

The overall aim of the present thesis is to investigate the effects of aerobic, anaerobic and relaxation forms of exercise on physical self-perception and self-esteem of Danish depressed patients. This study was designed as part of a larger project called DEMO which was a parallel-group, randomised superiority trial, carried out at the Copenhagen University Hospital in Denmark (Krogh et al., 2007). This dissertation is written based on the results of three consecutive studies.

In the first study (Mohammadi-nezhad et al., 2011) we investigated the factor structure, validity, and internal reliability of the Physical Self-Perception Profile (PSPP) in Danish depressed patients. We also tested the ability of the PSPP for discriminant validity when depression groups were compared with normal adults. The mediating role of self-esteem in physical self-perceptions and negative affect relationship were examined. A sample of 96 Danish psychiatric patients completed the PSPP, the Rosenberg Self-Esteem Scale (RSES), the Beck Depression Inventory (BDI) and the Hamilton Anxiety Rating Scale (HAMA). The Danish version of the PSPP showed high internal consistency and Applying the exploratory and confirmatory factor analyses provided support for the PSPP to be used with depressed patients. The data were more consistent with the four-factor model than with a combined three-factor model. PSPP significantly discriminated between healthy subjects ( $n=46$ ) and patients ( $p < 0.005$ ). A path analysis indicated the role of physical self-worth as a mediator between the PSPP sub-domains and self-esteem and depression. The strong content validity and construct validity confirmed the PSPP application on depressed patients.

In the second study we aimed to investigate the impact of a sixteen-week exercise intervention (both aerobic and non-aerobic) compared to a relaxation exercise control group on physical self-perception and self-esteem of depressed outpatients in an urban Danish context, using a repeated measures design; We furthermore investigated the relationship between physical fitness and psychological changes. We eventually tested the physio-psychological associations in low-fit patients compared with non-low fit participants. From the pool of 165 patients randomly recruited to the DEMO continuously, only 96 participants who answered to PSPP and RSES (28 male, 29.2%, and 68 female, 70.8%) were considered for this Study. The intervention consisted of aerobic, anaerobic and relaxation exercise twice a day over 16-weeks. PSPP, RSES, BDI and the HAMA,  $VO_{2max}$ , 1-RM for knee extension, chest press and leg press, BMI, and  $HR_{max}$  were administered to participants before, and after the intervention and at the end of a 12 month follow-up. Based on intent-to treat analysis, all three groups exhibited significant time-effect improvements on psychological and physiological indices except on the BMI. There was a significant interaction effect for group  $\times$  time only for PSPP-Sport. Per-protocol analysis revealed no significant interaction effects for group  $\times$  time for psychological variables. The results suggest that all three programs are equally effective in enhancing physical self-perception. There was no indication of any difference between low-fit and moderate to highly fit individuals. The significant inverse correlations between PSPP and RSES with depression were evident. This study supported the effectiveness of exercise intervention for a significant improvement of PSPP, self-esteem, and reduction in anxiety and depression. Moreover, physical fitness achievement was partially associated with positive psychological changes in depressed patients.

In the third study, we intended to establish longitudinally the extent to which an integrated model of Fox and Corbin (1989) hierarchal model and Physical Self-Perception sub-scales to depression model (Van de Vliet et al., 2002b) was tenable. Thus, the objectives of the third study were, (1) to investigate the associations of the five sub-domains of PSP with global self-esteem, depression and anxiety longitudinally across the three waves of time, (2) to test the effects of exercise on the changes of

physical self-perceptions (PSPs) among clinical depressed samples over time, (3) to examine the contribution of self-esteem and PSW as mediators between physical self-perceptions and negative affect relationships among depressed patients over a 12 month period, (4) to determine whether a causal relationship exists between exercise and changes in self-perceptions, self-esteem and depression. Results demonstrated that most of the scales represent acceptable to excellent values of internal consistency and the reliability of scales employed (Cronbach alpha = 0.92 to 0.78 at all three time points). We found that correlations between Fitness ( $VO_{2max}$ ) and PSPP subscales were significant at all three time periods. The same associations, but inversely, were found for fitness and depression. PSPs influence on BDI and HAMA was mediated longitudinally by RSES and PSW across the three waves of time. Also the results accentuated the strong association between the level of physical self-perceptions, self-esteem, and the degree of mood disorder symptoms. Applying partial correlations, the impact of PSW and RSES were attenuated. Only the relationship between body attractiveness and depression was not extinguished at baseline and even in follow-up assessment.

Exercise showed to influence mood through self-esteem and its perceived physical competences in a vertical continuum of specificity-generality, as the paths hypothesized by the models 3-6 (time 2 and 3) were significant. This influence was also evident through longitudinal trajectories at model 7 through which the skill-development hypothesis was corroborated. The *self-enhancement hypothesis* also was supported through the top-down model-8 on depressed patients. Moreover, most direct and indirect hypothesized associations between depression, self-esteem, PSPs and exercise behavior were found to be significant, especially the descending effects from time 2 (the post intervention) to time 3 were more vigorous. All of the hypothesized relationships in the longitudinal data were substantiated and the overall model fitting results of the path analysis provided strong empirical support for both proposed theoretical models (i.e. skill development and the self-enhancement hypotheses). By showing strong direct associations with a high magnitude of coefficients in PAs with a theoretical basis, this study indicates that there is causal and mediating relationship. Moreover, due to the longitudinal nature of this study and because this study examined mediators at multiple time points (i.e., short and long-term time points), thus causal inferences can be made. These findings extend the previously established theories and models related to global self-esteem to the clinical population.