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Abstract

Background: The complexity of diagnostic presentations of an inpatient psychiatry population requires an integrative approach to health and well-being. In this sense, the primary need of this research aims at developing clinical strategies and healthier coping skills for anger, anxiety, and depression; promoting self-esteem, healthier sleep, and anxiety reduction; as well as enhancing mood and emotional-behavioral regulation via exercise and nutrition education.

Objectives: The primary objective is to promote exercise, fitness, and physical health in inpatient psychiatry patients. The secondary objective includes therapeutic management of depressive symptoms and patient-centered approach to mania, angry outbursts, and generalized disruptive behavior. The tertiary objective is promoting research in the psychophysiological effectors of exercise and nutrition education in combination with psychotherapy.

Method: Monitoring self-reported changes in mood and general well-being via administration of surveys and questionnaires pre- and postexercise sessions.

Results: The research yielded positive outcomes in all areas investigated, suggesting the positive effects of exercise and mind-body strategies in the context of psychotherapy in inpatient psychiatry.

Conclusion: Physical exercise may be a helpful way to reduce mental health disorders in the context of inpatient psychiatry by targeting anxiety, depression, anger, psychomotor agitation, and muscle tension and addressing stressors and triggers and to develop a more balanced and integrated sense of self.

Keywords

psychiatry, psychology, psychotherapy, exercise, well-being, integrative medicine, health coaching

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Introduction

Multiple studies have indicated that a multidisciplinary approach focused on mind-body connection has been instrumental in promoting well-being in the general population.^{1–3} In the context of inpatient psychiatry, the specific needs of complex diagnostic presentations represent a challenge to the commonly utilized combination of psychotherapy and pharmacological intervention.^{4,5} To respond to this need, this research aimed at implementing this approach through the application of exercise and nutrition education sessions.⁶ *In this context, Mind-Body Flexibility* indicates the ability for an effective form of therapeutic intervention, to promote more empowering, dynamic, dialectic, holistic, and adaptive

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psychological (cognitive) and physical (somatosensory) strategies to well-being.^{7,8}

Intervention

General Description

Psychotherapists/Group Therapists (GTs) offered exercise groups followed by nutrition education sessions to patients on the inpatient psychiatry units Shepardson 3/Shepardson 6 at the University of Vermont (UVM) Medical Center 4 times a week. Each 60-minute exercise session consisted in a combination of cardiovascular training, resistance training, and flexibility development inclusive of (a) free-body exercises; (b) stretching and strengthening exercises; and (c) muscle activation-specific fitness equipment such as upright and recumbent bikes, ellipticals, standard rowers and water rowers, push-up bars and stands, bosu balance trainers, exercise balls, handheld fitness balls, balance pods, and aerobic steps. Furthermore, each exercise session was created following safety versus effectiveness fitness parameters according to the international guidelines in the current scientific literature,⁹ as well as the general recommendations from the American College of Sports Medicine,¹⁰ followed by a discussion with the therapist and the student/intern(s). The 60-minute nutrition education sessions consisted of identifying food groups, clarifying healthy food choices, discussing budgeting, and developing meal preparation/planning, according to the most recent recommendations in the scientific literature on the connection between gastrointestinal health and psychological well-being.^{11–13} The sessions also facilitated discussions around the challenges of maintaining a healthy lifestyle with fluctuating psychiatric concerns attributed to cognitive functioning.¹⁴ All aspects of physical and psychological/educational interventions have been developed from a patient-centered perspective, taking into account the specific diagnostic parameters for each individual enrolled in the study. Measures of fitness (ie, walk test) were not collected in order to present an individual-focused assessment. The latter is especially relevant, given the possible negative influence of standardized expectations (in the case of “normal” values for expected steps, physical performance/fitness) to values of self-image and self-esteem in Major Depressive Disorder (MDD) patients, especially in the context of a comparative analysis inclusive of a control group.

Primary Workflow

GTs administered presurveys to patients at the beginning of each session and assisted students/volunteers in having patients fill out surveys. GTs also collected the

postsurveys at the end of each session and placed it in the appropriate collection box. Prior to patient’s discharge, further recommendations based on interactions with patients in the exercise and nutrition education groups have been delivered to patients in the form of individual consultations as well as printed manuals with individualized descriptions developed by the GTs in collaboration with UVM students/interns.

Timeline

Communication explaining the research including Health Insurance Portability and Accountability Act HIPAA rules and regulations, medical ethics parameters, institutional review board/ Clinical research center (IRB)/CRC approval, and informed consent paperwork has been e-mailed to and further discussed in person with all interested parties prior to the start of the study. The length of the study has been 12 months on both inpatient psychiatry units Shepardson 3 and Shepardson 6.

