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Comments on "The *Feldenkrais Method*®: A Dynamic Approach to Changing Motor Behavior"

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The Feldenkrais Method® *has recently been discussed to fit within a dynamic systems model of human movement. One basis for this discussion is that small changes in one system—for example, enhanced body awareness—has far reaching implications across the whole of human performance. An alternative view on the* Feldenkrais Method *is argued here. It is argued that the clinical data do not support the* Feldenkrais Method *as being an effective way to improve motor performance. Further, it is argued that positive outcomes in pain and other wellness measures following* Feldenkrais *interventions can be ascribed to self-regulation. As part of this discussion, the role of body awareness, attentional focus, and kinesthesia in motor learning and control are explored.*

Key words: attentional focus, kinesthesia, motor learning, self-regulation

In a recent issue of this journal, Buchanan and Ulrich (2001) provided a thoughtful look at *Feldenkrais Method*® principles and how they fit within a dynamic systems model. Using this model, the authors proposed a number of potentially fruitful areas of research into the clinical effectiveness and theoretical bases of the *Feldenkrais Method*. This research is warranted, but as Buchanan and Ulrich mentioned, models other than dynamic systems may be appropriate to provide a research perspective. Proposed here are alternative models based largely on data rather than *Feldenkrais* theory. It is asserted that the clinical data show only marginal effectiveness and narrow applicability of the *Feldenkrais Method* to enhance motor learning and performance, and these findings are readily explained by current data and theories on attentional focus, kinesthesia, and self-regulation. Specifically, it is argued that the *Feldenkrais* emphasis on self-awareness is a relatively ineffective way to improve motor or perceptual motor performance and that self-regulation theory may be a suitable way to look at the psychological aspects of the *Feldenkrais Method*. To justify these arguments, it is first necessary to examine closely the clinical data on the *Feldenkrais Method*.

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Prior Reviews of the *Feldenkrais Method*

The clinical research of the *Feldenkrais Method* has been thoroughly reviewed. Literature reviews by Ives and his colleagues (Ives & Shelley, 1998; Ives & Sosnoff, 2000) and Ellis (1995) have concluded that the data are not compelling but that the poor quality of research makes interpretation difficult. Stephens' (2000) brief review included a number of theses and conference abstracts and noted that, despite abundant methodological flaws among the studies, the *Feldenkrais Method* showed positive results in pain management, range of motion, muscle activity, posture and breathing, functional mobility, and quality of life. In the most comprehensive review to date, and one that included many of the same abstracts, unpublished theses, and nonjuried sources included in the Stephens (2000) paper, Ives and Shelley (1998) concluded that the findings ". . . do not match the extravagant anecdotal claims. . ." and that ". . . it

has not been shown that any of the positive findings can be directly attributable to *Feldenkrais* treatments apart from other factors, such as practice, relaxation, the Hawthorne effect, exercise/mobility training, biologic variability, spontaneous and normal recovery, or experimental error" (p. 85). Hopper, Kolt, and McConville (1999) similarly described the positive results found by many authors to be unsupportable because of serious methodological flaws.

More recently, Ives and Sosnoff (2000) concluded that the best evidence of *Feldenkrais* effectiveness is for psychological benefits, a statement also supported by Huntley and Ernst (2000). Since the extensive review by Ives and Shelly (1998), other studies have been published that have been interpreted to provide strong evidence for the positive effects of the *Feldenkrais Method*. Scrutiny of these data, however, gives rise to alternative explanations that have important theoretical and clinical implications. Space does not permit a full description of these studies, so the reader is urged to seek the original sources.

Recent Studies

A series of studies by Kolt and his colleagues (Hopper et al., 1999; James, Kolt, McConville, & Bate, 1998; Kolt & McConville, 2000; Smith, Kolt, & McConville, 2001) have produced conflicting results regarding perceived exertion, hamstring flexibility and length, anxiety reduction, and pain reduction following single or multiple *Feldenkrais* lessons. For example, Kolt and McConville (2000) reported that after four treatment sessions participants in the *Feldenkrais* group and in the relaxation group displayed lower measures of anxiety, but these significant findings were only in the female participants and only due to a reduction in anxiety level from just before Treatment 4 to just after Treatment 4. These authors (Smith et al., 2001) found no significant ($p = .13$) reduction in state anxiety in low back pain sufferers following a 30-min audiotaped *Feldenkrais* lesson or in a control group ($p = .06$) that listened to an audiotaped story. In this study, the *Feldenkrais* group significantly reduced the affective dimension of pain, the control group significantly reduced the sensory dimension of pain, and neither group significantly reduced the evaluative dimension of pain (the *Feldenkrais* group had a nonsignificant increase). Examination of the pre to post mean values suggests that the control group actually fared better than the *Feldenkrais* group.

