APPLICATION RESEARCH OF CORE STRENGTH TRAINING IN THE FIELD OF FASHION PERFORMANCE

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ABSTRACT
This study aims to analyze the correlation mechanism between core strength training and professional performance. A study enrolled 30 fashion performance students from a university, randomly divided into an experimental group (15) and a control group (15). The control group received standard professional training, while the experimental group underwent core strength-specific training supplemented with regular exercises over a 16-week intervention period. Analysis of core strength metrics, performance indicators, and physical function parameters before and after the intervention revealed that the experimental group demonstrated significantly better results than the control group in three key areas: 1) core strength, 2) performance metrics, 3) physical functions. These findings were statistically significant ($P<0.05$), with the experimental group also showing lower rates of sports-related injuries compared to the control group. The results show that core strength training can effectively improve the core muscle strength and control of fashion performance students, optimize body posture and dynamic performance, reduce the risk of sports injury, and has important practical significance for improving the training system of fashion performance. The effect sizes (Cohen's d) for the key significant findings are reported as follows: plank support time ($d = 3.86$), side bridge support time ($d = 4.21$), core control ability score ($d = 4.53$), posture normativity score ($d = 3.28$), steppage stability score ($d=3.65$), dynamic expression score ($d = 3.92$), single-leg standing with eyes closed time ($d = 3.74$), and finger nose test completion time ($d = 3.81$).
Keywords: Core Strength Training, Fashion Performance, Stability, Balance, Dynamic

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INTRODUCTION

As a multidisciplinary field combining artistic expression and physical control, fashion performance demands exceptional physical literacy from practitioners. Performers must not only possess well-proportioned figures and excellent flexibility but also demonstrate precise posture management to execute aesthetically pleasing and rhythmically balanced movements on the runway, camera lens, or stage. Whether its static pose displays or dynamic walking techniques, all rely on coordinated body coordination. The core muscle group, acting as the "central nervous system" of bodily movement, directly determines the precision and stability of physical control.

The core muscle group refers to the muscles surrounding the human torso, including the diaphragm, rectus abdominis, oblique abdominis, erector spinae, pelvic floor muscles, and gluteus maximus. Together, they form the bodys "core area" that plays a crucial role in maintaining spinal stability, transmitting force, and coordinating limb movements (McGill, 2010). In fashion performances, the core muscles serve multiple functions.

However, the current training system for fashion performance majors exhibits a "skills-focused, foundation-neglected" imbalance: Training programs predominantly emphasize visible skills like gait exercises, pose design, and facial expression management, while neglecting fundamental physical capabilities such as core strength. Many students develop posture instability and poor movement coordination due to weak core muscles. These issues not only compromise performance quality but may also lead to sports injuries like lumbar muscle strain and herniated discs from prolonged improper exertion (Wang Li, 2020). Therefore, exploring the application value of core strength training in fashion performance education and establishing scientific training programs have become crucial tasks for enhancing teaching quality.

The theoretical significance of this study lies in: enriching the training theories for fashion performance majors, clarifying the correlation mechanism between core strength and professional performance, and providing theoretical references for related research. The practical significance is: developing a core strength training program tailored for fashion performance majors, offering actionable guidance to instructors, helping students enhance core competencies and professional literacy, reducing sports injury risks, and promoting the scientific development of training systems in fashion performance education.

LITERATURE REVIEWS

Core strength training has numerous applications in fashion performance

1) Runway Walking and Dynamic Balance

Runway walking is a fundamental skill in fashion modeling, requiring models to maintain upper-body stability while achieving fluid lower-body movement. Research indicates that after 8-12 weeks of core stability training (e.g., plank variations, side bridges, dead bug exercises), models exhibit a 23% reduction in lateral trunk sway during walking and significantly improved gait symmetry (Zhang et al., 2021; Li Ting, 2020). This enhanced stability not only elevates visual aesthetics but also reduces error rates caused by imbalance.

