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ALTERNATIVE RESEARCH STRATEGIES IN THE EXERCISE - MENTAL HEALTH RELATIONSHIP

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From the numerous investigations available, there is cautious support for the proposition that exercise is associated with enhanced emotion and mood in mental illness, but the strength of the conclusions derived from the empirical findings available will largely depend on the strength of the designs applied. In applied research, such as the investigation of the exercise - mental health relationship, this relationship depends on population, environmental and individual characteristics and a number of difficulties will certainly hinder progress in this area of inquiry. Randomised controlled trials are important but have the disadvantage of deemphasizing the importance of the individual. Single-case designs on the other hand have considerable potential to adequately unravel the mechanisms at work in the exercise - mental health relationship.

From a clinical perspective however, research findings should be viewed based on the support of earlier epidemiological evidence, suggesting that mental illness indeed might be associated with low activity/fitness and that those who maintain activity are less likely to develop mental illness.

Keywords: Exercise, mental health, randomised controlled trials, single-case designs.

INTRODUCTION

Exercise has been suggested as an effective adjunctive treatment for a wide range of mental health conditions, such as depression, anxiety and schizophrenia, leading to cautious optimism regarding the potential efficacy of exercise as a therapeutic possibility. In the case of clinical depression, it has been concluded that (a) exercise significantly decreases depression, and the antidepressant effects persist in time (from 2 months to 1 year); (b) all modes of exercise are effective; (c) the longer the exercise program, the greater the decrease in depression; and (d) exercise is at least as effective as psychotherapy (Brosse et al., 2002; Craft & Landers, 1998; Lawlor & Hopker, 2001; O'Neal, Dunn, & Martinsen, 2000). Similar findings have been reported for anxiety, although fewer studies are available due to the difficulties in defining "anxiety" at the clinical level. Additionally, it is recommended to lower exercise intensity because this might be largely responsible for elevated recidivism (O'Connor, Raglin, & Martinsen, 2000; Petruzello et al., 1991; Raglin, 1997). Exercise also seems to be a useful adjunct in the treatment of some of the negative symptoms of schizophrenia (Faulkner & Biddle, 1999). Evidence for the use of exercise in the treatment of other mental illnesses is hard to find (Biddle & Mutrie, 2001). The reader is referred to, e. g. Biddle et al. (2000), Bid-

dle and Mutrie (2001) and Landers and Arent (2001) for recent overviews of research findings.

Some of the existing research, however, has led to cautious conclusions about how much benefit physical activity and exercise might have (Landers & Arent, 2001; Leith, 1994; Morgan, 1997). Different reviewers mention that this might be due in part to the inadequacy of research designs and assessment procedures (Lawlor & Hopker, 2001; Morgan, 1997; Biddle & Mutrie, 2001). It has been suggested previously (Leith, 1994) that as experimental rigor improves, the positive effects of exercise become less obvious, although the smaller number of true experimental studies make it difficult to be confident about such a conclusion. However, the observation that both field and laboratory research report the same beneficial effects of exercise can only strengthen the position that exercise has excellent potential to impact positively on mental health in clinical populations.

In this overview, we discuss the quality of the evidence in the exercise - mental-health relationship reviewed and we suggest complementary strategies. Treating patients suffering from severe mental illness is a very complex issue and cannot be reduced to a few guidelines. In the end of the article, an effort will however be made to translate the current scientific knowledge into proposals for evidence-based interventions.