In an uncontrolled case study examination of two stutterers, Gilman and Yaruss (2000) reported that following 8 weeks of *Feldenkrais* lessons the patients felt more in control of their speech, were able to control tension during speaking, and had less anxiety, yet there was minimal change in the measurable degree of disfluency. In a well controlled study, Kirkby (1994) examined women with severe premenstrual symptoms undergoing *Feldenkrais Awareness Through Movement* (ATM) lessons or cognitive-behavioral coping skills training over 6 weeks. The women in the coping skills group had a greater improvement in quality of life and greater improvements over a much broader range of symptoms and measures than did the ATM group, which generally showed improvements slightly better (but not statistically better) than the control group.

One commonly cited article supporting the *Feldenkrais Method* examined pain reduction in seven chronic pain sufferers (Bearman & Shafarman, 1999). The participants underwent 2 months of *Feldenkrais* treatments in which pain ratings and historical medical costs were collected alongside information from the National Pain Data Bank test instrument. Bearman and Shafarman reported that the *Feldenkrais* participants showed "dramatic improvements" by the end of the 2-month program, and at a 1-year follow-up the authors concluded that, ". . . while participants lost ground in most areas of pain control, function, and quality of life, they were judged generally healthier than at intake" (p. 26). Both these conclusions are difficult to evaluate because of the lack of data reported and no statistical tests. These findings were based on the patients' recall of pain, which is often poor and underestimated (Feine, Lavigne, Dao, Morin, & Lund, 1998). The *Feldenkrais* participants were judged to have better results when compared to data provided by the National Pain Data Bank, but this comparison was inappropriate, because the *Feldenkrais* patients were considerably different in many factors than the comparison group. Although a 40% reduction in medical costs for the *Feldenkrais* patients was reported, the sponsoring health care agency did not choose to include *Feldenkrais* in its scope of benefits.

Stephens (2000) examined clinical data in 157 physical therapy patients with musculoskeletal problems over a 10-year period. The patients were typically seen by the physical therapist once every 1–3 weeks and were given a home program of regular physical therapy exercises or *Feldenkrais* ATM lessons to do on their own time. Presumably, the in-clinic sessions combined *Feldenkrais* with regular physical therapy. In comparison to the preferred practice patterns and expectations for recovery published by the American Physical Therapy Association (1998), the outcome success and number of visits fell "within the expected range." This statement suggests no special benefits with the *Feldenkrais* method.

Malmgren-Olsson, Armelius, and Armelius (2001) looked at a normal comparison database of patients suffering with nonspecific musculoskeletal disorders compared to a group undergoing conventional physical

therapy treatments (a median of 20 treatment sessions), body awareness therapy (20 sessions), and the *Feldenkrais Method* (20 sessions). The *Feldenkrais* treatments consisted of both ATM and Functional Integration® (FI). All patients were tested for measures of psychological distress, pain, and self image over a 1-year period. In comparison to a nonintervention control group, the three treatment groups all improved over the year. From a statistical significance standpoint, none of the three treatment groups differed from one another, but an examination of effects sizes and mean values indicated that body awareness therapy was a little better than the *Feldenkrais Method*, which was a little better than the conventional treatment. These authors acknowledged that some, but not all, of the effects may have been due to placebo or simply improvement over time. They also made the observation that the active participation by patients in the body awareness and *Feldenkrais* groups in treating their own problems may have been the reason these methods compared favorably to the conventional treatment group.

Another well controlled study did show positive effects of the *Feldenkrais Method* to lessen complaints from neck and shoulder problems when compared to conventional physical therapy (Lundblad, Elert, & Gerdle, 1999). Lundblad et al. examined 58 female factory workers complaining of neck and shoulder problems and tested them on 22 different clinical and physiological tests and 11 different complaint and pain measurements. Of the 22 clinical (e.g., neck and shoulder range of movement) and physiological (e.g., peak torque, $V0_2$, electromyographic measures) tests, the *Feldenkrais* group significantly improved on eight, the control group improved on six, and the physical therapy treatment group improved on two. The authors noted that the absolute differences among these interventions were minimal and coincided with a lack of statistical significance found for the combined treatment effects. The small differences found in all the groups from pre to post are of doubtful clinical significance and are most likely due to familiarization effects with the testing apparatus or, as the authors discussed, may have had something to do with a change in work environment that occurred during the study period. The only clinical test the *Feldenkrais* group clearly performed better at compared to the other groups was a "cortical control" measure, a measurement based on *Feldenkrais* methodology. This measurement, however, was not validated with any of the objective tests of muscle relaxation using electromyography. The *Feldenkrais* group did improve significantly in 5 of 11 complaint and pain disability tests (e.g., pain perception, coping) compared to 1 of 11 for the control group and 0 of 11 for the physical therapy group. The percentage of improvement for the *Feldenkrais* group in some of these measures was large, especially when compared to the other groups that had a tendency to worsen from pre to post. However, it was not necessarily expected that the physical therapy group would improve, for Lundblad and her colleagues noted that traditional physical therapy has been shown to be ineffective in similar cases (e.g., Feine & Lund, 1997).

