were free to withdraw from the study. The research complies with the research protocols of Hazara University, Pakistan. Participants were given 30 minutes to tick their responses. The coding progressed after a week of collecting and collating the data from the facility.

As per the metrics of G*power, with the statistical model of correlation, effect size of

0.3, non-centrality parameters of 3.31 and actual power of 0.95, a minimum sample of 111 is sufficient for the model to perform [32]. Informed consent was taken from the participants. Valid and reliable instruments were administered. The research protocol from the Department of Psychology, Hazara University, Pakistan, is adhered to.

Instruments. The Effects of Exercise Causality Orientations self-report questionnaire. It has three subscales: autonomy, control and impersonality. The scale is rated on a 7-point Likert scale. The total items are 21. The Cronbach alpha ranges from 0.64 to 0.65[1].

The Behaviour Regulation Instrument has four subscales. The scale has dimensions of external regulation, introjected regulation, identified regulation and intrinsic regulation. The scale has a total of 19 items. The Cronbach alpha ranges from 0.70-0.80[2]

The Mental, Physical and Spiritual Well-Being is a 30-item instrument. The scale is unidimensional. The Cronbach alpha ranges from 0.75 to 0.85 [3]

The Health Promoting Life Style Scale is a 52-item instrument with a 4-point Likert scale. The sub-dimensions include 6 subscales of health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations and stress management. The Cronbach alpha ranges from 0.70-0.90 [33].

Results

The following Table 1 enlists the distribution of the demographic profile

Table 1. Demographics (n=184)

| Variable | | Frequency | Per cent |
|----------|--------|-----------|----------|
| Gender | Male | 122 | 65.8 |
| | Female | 62 | 33.7 |
| Age | 18-30 | 129 | 70.1 |
| | 31-50 | 40 | 21.7 |
| | 51-65 | 10 | 5.4 |
| | 66-75 | 5 | 2.7 |

| | | | |
|----------------|----------|-----|------|
| Marital status | Single | 65 | 35.3 |
| | Married | 115 | 62.5 |
| | Divorced | 4 | 2.2 |
| | Total | 184 | 100 |

Correlation Analysis

Table 2 shows the correlation among the scales and subscales

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|----------|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1. ETT | - | .30* | .55* | .84* | .74* | .63* | .20* | .10* | .03* | .92* | .15* | .14* | .14* | .14* | .58* |
| 2. BIRT | - | - | .33* | .45* | .43* | .66* | .73* | .23* | .45* | .34* | .47* | .48* | .54* | .56* | .55* |
| 3. BAERT | - | - | - | .44* | .58* | .32* | .36* | .45* | .25* | .56* | .48* | .51* | .59* | .62* | .42* |
| 4. BIT | - | - | - | - | .64* | .60* | .54* | .51* | .71* | .49* | .64* | .31* | .21* | .58* | .55* |
| 5. BRT | - | - | - | - | - | .65* | .72* | .32* | .44* | .56* | .22* | .70* | .54* | .86* | .65* |
| 6. BMT | - | - | - | - | - | - | .43* | .23* | .35* | .50* | .32* | .77* | .42* | .66* | .39* |
| 7. MTT | - | - | - | - | - | - | - | .56* | .64* | .83* | .34* | .43* | .55* | .89* | .98* |
| 8. IRT | - | - | - | - | - | - | - | - | .72* | .59* | .37* | .53* | .97* | .16* | .48* |
| 9. NT | - | - | - | - | - | - | - | - | - | .90* | .46* | .26* | .45* | .96* | .43* |
| 10. HRT | - | - | - | - | - | - | - | - | - | - | .88* | .63* | .55* | .91* | .42* |
| 11. PAT | - | - | - | - | - | - | - | - | - | - | - | .43* | .87* | .02* | .47* |
| 12. SMT | - | - | - | - | - | - | - | - | - | - | - | - | .33* | .14* | .50* |
| 13. SGT | - | - | - | - | - | - | - | - | - | - | - | - | - | .33* | .53* |
| 14. BT | - | - | - | - | - | - | - | - | - | - | - | - | - | - | .58* |
| 15. HT | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

Note: ETT=Effects of Exercise Causality Orientations; BIRT=Behavior Regulation ; BAERT=external regulation ; BIT =introjected regulation ; BRT=identified regulation BMT= intrinsic regulation; MTT= mental, physical and spiritual well-being ; IRT= interpersonal relations ; NT=nutrition ; HRT= health responsibility ; PAT= physical activity; SMT= stress management ; SGT= spiritual growth ; HT=health promoting lifestyle

The correlation analysis shows robust and significant associations among the constructs and the subscales.

