

Effects of an Outdoor Physical Exercise Program on the Quality of Life of Women Weavers of Faso Danfani in the City of Ouagadougou

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Abstract

This present study aimed to evaluate the impact of an outdoor physical exercise program on the quality of life of women weavers in Faso Danfani. This is an 8-week intervention study without a control group, involving 30 female weavers with a mean age of 46.3 ± 8.8 years. The participants provided their consent and took part in a program to prevent musculoskeletal disorders in the workplace. The SF-36 questionnaire was used to evaluate quality of life. It was administrated 72 hours prior to the commencement of the initial session, at the mid-term point, and upon the end of the program. The data were analysed using JASP Computer Software, version 0.95.4. Change in scores was determined using repeated measures ANOVA, with a significance threshold of $p = 0.05$. The results of the initial measurement showed an overall score of 63.7 ± 15 , with a lower mental component score of 55.2 ± 16.2 . By the end of intervention, an improvement in the overall quality of life score was evident, with a significant increase of 35.7 points ($p < 0.001$). Increase in the scores across all mental and physical health domains were evident, with a statistical significance of $p < 0.001$ ascertained during the mid-term evaluation. These findings of this study demonstrate that supervised outdoor physical exercise has the potential to improve the quality of life of weavers. Further randomised studies and strategies to promote this type of exercise for preventing health risks related to physical load at work are required.

Keywords

Outdoor Physical Exercise, Quality of Life, Occupational Risks, Weavers of Faso Danfani, Burkina Faso

1. Introduction

The concept of quality of life is recognised as inherently complex, predicated on several frames of reference, including but not limited to health, the economy, education and the environment [1]. From a health perspective, quality of life is associated with physical, psychological and social, spiritual and mental well-being [1]-[3]. In the context of the present study, certain authors, including [4], have demonstrated a particular interest in the relationship between quality of life and quality of life in the workplace. These authors have established that the nature of work, relationships with colleagues, the environment and workload have a significant impact on quality of life at work. Furthermore, it has been demonstrated by the same authors that a good quality of life at work directly affects a better quality of life. In other words, the health risks associated with the type of work, the physical load and the social climate in the workplace influence the worker's quality of life [4] [5].

In Burkina Faso, the weaving of traditional loincloths, known as Faso Danfani, represents a sector that provides employment for a significant number of women [6]. This practice is recognised as a means of promoting the socio-economic empowerment of women. Consequently, the government of Burkina Faso, in collaboration with its partners, has initiated initiatives aimed at promoting this traditional craft [7].

The manual weaving sector of loincloths has been identified in a number of studies conducted across various countries worldwide as a field associated with potential health risks, particularly in terms of musculoskeletal disorders. A significant number of studies have been conducted in Burkina Faso on this sector, with the objective of enhancing working conditions. A study by [8] demonstrated that the weaving of the Daso Danfani loincloth is predominantly undertaken within the family unit and encompasses multiple stages, accompanied by potential hazards related to health and safety in the workplace. Subsequently, the same authors identified a prevalence of 94% of musculoskeletal disorders (MSDs) among the population of women weavers of Faso Danfani loincloth [9]. An analysis of weaving tasks reveals that they are associated with physical risks of MSDs [10]. Furthermore, the study by [11] highlights the prevalence of perceived stress among women in this sector.

The synthesis of the results of the aforementioned studies indicates that the sector presents health risks, which undoubtedly affects the quality of working life [4]. It is therefore important to find ways to prevent these risks from altering the quality of life of weavers. One of the first ways is to raise awareness [12]. The present

study is part of a global approach to the prevention of MSDs among women weavers, with several components, including awareness and physical exercise. Indeed, physical exercise is also recognised as having an impact on quality of life, especially in the workplace for work involving a physical load [13] [14]. The objective of the study is to evaluate the effect. This paper sets out the findings of a study which examined the impact of an outdoor exercise program on the quality of life of women weavers of traditional Faso Danfani loincloths.

2. Materials and Methods

The study was conducted at the Institute of Sports Sciences and Human Development (ISSDH) of the Joseph Ki-Zerbo University, located in the city of Ouagadougou. The study is of a non-experimental nature and employs a pre-test and post-test design, lacking a control group.

2.1. Participants

The study participants are exclusively female, and their primary activity is weaving. They are all enrolled in a comprehensive program designed to prevent health risks associated with their weaving activities. This program involves the explanation of an exercise program. All of the participants are still active and reside in Ouagadougou. The synthesis of the data characterising the study participants is presented in **Table 1**.