Preliminary Clinical Conclusions

The current evidence supports two conclusions. First, the *Feldenkrais Method* has not been shown to be better than the treatments it has been compared against or if compared to successful treatments that have been indicated for a particular condition. Even the effects of pain reduction reported for the *Feldenkrais* treatments must be considered in comparison to targeted behavioral interventions that have been shown to be statistically and clinically effective (e.g., Haugli, Steen, Lærum, Nygard, & Finset, 2001). Findings of improved emotional well being among *Feldenkrais* participants must similarly be compared to the near unequivocal effects reported for simple relaxation training (Linden, 1994) and exercise (Fox, 1999). From a clinical standpoint, it seems difficult to recommend the *Feldenkrais Method* above other techniques.

Second, any effects noted appear to be psychological and not physiological. These psychological effects may be related to simple relaxation effects (Gilman & Yaruss, 2000), the interpersonal relationships developed among clients and practitioner, or the feelings of wellness and anxiety reduction that may accompany touch-based therapy (Vickers & Zollman, 1999). These findings are consistent with suggestions that the *Feldenkrais Method* may be more efficacious in women than men, particularly regarding pain and other psychological factors (Malmgren-Olsson et al., 2001). Most of the studies that have shown positive psychological effects have used predominately female participants (e.g., Johnson, Frederick, Kaufman, & Mountjoy, 1999; Kirkby, 1994; Lundblad et al., 1999). These data can be tied to the numerous findings that men and women differ in pain perception and manifestation of pain types (Berkley, 1997), somatization of stress (Nakao et al., 2001), and that women have been shown to positively respond to behavioral interventions for pain (Haugli et al., 2001). Using *Feldenkrais* methods to improve awareness may aid in some types of psychological and somatic complaints, but, again, when compared to other methods such a body awareness training (which has a considerable psychological counseling component, see Malmgren-Olsson et al., 2001) or simple relaxation (Smith et al., 2001), the *Feldenkrais Method* does not stand out. Changes in physiological performance, such as flexibil-

ity, movement efficiency, or postural control, have either not been shown, shown conflicting results, or been of minimal effect size. In light of the claims that the *Feldenkrais Method* is a movement re-education method, greater changes in physiological performance should be expected.

Consider, for instance, three recent studies that looked at postural sway characteristics following *Feldenkrais* interventions (Buchanan & Vardaxis, 2000; Diedrich, Feng, Buchanan, Reese, & Thelen, 1999; Seegert & Shapiro, 1999). From a statistical and effect size standpoint there were few differences among the Feldenkrais treatments and control treatments that consisted of either no activity, stretching, or relaxation. There were also conflicting findings among the reports. Seegert and Shapiro (1999) reported after a single 75-min *Feldenkrais* session that their participants displayed less postural sway velocity and amplitude. In contrast, following a single *Feldenkrais* lesson Diedrich et al. (1999) reported that their participants swayed at higher frequencies than the control groups. After eight *Feldenkrais* lessons over 4 weeks, Buchanan and Vardaxis (2000) noted that sway had become more circular by reducing the amount of extreme excursions. Again, however, all of these findings must be viewed with reservation, because in all the studies there were few statistical and effect size differences from pre- to posttest or among the *Feldenkrais* and control groups.

Explanations and Alternative Viewpoints

Given the arguments from Buchanan and Ulrich (2001) and others (e.g., see Bate, 1994) that the *Feldenkrais Method* fits motor learning and control theories, why has it not been shown to be more effective in producing notable motor performance changes? An essential factor in the *Feldenkrais Method* is its emphasis on self-awareness, and this factor may be its shortcoming when training for better body coordination. As Buchanan and Ulrich pointed out, the self-awareness emphasis is contrary to the literature on goal setting. Focusing on being aware of one's own movements and exploration of one's own sensory and perceptual cues are analogous to adopting an internal focus of attention. An internal focus or "body awareness" may be a useful strategy at times for certain conditions, namely those with a large psychological dimension (e.g., pain, see Steen & Haugli, 2001), but an external focus is more effective in learning and performing motor skills, so much so that Singer, Lidor, and Cauraugh (1993) described the best motor skill learning as following a "nonawareness" approach.