Methods

Population and Eligibility

Eligibility criteria include adult patients (older than 18 years, N = 100) on the inpatient psychiatry units Shepardson 3 and Shepardson 6, UVM Medical Center, over a 12-month study period.

Qualitative and Quantitative Analysis

The pre- and postsession surveys addressed overall mood, willingness to engage in further education, physical condition, physical fitness/readiness, and movement-based practices, nutrition group attendance, and perceived body image, using a combination of binary (yes/no) responses and Likert-type scales, with reported percentages and *P* value from McNemar’s test and *P* value from Wilcoxon signed-rank test. The list of questions in the surveys administered to patients, with relative percentages and statistically relevant annotations, is reported in Table 1. Objective data have not been collected in this stage, as they would have to be (from both a legal/IRB perspective and a clinical one) directly linked to patient’s identifiers, including diagnostic background and medical history. Furthermore, the researchers in this study wanted to limit the possible negative effects of bias (both from patient’s and provider’s perspective) in collecting this type of data. The researchers are planning to expand this study in the near future, in order to include measurable, biological data inclusive of patient-specific vitals.

Table 1. List of Questions in Patient administered Surveys With Relative Percentage and Statistically Relevant Annotations.

	Yes	No
Shepardson 3—Before the Session ^{a,b}		
Are you pleased with the physical condition of your body, in general?	48.0% (24/50)	52.0% (26/50)
Do you warm up and cool down by stretching before and after the exercise?	41.9% (18/43)	58.1% (25/43)
Was it helpful to attend the nutrition group?	55.6% (15/27)	44.4% (12/27)
I don't exercise on a regular basis	Once a week	2 to 4 5 to 7
In a typical week, how many days do you exercise, per week?	4.2% (2/48)	43.7% (21/48) 25.0% (12/48)
Free body/guided movement	Elliptical	Bicycle Rower
What is your favorite exercise in general?	34.1% (15/44) 20.5% (9/44)	36.4% (16/44) 31.8% (14/44)
How would you rate your mood before the session?	Very happy 6.0% (3/50) 16.0% (8/50)	Neutral ^f Sad 12.0% (6/50) 8.0% (4/50)
Shepardson 3—After the Session ^a	Yes	No
Are you pleased with the way your body feels now	93.0% (40/43)	7.0% (3/43)
Did the exercise group improve your mood?	93.2% (41/44)	6.8% (3/44)
Did the exercise group make your body feel good?	55.6% (15/27)	44.4% (12/27)
After attending this group, do you think you will exercise more?	97.6% (41/42)	2.4% (1/42)
How would you rate your mood after the session?	Very happy 33.3% (15/45) 42.2% (19/45)	Sad Neutral 17.8% (8/45) 6.7% (3/45) 0.0%
Free body/guided movement	Elliptical	Bicycle Rower
What was your favorite exercise in this session	18.2% (8/44) 15.9% (7/44)	43.2% (19/44) 31.8% (14/44)
Shepardson 3—Comparing Before and After—for Respondents to Both	Before session (% "yes")	After session (% yes) P value from McNemar's test
Pleased with physical condition of your body in general/ pleased with the way your body feels now	53.5% (23/43) 93.0% (40/43)	P < .001

(continued)