2.2. Procedures

The general procedure of the study is consistent with the approach delineated [11]. It should be noted that the following components are integral to the study: firstly, a pilot interview is conducted to provide a comprehensive explanation of the study and to obtain consent; secondly, a pre-test is conducted, which involves the administration of questionnaires 72 hours prior to the commencement of the first session; thirdly, the intervention is administered; and finally, mid-term and final evaluations (post-test) are conducted 48 hours after the 36th session. The questionnaires utilised are the Fitness for Physical Activity Questionnaire (QAA-P) version 2002, which is administered exclusively during the pre-test, and the Short Form 36 (SF-36) Self-Assessment System, which is employed to assess health-related quality of life.

2.3. Data Collection Methods and Techniques

In the context of the present study, two questionnaires were utilised:

- The SF-36 questionnaire is a tool used to assess health-related quality of life.

The present questionnaire is a self-report scale that has been validated by the Medical Outcome Study. It consists of 36 items divided into eleven questions, and is intended to obtain information on the general physical health, as well as the psychological and social aspects of all participants.

According to the World Health Organization (WHO), the objective of the test

is to assess a subject's perception of their physical health, psychological health, the quality of their social relationships, and their environment. The questionnaire has been modified to align more closely with the study's context. The assessment encompasses the physical, emotional, and social health dimensions. Each item is weighted to generate a score ranging from zero (0) to one hundred (100) for each of the eight dimensions. The first four dimensions can be condensed into a physical summary score, and the subsequent four into a psychological summary score [15].

- The Physical Activity Readiness Questionnaire (PRAQ) is a tool designed to assess an individual's level of physical activity readiness.

The program was initially validated by the British Columbia Ministry of Health (BCMh) in 1978, and subsequently revised by the Canadian Society for Exercise Physiology (CSEP) in 2002. The objective of the present questionnaire was to facilitate the identification of individuals for whom a medical examination is recommended. The questionnaire comprises seven questions, which participants are invited to answer using a "Yes" or "No" response format. It is noteworthy that the questionnaire is accompanied by a consent form. Participants were administered the questionnaire on the premises of the ISSDH, where the program is conducted. Furthermore, to mitigate errors, the participants were assisted in the completion of the questionnaires.

2.4. The Intervention Program

All participants in this study were required to attend the sessions on three occasions per week for a period of eight weeks. An attendance register was therefore established in order to verify the punctuality and attendance of the participants. The detailed content of the eight-week program of outdoor physical training with the weavers is as follows:

- Weeks 1 and 2: sessions 1 to 6, duration = 1 hour of time
 - Slow walk used for warm-up: 10 min
 - Exercise 1: Brisk walk around the exercise area: 10 min
 - Exercise 2: Stretching: 5 min
 - Exercise 3: physical exercises accompanied by music (Aerobics): 15 min
 - Exercise 4: 15 min
 - Rowing machine exercises: 60% maximum reps (RM), 6 sets of 30 sec with 1 min recovery;
 - Skier-type machine exercises: 2 sets working on 60% resting-HR for 2 min with 1 min recovery;
 - Exercise 5: Cool-down: 5 min of stretching and relaxation exercises.
- Weeks 3 and 4: sessions 7 to 12, duration = 1 hour
 - Slow walk used for warm-up: 5 min
 - Exercise 1: Stretching: 5 min
 - Exercise 2: Brisk walking in the form of a game (two groups A and B compete by the direct transmission of a witness, the group that ends up winning the game

first): 10 min

Exercise 3: physical exercises accompanied by music (Aerobics): 20'

Exercise 4: 15 min of rowing machine exercise: 65% RM, 6 sets of 30 second working with 1 min recovery

Skier-type machine exercise: of working on 65% resting-HR for 2 sets of 2 min with 1min recovery.

Exercise 5: Cool-down: 5 min stretching and relaxation exercises.

- Weeks 5 and 6: Session 13 to 24, duration = 1 hour

Slow walk used for warm-up: 10 min

Exercise 1: Stretching: 5 min

Exercise 2: Pursuit walking in the form of a game (two groups A and B compete), group A pursues group B, the group that comes first to win: 30 min.

Exercise 3 for 10 min:

Rowing machine exercise: 70% RM, 6 sets of 30 sec with 30 sec of recovery

Skier-type machine exercise: 70% of resting-HR for 2 sets of 2 min with 30 sec of recovery

Exercise 4: Cool-down: 5 min stretching and relaxation exercises.