When learners focus attention on their own bodily movements (internal focus of attention) versus focusing attention on the effects of these movements (external focus of attention), learning and performance suffer (Wulf, McNevin, Shea, & Wright, 1999). Wulf and her colleagues have shown that movements ranging from object manipulation tasks to whole body movement and balance tasks were acquired, performed, and retained better with an external focus (Wulf et al., 1999; Wulf, Shea, & Park, 2001). Similar results can been found in the physical rehabilitation literature, where added purpose activities (physical activities with meaningful outcome goals or purposes) that take conscious attention away from the movement itself help develop more effective movements (e.g., Hsieh, Nelson, Smith, & Peterson, 1994). These findings are all in line with the five-step approach of Singer et al. (1993), where learning and performing motor skills are best done without thinking about them, and attention is initially placed on some external cue or movement goal.

If an external focus of attention is purported to be better for learning and performing motor skills, how can this be reconciled with evidence that high-level endurance athletes tend to adopt an associative strategy in which focus is placed on internal bodily sensations such as breathing, pain, and muscle tension (Masters & Ogles, 1998)? Association appears to work for low strategy endurance sports with a low motor skill component (e.g., running and swimming), where external cues are less important, and is tied to competitive environments, where the exercise intensity is high (Bachman, Brewer, & Petipas, 1997). In their review, Masters and Ogles (1998) concluded that associative strategies relate to faster performance, whereas dissociative strategies (e.g., external focus) relate to lower perceived exertion. This conclusion is consistent with reports that the mood-enhancing qualities of recreational aerobic exercise can be diminished with an internal focus (Fillingim & Fine, 1986). Thus, an associative strategy appears not in harmony with the desired outcomes of *Feldenkrais* lessons.

Irrespective of the benefits of an external focus, can improving body awareness improve performance or enhance motor learning? Buchanan and Ulrich (2001) noted that *Feldenkrais* proponents "argue that by first improving the sensitivity of perception [i.e., goal is on bodily awareness] one can learn to adapt any behavior more easily" (p. 319). Body awareness requires a myriad of sensory and perceptual systems (e.g., tactile, proprioceptive, interoceptors), but kinesthesia predominates among nonvisual sensory systems and is emphasized in *Feldenkrais* lessons. The role of kinesthesia in motor learning and control and the effectiveness of kinesthetic training have been vigorously debated, and many questions remain (Geron, 1986, see also Sims, Henderson, Morton, & Hulme, 1996, regarding kinesthetic sensitivity training). Nonetheless, evidence strongly suggests that kinesthetic cues, kinesthetic imagery, and kinesthetic

sensitivity are least used or least needed in the early stages of motor learning (Fleishman and Rich, 1963; Hardy & Callow, 1999; Laszlo & Sainsbury, 1993) and that conscious and focused effort is not required and perhaps not even important to improve perceptual sensitivity. For instance, movement repetitions improve position sense (Meeuwsen, Sawicki, & Stelmach, 1993), a single weight training session improves body awareness (Koltyn, Raglin, O'Connor, & Morgan, 1995), and children improve spontaneously in kinesthetic ability (Laszlo & Sainsbury, 1993). Aerobic exercise training has shown to increase internal body consciousness (similar to body awareness) and body competence (Skrinar, Bullen, Cheek, McArthur, & Vaughan, 1986). When an associative strategy or internal focus may be beneficial to learn or perform certain skills, the ability to do so is learned quickly (Couture, Jerome, & Tihanyi, 1999; Miller & Medeiros, 1987).

Early research indicated that kinesthetic ability was associated with athletic performance (Geron, 1986), but recent evidence contradicts these findings (Freeman & Broderick, 1996). This discrepancy is likely a result of the specificity of training principle, that is, kinesthetic ability is more likely to be found if the kinesthetic measures are specific to the athletic movements most practiced (Jacobson, Chen, Cashel, and Guerrero, 1997). Perhaps the most controversial topic in kinesthesia concerns kinesthetic training for children with motor problems (e.g., see Sims et al., 1996). Although kinesthetic training may help children with or without motor problems, there are other factors independent of kinesthesia that play a role (Sims & Morton, 1998). Furthermore, in young school-age children kinesthetic inability does not affect overall motor skill function (Laszlo & Sainsbury, 1993). As with other types of training with an internal focus, kinesthetic training can be brief (e.g., 10 min, see Laszlo & Sainsbury, 1993; Sims & Morton, 1998).