2) Static Posing and Spatial Tension Expression

Strong core muscles enable models to sustain challenging poses for extended periods while maintaining spinal neutral alignment and preventing compensatory distortions. Pilates exercises like The Hundred and Roll-Up have been proven to significantly improve trunk control and movement quality (Starkie, 2019).

3) Complex Choreography and Team Coordination

Functional core training enhances neuromuscular coordination, enabling models to maintain movement integrity during rapid direction changes, abrupt stops, or asymmetric loading scenarios (Wang & Liu, 2022).

Regarding core strength training, while its application in fields such as dance and athletics has gained widespread recognition, related research and practice in the realm of fashion shows remains insufficient.

RESEARCH METHODOLOGY

A study was conducted with 30 undergraduate students majoring in Fashion Performance from a university, comprising 10 males and 20 females aged 19-23 years (average age 21.2±1.5 years). All participants had no history of major illnesses or sports injuries and had at least one year of professional training experience. Using the random number table method, the subjects were divided into an experimental group (15 members: 5 males and 10 females) and a control group (15 members: 5 males and 10 females). No significant differences were observed between the two groups in terms of age, height, weight, training duration, core strength indicators prior to the experiment, or professional performance scores ($P>0.05$), confirming their comparability.

1) Method of documentary data

Through platforms such as China National Knowledge Infrastructure (CNKI), Wanfang Database, and Web of Science, we conducted searches using keywords including "core strength training", "costume performance", and "body control" to collect relevant literature. This included theoretical foundations of core strength training, distinctive training characteristics of costume performance majors, and interdisciplinary studies between the two fields, thereby providing theoretical support for research design and program development.

2) Experimental method

Experimental period: 16 weeks, 4 times a week, 90 minutes each time.

Training content of the control group: conventional costume performance professional training, including posture training (leg stretching, split and other flexibility exercises), gait training (basic step, turning skills, etc.), and posture training (static pose design, expression management, etc.).

Training content of the experimental group: 30 minutes of core strength training was added on the basis of the routine training of the control group. The training program was designed according to the needs of clothing performance majors and divided into three stages:

Basement stage (1-4 weeks): focus on activating the core muscles, including abdominal breathing exercises, dead bug position, plank (primary), etc. The intensity is moderate and the standardization of movements is emphasized.

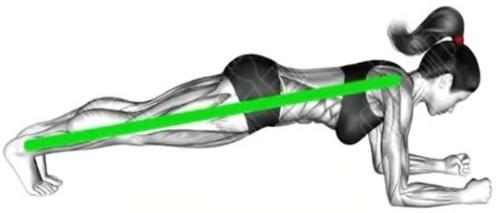

Figure 1 Diagram of Plank Support
source: www.xiaohongshu.com

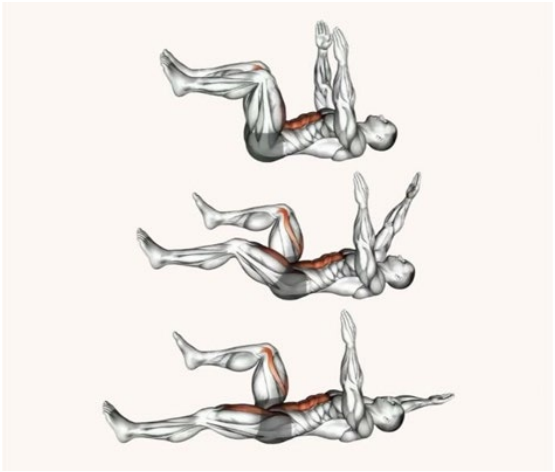

Figure 2 Diagram of the "Dead Bug" Training Technique
source: www.xiaohongshu.com

Intensive phase (5-12 weeks): Increase the intensity and complexity of training, including side bridge alternating leg lifts, Russian twists (with weight), hanging sit-ups, etc., to gradually improve the strength and endurance of core muscles.

Figure 3 Diagram of Russia's Rotation
source: www.xiaohongshu.com

Integration stage (13-16 weeks): Combine core strength training with professional movements, such as gait practice under the control of the core and modeling movements with the force of the core, so as to strengthen the coordination ability between the core muscle group and limb movements.
Recovery phase (last training once a week): foam axis relaxation, static stretching and other methods are used to relieve the fatigue of core muscles.