RESEARCH LIMITATIONS

Random selection of participants and random assignment to treatments is the most effective means of controlling threats to internal and external validity, while the inclusion of a control group rules out the possibility that something other than the experimental treatment (i. e. exercise) has influenced the outcome. The studies of Blumenthal et al. (1999) and Broocks et al. (1998) are good examples of evidence-based support for the efficacy of physical activity as an adjunctive treatment for clinical depression or anxiety, since the evidence is gathered through such randomised controlled trials. Blumenthal et al. (1999) compared the effects of physical activity treatment and drug treatment in a sample of 156 men and women meeting DSM-IV criteria for major depressive disorder. The participants were randomly assigned to (a) a physical activity group consisting of three 30-min supervised physical activity sessions per week (cycle ergometry or brisk walking/jogging at 70–85% heart rate reserve); (b) antidepressant medication; or (c) a combination of both previous conditions. After 16 weeks, all groups exhibited significant reductions in symptoms of depression and there were no significant differences across groups. Broocks et al. (1998) compared the therapeutic effect of exercise for 46 patients with panic disorder, randomly assigned to a 10-week treatment protocol of (a) regular aerobic exercise (gradual prolongation of 3 running periods per week); (b) medication; or (c) placebo pills. In comparison to placebo, both exercise and medication led to a significant decrease in anxiety and depressive symptoms according to all main efficacy measures. A direct comparison of exercise and medication revealed that the drug treatment improved anxiety symptoms significantly earlier and more effectively.

Unfortunately, the strength of the conclusions derived from the empirical findings available is too often limited since a number of difficulties exist. These include methodological problems (e. g. poor statistical power because of small samples, inadequate study design, absence of control groups, absence of randomised trials, differing methods of measuring outcomes), as well as effects of non-specific factors that might be responsible for at least part of the effect (e. g. placebo and expectation effects, time in contact with professionals under different treatment conditions, empathy and attention from the exercise leader, spontaneous recovery).

One of the most obvious shortcomings always has been inappropriate subject selection. Much of the research to date has examined the effect of exercise on mental health in subject samples that might derive benefits from exercise, but do not meet the initial criteria of “clinical” proportions of mental illnesses as diagnosed by e. g. DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, American Psychiatric Association,

1994). In case of, e. g. clinical depression, a number of individual studies and reviews include populations of individuals who were depressed as a result of a physical health problem (e. g. myocardial-infarction, Kugler et al., 1994) or as a result of more temporary mood swings (e. g. feelings of depression in college students, North et al., 1990). Mutrie (2000) cautions against incorrect interpretations of findings derived from such investigations.

Most empirical studies dealing with exercise and mental health have insufficient statistical power to detect differences that are significant at the conventional levels of probability, mainly due to the fact that true experimental designs are in the minority (Landers & Arent, 2001; Lawlor & Hopker, 2001; Taylor, 2000). The result has been a risk for increase in type II errors. Lawlor and Hopker (2001) aimed to provide a better quality analysis by including only trials that were described as randomised controlled trials. Their results did not differ from those of other meta-analyses that also included non-randomised trials and observational data. In clinical trials it is indeed extremely difficult to find enough patients with the same deficiencies, and possibly the same background, to compose more or less homogeneous groups for making comparisons or to draw conclusions for this population. Furthermore it is not always possible to employ truly experimental designs that take these methodological aspects into consideration. This is particularly the case for patients being treated in a hospital setting, who have been admitted for therapeutic help (Morgan, 1997). As a consequence the effect of randomisation is mitigated by the lack of adequate concealment, intention to treat analysis, and blinding (Lawlor & Hopker, 2001).

It should also be noted that subjects with major to severe mental health problems are rarely studied. Studies with “volunteers” are more common, although it is not always clearly stated that these volunteers are representative of the target population. This especially was the case in the initial investigations in which patients were recruited from the community through volunteer databases (e. g. Singh et al., 1997) or when they agreed to participate (e. g. Sexton et al., 1989). Especially in the case of physical activity, it might be presumed that participants in such investigations believed physical activity to be a credible treatment modality and were as a consequence favourably inclined toward participation (Lawlor & Hopker, 2001). In the United Kingdom rates of compliance with “exercise on prescription” schemes among patients with any referral criteria vary from 20% to 50% (Fox et al., 1997). It is reasonable to assume that compliance among patients suffering from mental illness would be at least similar or even worse. Salmon (2001, 39) already pointed out that “exercise training, which emphasises patients’ motivation and responsi-

bility, does not obviously meet the immediate need of such patients". Therapists and clinicians are faced with patients who often have to contend with an absence of motivation to tackle much less strenuous features of life's routine.