Table 1. Continued

	Before session	After session	P value from Wilcoxon signed-rank test
How would you rate your mood?	Median "neutral"	Median "happy"	P < .001
Very happy	6.7% (3/45)	33.3% (15/45)	
Happy	15.6% (7/45)	42.2% (19/45)	
Neutral	57.8% (26/45)	17.8% (8/45)	
Sad	11.1% (5/45)	6.7% (3/45)	
Very sad	8.9% (4/45)	0.0% (0/45)	
Shepardson 6—Before the Session ^a	Yes	No	
Are you pleased with the physical condition of your body, in general?	75.7% (28/37)	24.3% (9/37)	
Do you warm up and cool down by stretching before and after the exercise?	45.0% (9/20)	55.0% (11/20)	
Was it helpful to attend the nutrition group?	68.8% (11/16)	31.2% (5/16)	
In a typical week, how many days do you exercise, per week?	I don't exercise on a regular basis	Once a week	2–4
	11.1% (4/36)	8.3% (3/36)	30.6% (11/36)
What is your favorite exercise in general	Free body/guided movement	Elliptical	Bicycle
	22.2% (8/36)	8.3% (3/36)	69.4% (25/36)
	Very happy	Happy ^d	Neutral
	2.7% (1/37)	67.6% (25/37)	27.0% (10/37)
How would you rate your mood before the session?	Very happy	Neutral	Sad
Shepardson 6—After the Session ^a	Yes	No	Very sad
Are you pleased with the way your body feels now	90.6% (29/32)	9.4% (3/32)	0.0%
Did the exercise group improve your mood?	96.8% (30/31)	3.2% (1/31)	
Did the exercise group make your body feel good?	55.6% (15/27)	44.4% (12/27)	
After attending this group, do you think you will exercise more?	100.0% (33/33)	0.0% (0/33)	
How would you rate your mood after the session?	Very happy	Happy ^d	Sad
	9.1% (3/33)	78.8% (26/33)	0.0% (0/33)
	Free body/guided movement	Neutral	Very sad
	12.1% (4/33)	12.1% (4/33)	0.0%
What was your favorite exercise in this session	Elliptical	Bicycle	Rower
Shepardson 6—Comparing Before and After—for Respondents to Both	9.1% (3/33)	72.7% (24/33)	12.1% (4/33)

(continued)

Table 1. Continued

	Before session (% "yes")	After session (% yes)	P value from McNemar test
Pleased with physical condition of your body, in general/ pleased with the way your body feels now	81.3% (26/32)	90.6% (29/32)	P = .08
How would you rate your mood?	Before session	After session	P value from Wilcoxon signed-rank test
Very happy	Median "happy"	Median "happy"	P = .03
Happy	0.0% (0/33)	9.1% (3/33)	
Neutral	69.7% (23/33)	78.8% (26/33)	
Sad	27.3% (9/33)	12.1% (4/33)	
Very sad	3.0% (1/33)	0.0% (0/33)	
	0.0% (0/33)	0.0% (0/33)	

^aPercentages add up to more than 100% due to subjects' checking multiple choices.

^bVariability in the denominators due to individual subjects' choice not to answer the question.

^cMedian = "neutral."

^dMedian = "happy."

Inclusion Criteria

At the beginning of each Exercise and Nutrition Group, the GT, Registered Nurse, or Mental Health Technician (GT/RN/MHT) read the informed consent information and procedure to the patients. Following informed consent documentation, every patient had the option to decline to take part in the exercise and nutrition education group. The total time allowed to complete both Exercise and Survey, from beginning to end, was 60 minutes.

Withdrawal Procedures

Following informed consent documentation, every patient had the option to decline to fill out the research survey; 15 minutes before the beginning of each group, the GT/RN/MHT asked patients to decide whether they wanted to take part in the group. Each GT/RN/MHT actively monitored the activity and the safety of patients and environment, interrupting the regular progress of the group when necessary. Conditions such as environment within the group and on the unit affecting the modification of the study had been taken in consideration. Each GT/RN/MHT had also the option to make the decision not to invite 1 or more patients to the group or interrupt the group/terminate the study if such situation arose to be clinically or medically inappropriate.

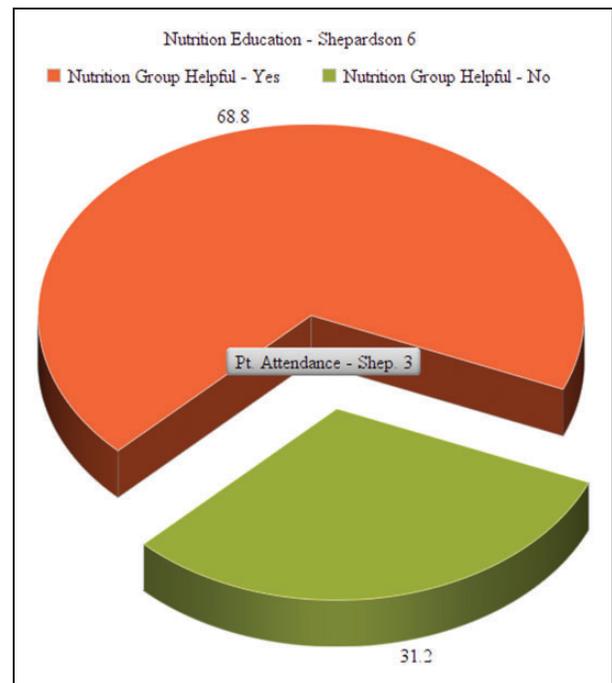


Figure 1. Shepardson 6 Comparison of Yes (Orange, 68.8%) Versus No (Green, 31.2%) Responses to the Question "Was It Helpful to Attend the Nutrition Group?"