Table 1 Training Contents of the Experimental Group

Phase	**Primary Training Content**
Basic Phase (1-4 weeks)	Focus on activating the core muscles
Reinforcement Phase (5-12 weeks)	Increase training intensity and complexity
Integration Phase (13-16 weeks)	Combine core strength training with professional movements

Test time: each index was tested one week before the experiment (baseline test), eight weeks after the experiment (intermediate test), and one week after the experiment (final test), and the data were recorded.

3) Interviewing method

After the experiment, semi-structured interviews were conducted with 10 students and 3 professional teachers in the experimental group to understand the actual impact of core strength training on professional performance, the applicability of the training program, etc., and collect subjective feedback opinions to provide reference for result analysis and program optimization.

4) Questionnaire survey method

After the experiment, questionnaires (15 in total, all valid responses were collected with a 100% effective response rate) were distributed to students in the experimental group to investigate their acceptance of core strength training and subjective feelings about training effects (such as improved body control ability, smoother movements, etc.). The Likert 5-point scale (1=strongly disagree, 5=strongly agree) was used for scoring.

Table 2 Distribution and Collection Status of Questionnaires

Distribute questionnaires	Collect questionnaires	Valid questionnaires Valid rate	Valid rate
15	15	15	100%

5) Statistical methods of data

SPSS 26.0 statistical software was used for data processing. The measurement data were expressed as "mean ± standard deviation (x±s)". The paired t-test was used for intra-group comparison, and the independent sample t-test was used for inter-group comparison. The χ^2 test was used for counting data (such as injury incidence), and $P < 0.05$ was considered as statistically significant difference.

6) Reliability of Assessment Tools

Core strength metrics: Objective indicators including plank support time and side bridge support time were measured by two trained researchers independently. The inter-rater reliability was verified with an Intraclass Correlation Coefficient (ICC) of 0.94 and 0.92 respectively, indicating excellent reliability.

Performance indicators: Subjective assessments of posture normativity, steppage stability, and dynamic expression were conducted by three professional fashion performance instructors with more than 5 years of teaching experience. Prior to the assessment, the instructors received 2 hours of unified training to standardize the evaluation criteria. The inter-rater reliability was determined using Cohen's Kappa coefficient, with values of 0.87, 0.85, and 0.83 respectively, showing good reliability.

Physical function parameters: Objective measurements of single-leg standing with eyes closed time and finger nose test completion time were performed by the same researcher throughout the study to ensure consistency, with an ICC of 0.93 and 0.91 respectively.

RESEARCH RESULTS

1) Comparison of core strength index before and after experiment

Internal comparisons

The core strength indexes in the experimental group were significantly better than that before the experiment ($P<0.05$), and the specific data are as follows:

Tablet support time: 73.7% increased from before the experiment (45.2±6.8 seconds) to after the experiment (78.5±8.3 seconds).

Side bridge support time (average value of left and right sides): 97.3% increased from before the experiment (26.5±4.2 seconds) to after the experiment (52.3±5.6 seconds).

Core control ability score: before the experiment (6.2±0.8 points) → after the experiment (8.9±0.6 points), an increase of 43.5%.
There was no significant difference in the core strength indexes before and after the control group experiment (P>0.05). For example, the time of plank support increased by 6.0% before and after the experiment (44.8±7.1 seconds to 47.5±6.5 seconds), which was significant (P>0.05).
Group comparison
After the experiment, the core strength indexes of the experimental group were significantly better than that of the control group (P<0.05). Taking the time of plank support as an example, the difference between the experimental group (78.5±8.3 seconds) and the control group (48.2±6.9 seconds) was significant (t=12.36, P<0.001).