- Week 7 and 8: Session 25 to 36, duration = 1 hour of time

Slow walk used for warm-up: 10 min

Exercise 1: Stretching: 5 min

Exercise 2: Cross march in the form of a game (two groups A and B compete), group A will meet group B in the center of the playing area, The group that reaches its starting area first after two rounds has won, 10 min

Exercise 3: Physical exercises accompanied by music (Aerobics): 35 min

Exercise 4: 10 min

Exercise with rowing machine: 5 sets of 80% RM for 30 sec work and 30 sec of recovery;

Exercise with skier-type machine: 2 sets of 80% resting-HR for 2 min work and 30 sec of recovery;

Exercise 4: Cool-down: 5 min stretching and relaxation exercises.

All sessions were carried out in the evening after the professional activities of the participants.

2.5. Outdoor Machines Used for the Study

The machines utilised in this process are of a locally manufactured nature, based on the designs and technical support provided by Smith Engineering at Queen's University. **Figure 1** illustrates the aforementioned points.

2.6. Precautions for Implementing the Program

At the commencement of the study, the participants underwent a familiarisation session with the equipment (*i.e.* the rowing and skiing machines). During this session, they received instruction on the proper usage of the equipment and the correct execution of the exercises. Moreover, they participated in an awareness

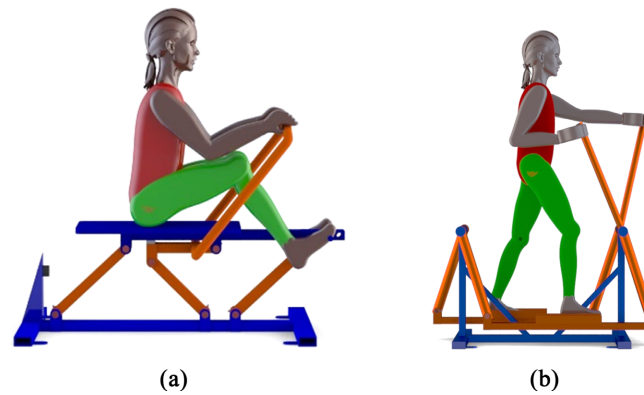


Figure 1. Illustrations of the outdoor machines used: (a) Rowing machine; (b) Skier machine.

session prior to the initiation of the program, during which they were apprised of the organisation of the work. The program was met with success, and the provision of drinking water ensured the participants' hydration. Moreover, the provision of adapted clothing catered to the physical exercise component of the program.

2.7. Data Processing and Analysis

The data were analysed using JASP, Computer Software Version 0.95.4. The Repeated Measures ANOVA test was employed to ascertain the variance in the mean between the various assessments.

The participants' perceived quality of life (QOL) scores was divided into two domains (physical health and mental health) during the pre-test (measure 1), mid-term test (measure 2) and post-test (measure 3).

The concept of physical health is comprised of four distinct domains: physical function (PF), physical condition limitations (PL), physical pain (LD), and general health perception (SG). Correspondingly, mental health is also composed of four domains: social functioning (FS), limitations due to mental state (SL), mental health (MH), and a specific dimension, namely the evaluation of perceived health compared to one year ago (EF).

From these eight domains, two summary scores were derived according to the following groupings:

The physical summary score (SRP) is concerned with the initial four domains (FP, DL, LP, SH).

The mental summary score (MSR) is a measure of performance in four domains: FS, LE, BE and EF.

The results were obtained by transforming the 36 items of the SF-36 into a score. Each item is weighted to obtain a score between zero (0) and one hundred (100) for each of the eight dimensions [15].

3. Results

In this chapter, the results of the surveys conducted will be presented. Out of thirty

questionnaires that were administered to weavers, twenty-nine were collected. One participant withdrew from the program halfway through. The results are presented in tabular and graphical form.

3.1. Characteristics of the Weavers

The characteristics of the study population are presented in **Table 1**.

Table 1. Characteristics of the participants.

Characteristics	Mean \pm Standard deviation
Age (year)	46.3 \pm 8.8
Height(m)	1.7 \pm 0.1
Weight (kg)	75.3 \pm 17.6

3.2. The Effects of the Program on Quality of Life

As demonstrated in **Table 2**, the analysis of variance Repeated measures generally shows a significant effect of outdoor physical exercise on the components during the three measures “Pain” ($F(2) = 34.84, p < 0.001$), “Physical Limitation” ($F(2) = 75.18, p < 0.001$), and “Emotional Limitation” ($F(2) = 113.8, p < 0.001$). This effect was also significant after Greenhouse-Geisser correction for the physical ($F(1) = 63, p_{GG} < 0.01$) and mental summary scores ($F(1, 165) = 185.1; p_{GG} < 0.001$), as well as the overall score ($F(1.078) = 172; p_{GG} < 0.001$).