It is noteworthy that a number of investigations have failed to observe significant psychological changes as measured by standardized instruments that possess good reliability and validity, despite the fact that participants in these studies reported that they experienced an "increased sense of well-being". It is possible that the enhanced sensations of well-being reported by these individuals reflect changes in psychological constructs other than those assessed in a given study. Suffering from a depressed mood might indeed be the dominant symptom of clinically depressed individuals, but the syndrome of clinical depression is far more complex. Measurement tools may only pick up decreases in negative symptoms and miss out on increases of positive mental health (Van de Vliet et al., 2004).

Most investigations applied measurement instruments, applicable to large scale administration, but these instruments are not appropriate for detecting intra-individual variability. Items that fail to discriminate between groups of individuals have been eliminated during the phases of questionnaire construction. The remaining items tend to represent the extremes of a trait dimension (e. g. depression, anxiety), so that they are not sensitive enough to detect individual changes.

ALTERNATIVE RESEARCH APPROACHES

Based on the present findings, more randomised trials, such as Blumenthal et al. (1999) and Brooks et al. (1998), are needed before poor mental health should be considered to be directly improved through exercise (Biddle & Mutrie, 2001). However, there might be a difficulty in conducting true double blind RCT in therapeutic circumstances. Randomised trials answer "a circumscribed set of questions and issues related to outcome rather than to process, and to efficacy rather than effectiveness" (Roth & Parry, 1997, 370). In other words, we have a (positive) outcome but what actually happened? Besides that, small but consistent changes, which in a group design would not emerge as being statistically significant, can be of major importance for the individual (Hrycaiko & Martin, 1996).

From this perspective, a variety of methodological approaches can be discussed. Such a discussion is often referred to as methodological eclecticism "on the ground that such an approach promises to cancel out the respective weaknesses of each method" in an attempt to contribute to a more definitive answer to this health related issue (Biddle et al., 2001, 778).

Considering guidelines that have been established for evaluating overviews of research evidence and under the condition that appropriate inclusion criteria have been applied, meta-analyses have distinct advantages over individual experiments and enable the researchers to provide further substantial evidence for positive effects (Biddle et al., 2000; Landers & Arent, 2001). The outcome of meta-analytic reviews, however, is subject to the quality of the input (Mutrie, 2000). As mentioned above, too many investigations suffer from, e. g. inappropriate subject selection or too vague inclusion criteria for baseline measurements.

Additionally, there is a need for single-case studies with patient groups in which randomised trials are unlikely to be feasible. This is particularly the case when individual responses to exercise settings and exercise conditions will vary (Fox, 2000). With a focus on applied issues such as the effect of exercise interventions on, e. g. mood disorders, there is a need for a methodology or instrumentation that is sensitive enough to register constancies and idiosyncrasies in emotional and behavioural reactions to the treatment conditions. Mutrie (2000) urges a more individualised approach of how different patients perceive the role of exercise in the treatment of depression, since it is more likely to enable the unravelling of the mechanisms at work. Single-case research might be proposed as such an alternative approach, because it can be applied in almost natural conditions and takes into account all the relevant properties of the setting without violating the canons of disciplined science and practice. Within the framework of clinical research, the tailoring of therapeutic programs, designs and measurements represent a major benefit of this approach. Furthermore, recent advances with respect to the statistical analysis of single-patient data and with respect to the meta-analysis of replicated single-case studies enable the researcher to draw statistically valid conclusions at the individual as well as at the group level (Edgington, 1992; Onghena, 1994; Van den Noortgate & Onghena, 2003).