Safety, Privacy, and Consent

All the information has been collected without any identifiers and used only for statistical purposes, and it will not be connected or linkable to clinical/medical records of single patients and/or groups/categories/diagnosis in the future. The hardcopy data have been archived in the locked GT Office on Shepardson 529, separated from both inpatient psychiatry units Shepardson 3 and Shepardson 6. Each GT/RN/MHT documented on paper the number of patients participating in the group and the number of patients absent or patients who declined to take part in the group.

Results

Examining the data obtained by analyzing patients' responses in the administered pre- and postsession surveys, we were able to identify multiple positive outcomes as direct results of the implementation of physical exercise

and nutrition education in inpatient psychiatry. In this analysis, the specific differences in terms of diagnostic presentations between Shepardson 3 and Shepardson 6 have to be taken into account, in our attempt to better understand, from an epidemiological viewpoint, the levels of cognitive strength, understanding, and ability versus capacity demonstrated in the responses provided. To give a more detailed context, Shepardson 3 presents a patient population with DSM-5 psychiatric diagnoses ranging from MDD, Bipolar Affective Disorder(s) (BPAD I vs II), Borderline Personality Disorder, mood disorders, and Generalized Anxiety Disorders, often in association with other specified/unspecified psychiatric versus general medical issues and comorbidities. The same applies to Shepardson 6, although, in this case, the most common diagnoses are Schizophrenia, Schizoaffective Disorder, Schizotypal and Schizoid Personality Disorders, and Psychosis. There are certainly overlaps between the 2 inpatient psychiatry units, spanning from paranoid and manic presentations, (to a lesser

