

Review

Effects of external focus of attention on balance: a short review

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Abstract. [Purpose] The present study reviewed studies that examined the effects of attentional focus on balance. [Methods] Keywords such as “attentional”, “focus”, and “balance” were used to find relevant research papers in PubMed (www.ncbi.nlm.nih.gov/pubmed). Forty-five papers were found, and 18 of them were used for this study, excluding review papers and papers irrelevant to the topic of this study. [Results] Among the papers used for the review, the number of papers in which external focus produced effective outcomes was 15 (83.3%). The number of papers in which both external and internal focus produced effective outcomes was 2 (11.1%). The number of paper in which no instruction about attentional focus was effective was 1 (5.5%), and the number of papers in which internal focus was effective was zero. [Conclusion] This short review suggests clinical implications about how physical therapists can use attentional focus for balance rehabilitation of patients. Instructions about external focus of attention can generally be useful as a method to improve posture and balance control. Furthermore, the present reviews indicates that external focus of attention would be more useful in a rehabilitation stage in which the difficulty level of balance performance is gradually increased.

Key words: Attentional focus, External focus, Balance

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INTRODUCTION

Balance is affected by proprioception, vision, vestibular function, cognitive ability, etc.^{1,2)}. Many recent studies have shown that attentional focus of a motor performer may affect balance³⁻⁸⁾. Attentional focus refers to the location to which a performer pays attention while performing a certain movement. Concentrating on the inside of the body while performing a movement is called “internal focus,” and concentrating on the outside of the body (e.g., the environment) is called “external focus”⁴⁾. Many previous studies showed that external focus was largely more effective than internal focus in performance of a movement⁹⁻¹²⁾. However, there is research showing different effects of attentional focus according to the characteristics of the performed task, evaluation method, and developmental stage¹³⁻¹⁶⁾. The purpose of the present study was to review studies investigating the effects of attentional focus on balance in order to suggest clinical implications about how physical therapists can use attentional focus for balance rehabilitation of patients.

SUBJECTS AND METHODS

For this review, keywords such as “attentional” “focus”, and “balance” were used to find relevant research papers in PubMed (www.ncbi.nlm.nih.gov/pubmed). Forty-five papers were found, and 18 of them were used for this study, excluding review papers (e.g., meta-analysis, systemic review) and papers irrelevant to the topic of this study (Table 1).

RESULTS

Among the 18 papers, 15 reported that external focus produced effective outcomes (83.3%). Two papers validated that both external and internal focus according to the situation produced effective outcomes (11.1%). The number of papers in which no instruction was effective was 1 (5.5%), and the number of papers in which internal focus was effective was zero (Table 1).

DISCUSSION

Our review of the literature revealed that external focus is effective for balance. Basically, directing attention toward the external environments around the body (external focus) seems to decrease postural sway more than standing with attention focused on body (internal focus)³⁾. Furthermore, a decrease in postural sway means that standing posture is more stably adjusted²⁶⁾, indicating that static balance ability is improved through external focus. Besides, external

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Table 1. Studies reviewed in the present short review

Study	Subject (number of subjects)	Experimental conditions/groups	Outcome (effective condition/group)
Wulf et al. ³⁾	Young (N=32)	EF, IF	EF
McNevin et al. ⁴⁾	Young (N=19)	EF, IF, N	EF
Chiviawosky et al. ⁵⁾	Old (N=32)	EF, IF	EF
Wulf et al. ⁶⁾	Young (N=54)	EF, IF, N	EF
Shea et al. ⁷⁾	Young (N=32)	EF, IF	EF
Jackson et al. ⁹⁾	Young (N=36)	EF, IF	EF
Wulf et al. ⁹⁾	Parkinson's (N=14)	EF, IF, N	EF
McNevin et al. ¹⁰⁾	Young (N=40)	EF, IF	EF
Wulf et al. ¹¹⁾	Young (N=20)	EF, IF	EF
Wulf et al. ¹⁷⁾	Young (N=28)	EF, IF	EF
Wulf et al. ¹⁸⁾	Young (Exp. 1, N=18; Exp. 2, N=29)	EF, IF	EF
Laufer et al. ¹⁹⁾	Ankle sprain (N=40)	EF, IF	EF
Rotem-Lehrer et al. ²⁰⁾	Ankle sprain (N=36)	EF, IF	EF
Wulf et al. ²¹⁾	Young (Exp. 1, N=18; Exp. 2, N=24)	EF, IF, N	EF
Wulf ²²⁾	World-class acrobats (N=12)	EF, IF, N	N
De Bruin et al. ²³⁾	Old (N=31)	EF, IF	NE
Cluff et al. ²⁴⁾	Young (N=10)	EF, IF	NE
McNevin et al. ²⁵⁾	Young (N=12), old (N=12)	EF, IF	EF

EF: external focus; IF: internal focus; N: no instruction; NE: no effect among conditions

focus effectively maintains static posture when performing a supra-postural task needing upper extremity movement with stable balance^{3, 4, 18, 25)}. This is important because external focus reacts more sensitively to perturbation during movement of the upper extremities.