Other factors also argue against the efficacy of kinesthetic training or the importance of conscious kinesthetic awareness in motor performance. For one, perceptions of movement-related effort in limb movement tasks are ambiguous measures that often hold little insight to physical performance related to biomechanical or metabolic efficiency (Rosenbaum & Gregory, 2002). Second, training using conscious attention toward proprioceptive signals may not be effective, because proprioception use in time-critical tasks is either reflexive or autonomic (Ashton-Miller, Wojtys, Huston, & Fry-Welch, 2001), or, as Henry (1953) found in his now classic study, purposeful movement adjustments to outside force stimuli are often done below the level of conscious awareness. In contrast to body awareness training, a number of training interventions to improve body control by challenging multiple sensory systems and requiring the participant to focus on the task demands or accomplishing movement-related goals, have shown marked effectiveness in musculoskeletal rehabilitation and injury prevention (e.g., Holme et al., 1999). Without dismissing the idea that periodic kinesthetic "scanning" can be beneficial to motor learning, it is evident that emphasizing kinesthetic training offers no particular benefit.

In sum, the relative ineffectiveness of the *Feldenkrais Method* to elicit changes in motor performance can be explained based on an inappropriate attentional focus and an overemphasis on kinesthetic training. Put differently, these data provide little support for the use of *Feldenkrais* for improving motor skills. On the other hand, an appropriate framework to study the *Feldenkrais Method* may be self-regulation theory. The findings that the *Feldenkrais Method* has a psychological emphasis, that men and women may be affected differently, and that the *Feldenkrais* effects may be a result of individuals taking responsibility for their own health (Malmgren-Olsson et al., 2001), are all consistent with models of self-regulation.

Self-regulation refers to the psychological processes one undertakes in pursuing a goal and often takes on five steps: problem recognition, commitment or motivation, acquisition and use of skills, maintenance processes, and transfer or generalization of skills (Crews, Lochbaum, & Karoly, 2001). As Crews and her colleagues pointed out, examining (and, hence, understanding) self-regulation is difficult because of the "sheer complexity of the process," but even a cursory look at self-regulation reveals several things in common with the *Feldenkrais Method*. The most important similarities are that people can harness and self-regulate their own thoughts, actions, and emotions toward achieving goals and that increasing awareness can be a first step in the self-regulation process. (Awareness, however, in self-regulation terminology has a much broader meaning than in *Feldenkrais* terminology.) In contrast to the *Feldenkrais Method*, self-regulation has a much greater emphasis on deliberate efforts aimed toward accomplishing specific goals (Crews et al., 2001). Nonetheless, self-regulation theory may offer researchers and clinicians alike a useful perspective on the *Feldenkrais Method*.

Comments on Methodology and Summary

Aside from using appropriate controls, three features of *Feldenkrais* interventions need to be taken into consideration. First, practitioner skill level and the dependence on subjective assessments of movement dysfunction raise concern. In chiropractic and other fields of manual medicine, such assessments have often been shown to be unreliable and invalid (e.g., Hestbœk & Leboeuf-Yde, 2000). Second, meaningful and valid criterion measures must be used. For example, postural

sway measures, like those used in some *Feldenkrais* studies, are little understood in healthy persons, and, thus, changes due to intervention effects are difficult to interpret (Tarantola, Nardone, Tacchini, & Schieppati, 1997). If testimonials and other qualitative accounts are reported, appropriate methods must be used in ensure credibility (Denzin & Lincoln, 1994). Last, as Johnson et al. (1999) noted, expectancy effects may influence the results. A patient's preference for a particular treatment affects the outcome of treatment (Awad, Shapiro, Lund, & Feine, 2000), and it would be anticipated that patient preferences would gravitate toward noninvasive and genial methods, such as *Feldenkrais*. Expectancy effects also influence the researcher in that a researcher's "therapy allegiances" can be associated with the treatment outcomes (Luborsky et al., 1999). Therapy allegiances are plain to see in many of the research reports on the *Feldenkrais Method*.

In summary, the current research on attentional focus and kinesthesia provide rationale as to the marginal effectiveness of the *Feldenkrais Method* to produce changes in motor performance. In contrast, changes in psychological performance corresponding to a self-awareness approach suggest that it may be fruitful to examine the *Feldenkrais Method* in light of a self-regulation perspective.

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