2) Comparison of professional performance indicators before and after the experiment

Internal comparison
The scores of professional performance indexes in the experimental group were significantly higher than that before the experiment (P <0.05):
Posture normativity: 22.4% increased from before the experiment (72.3±5.6 points) to after the experiment (88.5±4.2 points).
Steppage stability: improved by 25.8% from pre-experiment (68.5±6.1 points) to post-experiment (86.2±3.8 points).
Dynamic expression: 31.3% increased from before the experiment (65.2±7.3 points) to after the experiment (85.6±5.1 points).
Although there was a small improvement in professional performance indicators after the control group experiment (e.g., posture normativity from 71.8±5.9 to 75.6±5.2), there was no statistically significant difference (P>0.05).
Group comparison
After the experiment, the total score of professional performance in the experimental group (86.8±4.5 points) was significantly higher than that in the control group (74.2±5.3 points) (t=8.72, P<0.001), and it was significantly better than that in the control group in all sub-indexes (P<0.05).

3) Comparison of physical function and injury indicators

Balance and coordination
Time of single-leg standing with eyes closed: after the experiment, the experimental group was significantly longer than before the experiment (22.3±5.6 seconds) and after the control group (24.5±6.1 seconds) (P<0.05).
Time of finger nose test completion: significantly shorter in the experimental group after the experiment (8.2±1.3 seconds) than before the experiment (14.5±2.1 seconds) and after the control group (13.8±1.9 seconds) (P <0.05).

4) Results of questionnaire survey

The experimental group students had a high subjective evaluation of core strength training, as follows:
86.7% of the students thought that "core strength training improved their body control ability" (score ≥4).
93.3% of the students thought that "the gait was more stable and the movement was more fluent after training" (score ≥4).
80.0% of the students wanted "core strength training to be included in regular professional courses" (score ≥ 4).

DISCUSSION & CONCLUSION

Discussion

The findings of this study demonstrate that core strength training significantly enhances the professional performance of fashion performance students, which is closely related to the functional characteristics of core muscles. As the bodys "stabilizing core," strengthening core muscles first optimizes static posture control.

In dynamic performance, the core muscles play a crucial role. During gait walking, rapid contractions and relaxations of core muscles regulate body weight transfer: The coordinated action of gluteus maximus and oblique muscles controls pelvic rotation range to ensure uniform stride length; meanwhile, endurance of core muscles maintains posture stability during prolonged walking, preventing gait distortion caused by fatigue-this explains the significant improvement in "gait stability" scores. Additionally, enhanced core strength improves limb coordination, making auxiliary movements like turning and arm swinging smoother, thereby enhancing dynamic expressiveness.

Limitations

This study has several limitations that should be acknowledged. First, the sample size is relatively small (N = 30), which may limit the generalizability of the findings. Second, all participants were recruited from a single university, so the results may not be applicable to fashion performance students from other institutions with different training backgrounds and educational environments. Third, the Hawthorne effect may have influenced the results, as participants in the experimental group may have performed better due to being aware of their participation in an experimental intervention. Fourth, the study only focused on short-term (16 weeks) effects, and the long-term sustainability of the training effects remains unclear.

Future Research Directions

Future research could address these limitations by expanding the sample size and recruiting participants from multiple universities to enhance the generalizability of the findings. Additionally, a longer follow-up period should be adopted to investigate the long-term effects of core strength training. Furthermore, incorporating objective motion capture technology to assess performance indicators could reduce the subjectivity of the evaluation. Finally, exploring the optimal training intensity, frequency, and duration for different levels of fashion performance students (e.g., beginners vs. advanced) could provide more targeted training recommendations.

Conclusion

Core strength training can significantly improve the core muscle strength and endurance of students majoring in fashion performance, enhance the core control ability, and the training effect is targeted and sustainable.

Core strength training of the system can effectively optimize the professional performance of students majoring in fashion performance, including the standardization of static posture, the stability of dynamic gait and the expressiveness of the overall movement, which has a direct role in promoting the improvement of professional quality.

Core strength training can improve the balance ability and movement coordination of fashion performance students, reduce the incidence of sports injuries, and provide physical guarantee for long-term professional training.

The phased core strength training program (basic stage-intensive stage-integration stage) is in line with the needs of fashion performance majors, has strong practical applicability, and can be incorporated into the professional training system.

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Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Conflicts of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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