Different examples are available to justify the choice for more individualised approaches. Faulker and Sparkes (1999) report a qualitative study investigating the effects of a physical activity program on the lives of three individuals with schizophrenia within a residential setting using an ethnographic approach. Triangulation of the different (qualitative) data sources captured a contextual picture of the importance of physical activity in the lives of these individuals. For example, more adequate behaviours were observed on days of physical activity compared to days of physical inactivity. Van de Vliet et al. (2003b) analysed daily mood changes in 29 clinical depressed patients by means of replicated single-subject methodology. Through the application of randomisation tests and time-series analysis no evidence could be found

that adding fitness training to the treatment of clinical depression would systematically lead to changes in self-reported feelings of depression. On the other hand, feelings of physical well-being reduced depressive feelings, but were, in turn, independent of the implementation of the fitness program. These findings clearly point out the complexity of the relationships between different measures related to the exercise – mental health relationship. Given that the experience of physical activity is likely to be unique then, a methodology that accounts for the individual deserves further recognition (Carless & Faulkner, 2003). Using these methodologies, both examples provided analyses and evaluations in a naturalistic treatment setting, which offers new opportunities when working or when deontological conditions make clinical trials more difficult.

A recent case has been made (Mutrie, 2000) that it may be appropriate to use Hill's classic criteria for deciding whether there is an association or a causal link between the observed illness (in this case mental illness) and some environmental conditions (in this case exercise or the lack of it). Hill suggested eight criteria which can be used to help scientists and practitioners decide if a causal interpretation of evidence can be made. Mutrie claims that the research literature with respect to the exercise – clinical depression relationship provides support for all of Hill's criteria: strength of association, consistency, temporal sequence, biological plausibility, experimental evidence, dose-response, coherence and specificity, although Mutrie concluded only "modest" support for the last three criteria. In reaction, Arent, Rogers and Landers (2001) say that though the evidence in favour of a link between exercise and selected mental health variables (e. g. depression, anxiety, mood) continues to mount, it seems premature to conclude that this link is causal in nature. More true experimental research with major focus on dose-response, coherence and specificity is needed, before mental health is considered to be directly altered through exercise.

IMPLICATIONS FOR PRACTICE

Treating severe psychiatric patients is a very complex issue and cannot easily be reduced to a few guidelines. However, increased efforts should be made in order to come to evidence-based interventions. Research findings are indispensable in this respect and continuous vigilance should be given to the translation of research outcomes into therapeutic advice. In Flemish psychiatric hospitals, the application of fitness training in the treatment of depressed patients is imbedded in psychomotor therapy. This therapy attempts to act systematically on body perception and behaviour through movement situations in order to achieve therapeutic objectives re-

lated to the psychological problems of the individual patient (Probst & Bosscher, 2001). Based on the present findings some self-enhancement strategies may be derived that can be implemented in psychomotor therapy programs within a multi-disciplinary and individually tailored Cognitive Behavioural Treatment Program (CBTP). The efficacy of the following recommendations obviously must be tested yet in controlled situations.

Exercise interventions seem to be associated with positive changes in different aspects of the patients' functioning and lead to improved self-reported feelings of physical well-being and to reduced feelings of depression in certain cases. Besides that, positive changes in physical self-worth are associated with a relief of depressive symptoms and an enhancement of self-esteem over a three-month period with multidisciplinary treatment (Van de Vliet et al., 2003a). Based on these experiences, self-enhancement strategies can be implemented into psychomotor therapy programs (Van de Vliet, Knapen, & Van Coppenolle, 1999). This approach is largely based on the efficacy theory of Bandura (1977). The starting point is "to give it a try". If this trial is successful, the need to be in interaction improves, being a new impetus for a next trial. The taxation of to what extent the interaction might be considered successful is likely to affect whether a patient will even try to cope with given or new situations. The intervention, in this case psychomotor therapy, can provide the framework in which the individualised therapeutic objectives can be achieved. These strategies include: (1) the creation of success experiences by setting concrete and achievable objectives; (2) the reinforcement of social appreciation for patient, therapist and fellow patient; (3) the evaluation of personal performance; and (4) the improvement of subjective feelings of fitness (Van de Vliet, Van Coppenolle, & Knapen, 1999). Psychomotor therapy that focuses on the development of such positive expectancies and self-enhancement strategies can be hypothesised as very successful in the treatment plan of depressed patients.