Regression Analysis

Table 3 shows the multiple linear regression analysis

| Source | B | SE | t | p |
|----------------|---------|------|--------|--------|
| Constant | 43.713 | 2.51 | 20.323 | <.0001 |
| ETT | .228** | .042 | 5.372 | <.0001 |
| BTT | .261* | .103 | 2.529 | .012 |
| R ² | .914 | | | |
| F | 417.391 | | | |

Note: ETT: Exercise Causality Orientations Total. BTT: Behavioural Regulation Total, $p^{**}<.001$, $p^{*}<.05$. According to the regression analysis, there is a significant effect of exercise causality orientation ($B=.228$, $p=.000$), and behavioural regulation ($B=.261$, $p=.012$) on mental, physical and spiritual well-being. A total of 91.4% variance for mental, physical and spiritual well-being is brought through exercise causality orientation and behavioral regulation.

4. Mediation Analysis

Table 4 shows mediation analysis Indirect Effect

| Total | Effect | Boot SE | LLCI | ULCI |
|-------|--------|---------|-------|------|
| Total | .358 | .094 | .163 | .536 |
| IRT | .181 | .087 | .018 | .369 |
| NT | -.010 | .074 | -.162 | .132 |
| HRT | -.060 | .077 | -.090 | .208 |
| PAT | .012 | .080 | -.152 | .164 |
| SMT | .277 | .113 | .062 | .504 |
| SGT | -.161 | .119 | -.402 | .062 |

Note: IRT=interpersonal relations; NT=nutrition; HRT=; PAT=physical activity; SMT=stress management ; SGT=spiritual growth

| Total Effect of X on Y | SE | t | p | LLCI | ULCI |
|------------------------|------|--------|--------|------|------|
| Indirect Effect | .103 | 26.352 | <.0001 | .740 | .860 |
| Direct Effect | .442 | 4.280 | <.0001 | .238 | .647 |

According to mediation analysis, there is a significant total effect ($B=.545$, $p=.000$) for health-promoting lifestyle to mediate exercise causality orientation dimensions and behavioural regulation.

5. Multivariate Analysis

Table 5. Shows the MANOVA tests for age and gender. Test of Between-Subjects Effects

| Source | Dependent Variable | Type III Sum of Squares | df | Mean Square | F | p |
|--------|--------------------|-------------------------|----|-------------|-------|--------|
| Gender | BTT | 9695.604 | 2 | 97279.28 | 34.05 | <.0001 |
| | HTT | 36373.26 | 2 | 4847.80 | 28.63 | <.0001 |
| | MTT | 7597.14 | 2 | 3798.57 | 32.64 | <.0001 |
| Age | BTT | 480.985 | 3 | 160.328 | 1.126 | .340 |
| | HTT | 1946.066 | 3 | 648.689 | 1.021 | .385 |
| | MTT | 221.648 | 3 | 73.883 | .635 | .594 |

Note=BTT= Behavior regulation total; HTT= health-promoting life style

According to multivariate analysis of variance, only gender has a main effect on behavioural regulation ($F=34.05$, $p<.0001$, health-promoting lifestyle ($F=28.63$, $p=.000$), and for mental, physical and spiritual well-being ($F=32.64$, $p<.0001$. Age does not have a main effect for the three constructs.

Discussion

The study sample comprised 184 participants. As shown in Table 1, a majority were male (65.8%), while females represented 33.7% of the sample. The age distribution was skewed toward younger individuals, with 70.1% aged between 18 and 30 years, followed by 21.7% in the 31–50 age

group, 5.4% aged 51–65, and a small proportion (2.7%) aged 66–75.