In particular, external focus appears to be more effective when the level of difficulty of balance adjustment is higher^{21, 27)}. Wulf et al.²¹⁾ let subjects maintain static standing on different surfaces (solid, foam, and inflated rubber). As the level of difficulty increased (foam and inflated rubber conditions), postural sway considerably decreased under the external focus condition. Similar results were also found in research on Parkinson's disease patients²⁷⁾.

Studies about balance learning also showed that external focus was more effective than internal focus. Wulf et al.²⁸⁾ examined what effect attentional focus had on ordinary subjects in learning balance. Their results showed that the group that received training using external focus learned a balance technique better compared with other attentional focus groups. Studies on not only normal individuals but also on special populations such as elderly people⁵⁾, patients with Parkinson's disease^{9, 27)}, and patients with ankle sprain^{19, 20)} showed that external focus is more effective in balance control and learning than internal focus.

As the reviewed studies showed, external focus was more effective than internal focus in control and learning of balance. Why is this the case? According to the constrained action hypothesis, internal focus obstructs automatic information processing, but external focus stimulates it, resulting in improvement in motor adjustment^{29, 30)}. When automatic motor control is promoted, faster reactions to perturbations of postural sway may be created, increasing postural stability¹⁷⁾. Such an increase in stability results in improvement in

balance ability and may become the basis for performance of other movements (e.g., the supra-postural)^{3, 4, 18, 25)}.

Although many studies concluded that external focus was more effective in the control and learning of a balance task, the result may differ according to particular situations. First, effects of attentional focus may be related to the difficulty of the balance task. Studies showed that when the task was easier (e.g., static standing²⁴⁾, standing on a solid surface²¹⁾ for young adults, the effect of attentional focus disappeared. Second, when the skill level of a performer is high for specific motor skills, the effect of attentional focus may decrease. In a study by Wulf²²⁾, postural adjustment of top-level performers (balance acrobats) postural adjustment was most effective when no instruction was given while they performed a balance task. This shows that in the case of experts, attentional focus instruction decreases automatic motor control of their balance. Third, a study showed that frail elderly people yielded no effects of attentional focus in balance learning²³⁾. This suggests that automatic information processing for frail elderly people is greatly damaged.

Johnson et al.³¹⁾ pointed out that clinical physical therapists used mixed forms of instructions about attentional focus without having a clear knowledge base. This review suggests that instructions about attentional focus greatly affect the quality of motor performance and therefore should be provided in a way that is easy to understand. In the case of physical therapists in charge of physical rehabilitation of their patients, it is important to apply physical therapy specifically according to the rehabilitation conditions of their patients based on a good understanding of attentional focus. This short review suggests the following clinical implications about how physical therapists can use attentional focus for balance rehabilitation of patients. First, instructions about

external focus of attention can generally be useful as a method to improve posture and balance control^{3–11, 17–21, 25, 27, 28}. Such direction of attentional focus is considered useful for such populations as elderly people⁵, those with Parkinson's disease^{9, 27}, and physically injured patients^{19, 20} whose balance ability has decreased, as well as for ordinary people. Furthermore, the use of external focus for patients who have difficulty with postural and balance control during activities of daily living will reduce the risk of falling and prevent secondary damage^{9, 27}. Second, as the difficulty level of postural and balance performance increases, direction of attentional focus should be given more attention^{21, 27}. Such findings indicate that external focus of attention would be more useful in a rehabilitation stage in which the difficulty level of balance performance is gradually increased. The use of external focus at this stage would result in more improvement of postural and balance adjustment ability and further shorten the rehabilitation period^{22, 23}.

There are some limitations to this study. We reviewed 18 relevant papers, which might not be enough to make general conclusions. Examination of more relevant studies in the future could reveal more general clinical implications. Because of the small number of used papers, this study did not perform a quantitative and systematic review.

In conclusion, the present short review demonstrated that instructions about external focus of attention may enhance posture and balance control. This study suggested clinical implications concerning the treatment of patients with balance problems. When patients perform tasks requiring postural balance, therapists would be able to improve the patients' postural control effectively by instructing them to focus on the external environment around their body.

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