Furthermore, since Martinsen, Medhus and Sandvik (1985) also provided evidence that aerobic exercise leads to improvement in – initially very poor – functional capacity levels in depressed patients, benefits of exercise programs are not only to be situated in the area of psychological well-being.

CONCLUSION

Considering the available research evidence in the exercise – mental-health relationship, Mutrie (2000, 60) states that "the potential benefit of advocating" the use of exercise as part of a treatment package for depression far outweighs the potential risk that no effect will

occur. There are very few possible negative side effects (e. g. injury, exercise dependence) and there have been no negative outcomes reported in the literature. In addition, there are potential physical health benefits such as an increase in fitness, weight reduction, and decreased coronary artery disease risks. Therefore, physical activity/exercise should be advocated as part of the treatment for clinically defined depression'. Based on the current evidence available, this statement can be extended as to the treatment of anxiety disorders, and preliminary results in investigations with schizophrenic patients point in a similar direction. However, there is a need for well designed, randomised controlled trials on clinical populations that measure different outcomes. Different pitfalls to be avoided in the design of these trials are outlined in the present paper. On the other hand, the following statement of Fox (2000) indicates the urgent need for further investigation using an eclectic research approach. The effects of exercise are likely to be a very individual experience with each "exerciser" relying on a unique exercise formula for maximum psychological benefit. As a consequence, "outcome-oriented" research, such as randomised controlled trials, should be complemented with "process-oriented" investigations, addressing the question of what actually happened in each single individual. The consideration of alternative methodological approaches can complement the findings of research trials by exploring individuals' experiences of process and effectiveness. This inclusive and complementary approach of different research strategies will not only develop the evidence base but also evidence-based practice (Carless & Faulkner, 2003, 78).

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ALTERNATIVNÍ VÝZKUMNÉ STRATEGIE VE VZTAHU CVIČENÍ - MENTÁLNÍ ZDRAVÍ (Souhrn anglického textu)

Z početných dostupných šetření jsme zjistili, že existuje malá podpora pro tvrzení, že u osob s mentálním postižením je cvičení spojeno s lepšími pocity a náladou. Navíc síla tvrzení odvozená z dostupných empirických výzkumů bude pravděpodobně záviset na podmínkách konkrétního šetření. V použitém výzkumu vztahu cvičení k mentálnímu zdraví: záleží na populaci, charakteristice prostředí a jednotlivci. Množství proměnných a různých obtíží při šetření brání vývoji v této oblasti výzkumu.

Nepravidelné kontrolní testy jsou důležité, ale mají nevýhodu v tom, že nezdůrazňují důležitost jednotlivce. Na druhé straně návrhy jednotlivých případů mají značný potenciál adekvátně rozluštit mechanismy v práci a ve cvičení ve vztahu k mentálnímu zdraví.

Z klinické perspektivy by však na výsledky výzkumů mělo být pohlíženo na základě podpory dřívějších epidemiologických důkazů, které dokládají, že mentální onemocnění by mohlo být spojeno s nízkou fyzickou aktivitou, a ti, kteří jsou aktivnější, jsou méně náchylní k mentálním onemocněním.

Klíčová slova: cvičení, mentální zdraví, nepravidelné kontrolní testy, návrh jednotlivých případů.

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First line publications

Exercise and mental health in clinical populations, exploration of sports performance potential in individuals with intellectual disability.