Table 2. Repeated Measures ANOVA of quality of life components, domains and global score

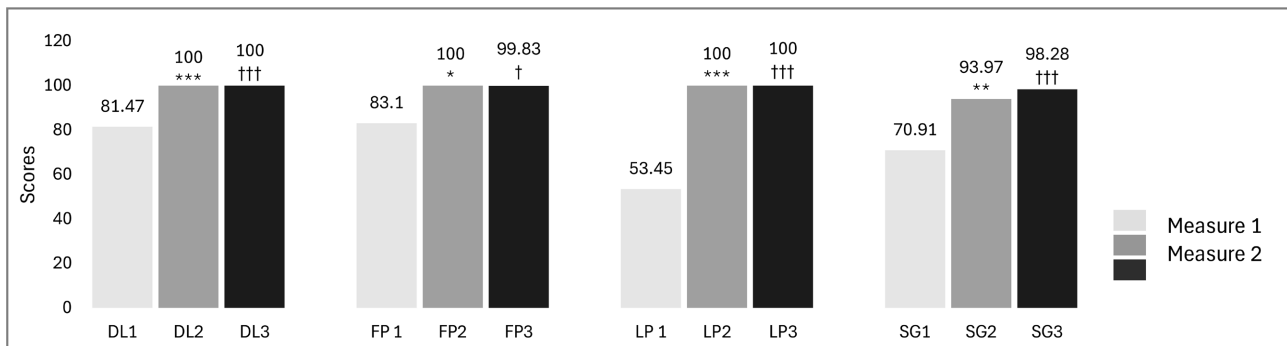
		df	F	<i>p</i>	F'	<i>p</i> _{GG} ^a
	Pain	2	34.84	<0.001	-	-
Domain of physical health	Physical function	1.001	-	-	9.671	0.004
	Physical limitation	2	75.18	<0.001	-	-
	General perceived health	1.327	-	-	71.61	<0.001
	Physical Summary Score	1.000	-	-	63.39	<0.001
	Emotional limitation	2	113.8	<0.001	-	-
Domain of physical health	Fatigue/Energy	1.568	-	-	48.48	<0.001
	Emotional well-being	1.205	-	-	129.3	<0.001
	Social function	1.579	-	-	42.86	<0.001
	Mental Summary Score	1.165	-	-	185.1	<0.001
	Global score	1.078	-	-	172.4	<0.001

a. *p* after Greenhouse-Geisser correction.

As illustrated in **Figure 2**, with the exception of the general perceived state of health (SG), the Post Hoc test shows a progression in the physical scores of the

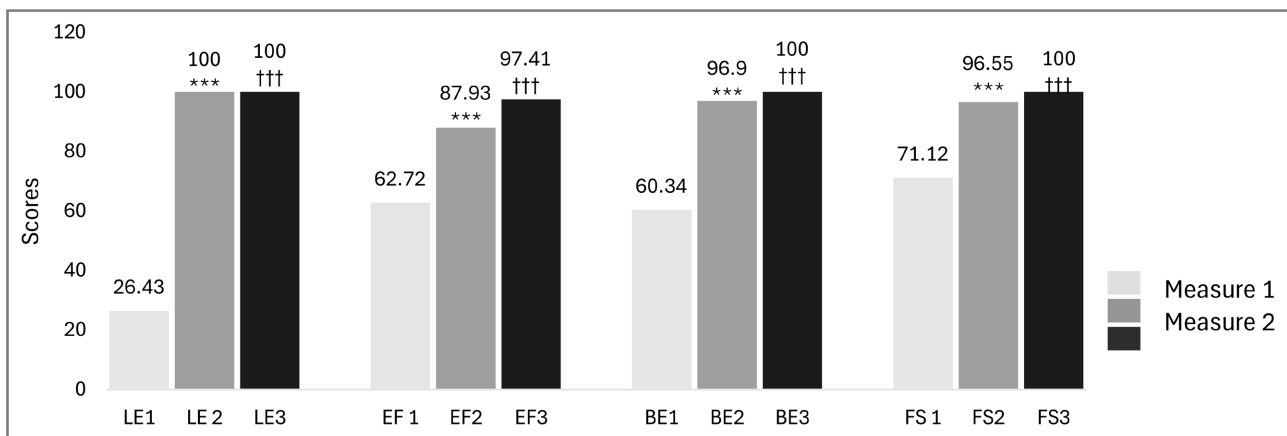
participants' perceived quality of life reaches its maximum values from the mid-term assessment. A significant variation is observed between measures 1 and 2 and measures 1 and 3. The greatest variation in scores is observed at the level of physical limitation $p < 0.001$