Regarding marital status, 62.5% of participants were married, while 35.3% were single and 2.2% were divorced. This demographic profile suggests that the sample was relatively young, predominantly male, and largely married.

Table 2 presents the Pearson correlation coefficients among the fifteen measured variables. Overall, the results indicate a pattern of significant positive associations among most variables, suggesting substantial interrelationships across the measured constructs.

The variable ETT showed strong positive correlations with BIT ($r = .84, p < .01$), BRT ($r = .74, p < .01$), HRT ($r = .92, p < .01$), and BAERT ($r = .55, p < .01$), indicating that increases in ETT are associated with higher scores in these domains. Moderate correlations were also found between ETT and BIRT ($r = .30, p < .01$), BMT ($r = .63, p < .01$), and HT ($r = .58, p < .01$).

BIRT correlated strongly with MTT ($r = .73, p < .01$), SGT ($r = .54, p < .01$), BT ($r = .56, p < .01$), and HT ($r = .55, p < .01$), suggesting it is a central variable linking several domains. Similarly, BAERT (Variable 3) displayed notable correlations with BT ($r = .62, p < .01$) and SGT ($r = .59, p < .01$), reinforcing its relevance within the overall structure.

BIT was significantly and strongly correlated with HRT ($r = .71, p < .01$), SMT ($r = .64, p < .01$), and BRT ($r = .64, p < .01$), suggesting a tightly coupled relationship between these constructs. Moreover, BRT had strong associations with BT ($r = .86, p < .01$), SMT ($r = .70, p < .01$), and HT ($r = .65, p < .01$), further underscoring the interconnectedness of the core constructs.

A particularly high correlation was observed between MTT and HT ($r = .98, p < .01$), which may indicate redundancy or overlapping content. Similarly, SGT and IRT also showed a very high correlation ($r = .97, p < .01$), suggesting these two variables may be closely related or conceptually similar. Across the board, most correlations were statistically significant ($p < .01$), indicating a high level of internal consistency and theoretical cohesion among the variables.

These results support the construct validity of the measures used and highlight potential multicollinearity among some variables, especially those with very high correlation coefficients ($r > .90$).

According to Table 3, multiple linear regression was conducted to examine the predictive effects of ETT and BTT on the outcome variable. The overall model was statistically significant, $F(2, 181) = 417.39, p < .001$, explaining a substantial proportion of variance in the dependent variable, $R^2 = .914$.

Both predictors made significant contributions to the model. Specifically, ETT was a strong positive predictor ($B = 0.228, SE = 0.042, t = 5.37, p < .001$), indicating that for each one-unit increase in ETT, the outcome variable increased by approximately 0.23 units, controlling for BTT. Similarly, BTT was also a significant positive predictor ($B = 0.261, SE = 0.103, t = 2.53, p = .012$), with each one-unit increase in BTT associated with a 0.26 unit increase in the outcome, holding ETT constant.

As per the mediation model, it examined the indirect effects of six mediators—Interpersonal Relations (IRT), Nutrition (NT), Health Responsibility (HRT), Physical Activity (PAT), Stress Management (SMT), and Spiritual Growth (SGT)—on the relationship between the independent variable and the dependent variable.

The total indirect effect was significant, with an effect size of 0.358 (Boot SE = 0.094), and a 95% bias-corrected confidence interval (CI) ranging from 0.163 to 0.536, indicating that, collectively, these mediators significantly explain part of the relationship between the independent and dependent variables. Individually, Interpersonal Relations (IRT) showed a significant positive indirect effect (effect = 0.181, Boot SE = 0.087, 95% CI [0.018, 0.369]), suggesting it partially mediates the relationship. Similarly,

Stress Management (SMT) also demonstrated a significant positive indirect effect (effect = 0.277, Boot SE = 0.113, 95% CI [0.062, 0.504]), further supporting its mediating role.