In **Figure 3**, it appears that only the relative scores of the emotional limit component (LE) experienced maximum variations from the mid-term measurement. This component also exhibited the greatest variation compared to the other psychological components. At the level of the state of fatigue (FE), the scores demonstrated continuous evolution without reaching the maximum score of 100, as observed at the level of the other components.



DL = pain; FP = physical function; LP = physical limitation; SG = general perceived health; *** = $p < 0.001$ between measure 1 et Measure 2; ††† = $p < 0.001$ between measure 1 et Measure 3; ** = $p < 0.01$ between measure 1 et Measure 2; †† = $p < 0.01$ between measure 1 et Measure 3; * = $p < 0.05$ between measure 1 et Measure 2; † = $p < 0.05$ between measure 1 et Measure 3.

Figure 2. Evolution in the domains of participants' physical health scores.



LE = Emotional limitation; EF = Fatigue/Energy; BE= Emotional well-being; FS = Social function; *** = $p < 0.001$ between measure 1 et Measure 2; ††† = $p < 0.001$ between measure 1 et Measure 3.

Figure 3. Evolution in the domains of participants' mental health scores.

In **Table 3**, the findings of the study indicate that the subjects of study show a deficit in mental health in comparison to their physical health. It emerged that intervention is correlated with substantial enhancement in both domains. These enhancements have been observed to be effective from the mid-term measure-

ment onwards. The greater adaptations have been manifested mainly at the cognitive level.

Table 3. Post Hoc comparison of summary scores and global quality of life score.

	Measure 1 ± SD ^a	Measure 2 ± SD	Measure 3 ± SD
Physical Summary Score	79.1 ± 14.2	94.8 ± 3.6 ^b	98.7 ± 0.1 ^{d,e}
Mental Summary Score	55.2 ± 16.2	95.4 ± 4.8 ^b	99.4 ± 1.9 ^{d,e}
Global score	63.7 ± 15.1	96.9 ± 2.8 ^c	99.4 ± 1.1 ^{f,g}

a. Standard deviation; b. $p < 0.001$ Measure 1 and Measure 2; d. $p < 0.001$ Measure 1 and Measure 3; e. $p < 0.001$ Measure 2 and Measure 3; c. $p < 0.01$ Measure 1 and Measure 2; f. $p < 0.01$ Measure 1 and Measure 3; g. $p < 0.01$ Measure 2 and Measure 3.

4. Discussion

It should be noted that the objective of this study was to ascertain the perceived effect of an eight-week outdoor physical exercise program on the quality of life of weavers. The study was conducted on a group of 29 sedentary weavers. The subjects of this study are adults with an average age of 46.3 years (± 8.8 years). The context of their recruitment constitutes a component of an integral approach to the prevention of physical and psychosocial health risks for weavers. Consequently, all subjects within this cohort participated in the outdoor exercise program, as isolating a control group presented a considerable challenge. The program was administered by physical activity for health professionals, and adapted tools such as the SF-36 questionnaire were used for the different tests before, mid-term and after the intervention by the same investigators.

The results of the initial assessment indicate an overall score of 63.7 ± 15 , with a lower mental component score of 55.2 ± 16.2 . This score is indicative of the upper limit of a satisfactory quality of life. This finding aligns with the results reported by [16], who observed a mean score of 62.8 among female employees in the Tunisian textile sector. The high quality of life observed in Burkina Faso can be attributed to the recognised role of weaving in the development of women and the promotion of their socio-economic empowerment [7].

With regard to the effects associated with the exercise program, a significant increase in scores was observed in all areas of physical health, with a $p < 0.01$ from the mid-point measurement. This development is also observed by referring to the data from the post-test. The outcomes of this study can be attributed to the comprehensive approach to physical activities employed, encompassing exercises such as walking and the utilisation of outdoor equipment (*i.e.*, rowing machines and skiers). Indeed, as demonstrated in the study by [17], these types of exercises have been shown to enhance the qualities of the. In this regard, [18] has demonstrated that regular physical activity can elicit numerous favourable responses, including the delay of the onset of pathologies and the enhancement of the physical state of the individual. This phenomenon can be attributed to the body's adaptation to the rhythm and intensity of the exercises, a process that commences from

the fourth week and continues as the program progresses. These changes in the domains of physical health are also reflected in an increase in the physical summary score of 19.6 points. The present findings corroborate the conclusions of [19], which demonstrated that physical activity is positively associated with the perception of motor and physical skills.

Moreover, the findings of the study indicated a substantial variation in the scores of all components of mental health with $p < 0.01$ at the conclusion of the three evaluations. Indeed, a significant increase in the psychological summary score of (44.2) was observed in terms of mental health. A progression has been observed in all four domains of mental health during the final evaluation. In a similar vein, the global approach to exercises in the form of play, sport and music (aerobics) employed in the study could contribute to this phenomenon. The psychological benefits of these exercises on the participants' well-being were evident. Indeed, the work of [20] demonstrates that movements to music have a beneficial effect on mental health. The present findings are consistent with the results of the work of [11]. The aforementioned researchers have shown that this type of exercise program has a positive effect on reducing stress in weavers. This can be evidenced by the substantial enhancement in the emotional limit domain, marked by an improvement of 73.6 points from the second measurement. In this regard, it is important to emphasise the positive influence that physical exercise has on psychological health. This is evidenced by the fact that it has been demonstrated to reduce stress and increase self-esteem [11] [21] [22].

Additionally, the eight-week outdoor physical exercise program implemented within the present study's framework fostered the development of a sense of friendship and fraternity within the study group, given their three weekly meetings in a conducive environment. The pursuit of physical exercise has been demonstrated to engender pleasure, facilitate the formation of new social connections, and promote health benefits. This aspect corroborates the findings of [1] who, utilising the prevailing model of social connections and adapted mental health by Cohen and Wills, demonstrated the impact of these social connections, such as those engendered by the present physical exercise program, on the enhancement of mental health [2] corroborated these findings through a study of 150 members of an army unit, which demonstrated that identification with the group is an important indicator of mental health. This aspect of identification with a group was considered in the present study through the competitive walking games that were regularly used in sessions. These factors collectively serve as intrinsic motivators, thereby justifying the enhancement of overall health status. This is of significance as perceived health can function as an indicator of an individual's overall health status. In a similar manner to the results of the present study, [23] demonstrated that physical activity exerts a positive influence on women's mental health by contributing to enhanced social integration and the development of a greater sense of self-efficacy. In [24] recent study, a comprehensive literature review was conducted, which concluded that physical exercise ex-

erts a favourable influence on the mental health and quality of life of individuals experiencing frailty.

The present study has demonstrated, through the results obtained, that there has been a positive impact on the quality of life of weavers in the city of Ouagadougou as a result of their participation in outdoor physical activity. The overall quality of life score demonstrated a significant increase of 35.7 points, with a p-value of less than 0.01. This suggests that such a program may contribute to a reduction in the occupational risks associated with weaving. These results are consistent with those reported by [25], who conducted their research on subjects suffering from low back pain. The study's findings indicated that physical activity significantly enhanced SF-36 indices in individuals afflicted with chronic low back pain. The present findings also corroborate those of [26], who report that there is high-quality evidence in the literature on improving health-related quality of life through physical exercise. The aforementioned observation is reiterated by [27], who discovered a positive correlation between physical activity levels and quality of life among Brazilian adults. Despite the differences in the study populations, the findings consistently demonstrate a positive impact of physical exercise on quality of life.

5. Conclusions

The relationship between physical exercise and quality of life has been the subject of numerous studies, encompassing a diverse type of population. The present study, which focused on the impact of outdoor exercises on the quality of life of women weavers in Faso Danfani with at least one musculoskeletal disorder, demonstrated that this type of exercise is associated with an enhancement in the quality of life of women weavers. This observation suggests potential avenues for the promotion of this type of exercise for the management and prevention of physical and mental disorders related to informal work, such as manual weaving.

Nevertheless, the primary limitation of the study pertains to its absence of a control group, which is a common practice in experimental psychology. Secondly, data were collected using a self-report questionnaire. Despite the fact that the participants were encouraged to articulate their sentiments authentically, it is evident that this must have resulted in a phenomenon of social desirability bias. The present results would be more robust if they were to be verified by randomised experimental studies. Such studies would also facilitate a more complete understanding of the interactions between the parameters of physical exercise and the different domains of quality of life.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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