In contrast, the indirect effects of Nutrition (NT) (effect = -0.010, 95% CI [-0.162, 0.132]), Health Responsibility (HRT) (effect = -0.060, 95% CI [-0.090, 0.208]), Physical Activity (PAT) (effect = 0.012, 95% CI [-0.152, 0.164]), and Spiritual Growth (SGT) (effect = -0.161, 95% CI [-0.402, 0.062]) were not significant, as their confidence intervals included zero.

These findings indicate that interpersonal relations and stress management are key mediators linking the independent variable to the outcome, whereas the other tested variables did not significantly mediate this relationship.

According to Table 5., multivariate analysis of variance showed impact of age and gender on all the constructs. It showed that gender a significant effect on all three dependent variables. For BTT, the effect of gender was significant, $F(2, N) = 34.05$, $p < .001$, indicating that scores on BTT differ by gender. Similarly, gender significantly affected HTT, $F(2, N) = 28.63$, $p < .001$. The effect of gender on MTT was also significant, $F(2, N) = 32.64$, $p < .001$. These results suggest that males and females differ significantly across the measures of BTT, HTT, and MTT. However, age did not have a statistically significant effect on any of the dependent variables.

In synthesis, the constructs are significantly associated with each other. Exercise causality orientation has a significant positive effect on mental and physical well-being. Exercise causality relates positively with behavioural regulation and external, introjected, internal and identified regulation. As per regression analysis, exercise causality and the sum of

behavioural regulation of autonomy, control, impersonality, external regulation, introjected regulation, identified regulation, and intrinsic regulation have significant effects on mental, physical and spiritual well-being. There is a significant mediating effect of a health-promoting lifestyle in terms of health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations and stress management on behaviour regulation and overall well-being. In the multivariate analysis of variance test, there is an impact of gender on all the constructs and sub-dimensions.

Training courses to form positive attitudes towards sports pursuits are important to promote physical culture [35]. Tele-exercise may prove fruitful in conservative cultures. Just as there is a physical culture concept in neighbouring countries of South Asia, South West Asia, North and Central Asia, similar parsimonious strategies must be developed for overall Asian sports students as they might be commonalities [36]. It is important to note that combination of exercise and behavior regulation can impact spiritual well-being, not only physical and mental well-being [37]. It is important to navigate the effects of physical exercise, not only in physical terms but a part and parcel for behavioral regulation and overall, well-being. The spiritual structure of the society is equally important, because it builds social orientation, impacts societal behavior and motivates towards a healthier society [38]. The recent literature suggests that baby boomers have a growing interest in overall wellness, rather than focusing on one aspect of physical fitness [39]. Especially for older adults, physical exercise is very important in terms of their functional capacity and well-being perception [40]. As per the Rodger's evolutionary concept, healthy lifestyle is a wau of like that is a direction towards sustaining optimal health for body, mind and

spirit [41]. The theory builds on the notion that there must be a holistic view of well-being, that just goes beyond physical health and more towards overall caring, supported by the salutogenic perspective. As well-being must not be regarded as an end state but a multi-dimensional construct [42]. As spiritual well-being is focused in sports psychology, to sustain behavioral regulation and self-control, it can heal many underlying ailments in the body and promote healthy life styles through different forms of exercises [43]. Supported by the embodied cognition theory, physical education nourishes not only the body, but the mind and spirit, yet studies are in death to explore the latter. Furthermore, the role of coach is integral in fostering and promoting healthy life style (Ali et al., 2025).

Conclusion

These findings indicate that interpersonal relations and stress management are key mediators linking the independent variable to the outcome, whereas the other tested variables did not significantly mediate this relationship.

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There can be more cross-cultural studies that can investigate the sports culture in South Asia, Central and North Asia and in South West Asia.

Author contributions

All authors contributed equally to the conceptualization of the article and writing of the original and subsequent drafts.

Data Availability Statement

The data is available from the authors at a reasonable request.

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Ethical Considerations

All ethical principles are considered in this article. The ethical principles observed in the article, such as the informed consent of the participants, the confidentiality of information, the permission of the participants to cancel their participation in the research. Ethical approval was obtained from the Research Ethics Committee of the Punjab Sports Board Pakistan and is in compliance with research rules of Hazara University, Pakistan

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Conflict of interest

The authors declared no conflict of interest.

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