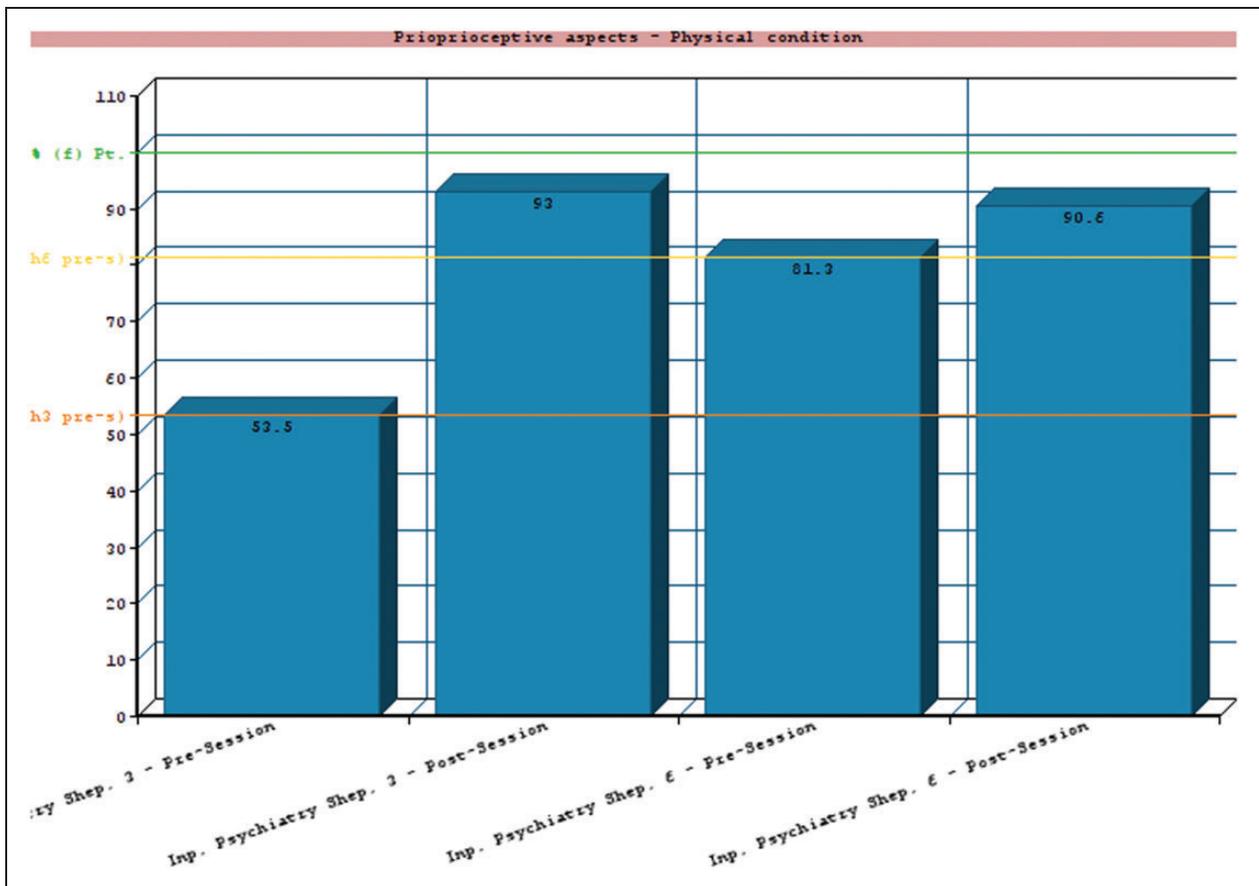


Figure 2. Shepardson 3–6 Comparison of Patient Reported Physical Conditions, Answering the Question “Are You Pleased With the Physical Condition of Your Body, in General?” Indicators, From Left to Right: Inpatient Psychiatry Shepardson 3—Presession, Inpatient Psychiatry Shepardson 3—Postsession, Inpatient Psychiatry Shepardson 6—Presession, Inpatient Psychiatry Shepardson 6—Postsession, $P < .001$ (McNemar).

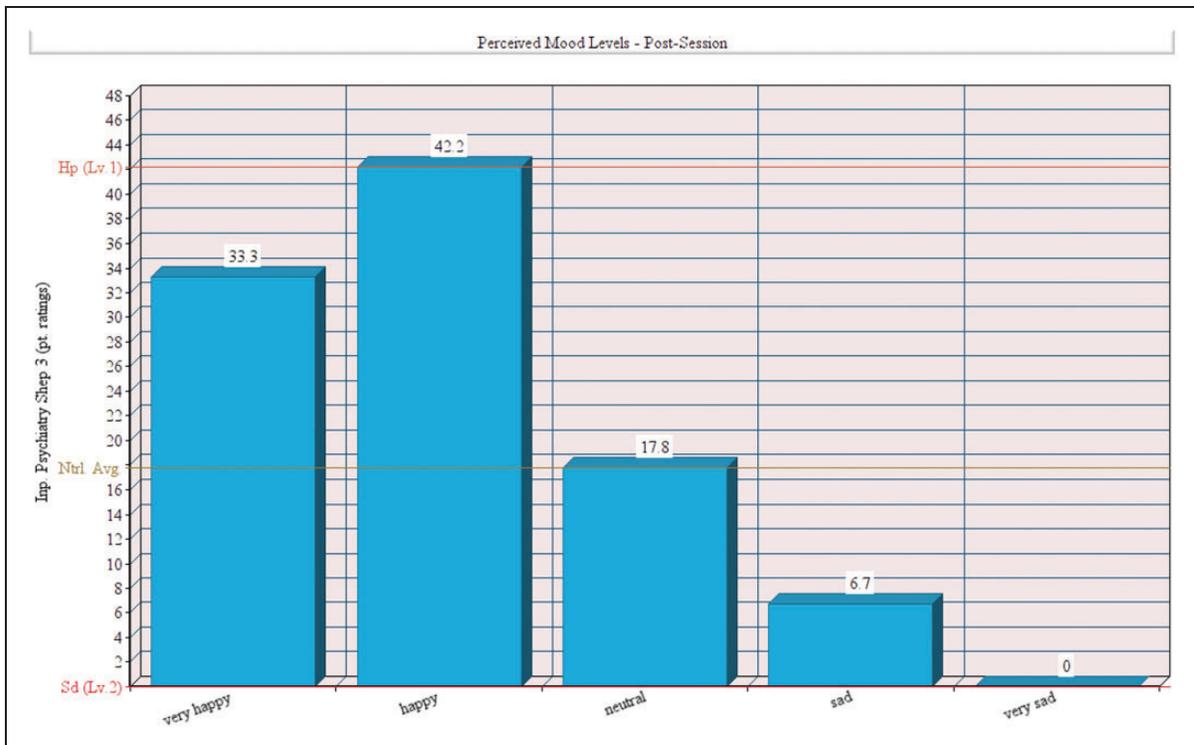


Figure 3. Shepardson 3 Perceived Mood Level Postexercise Session, Answering the Question “How Would You Rate Your Mood?” Indicators, From Left to Right: Very Happy, Happy, Neutral, Sad, Very Sad. $P < .001$ (Wilcoxon Signed-Rank Test).

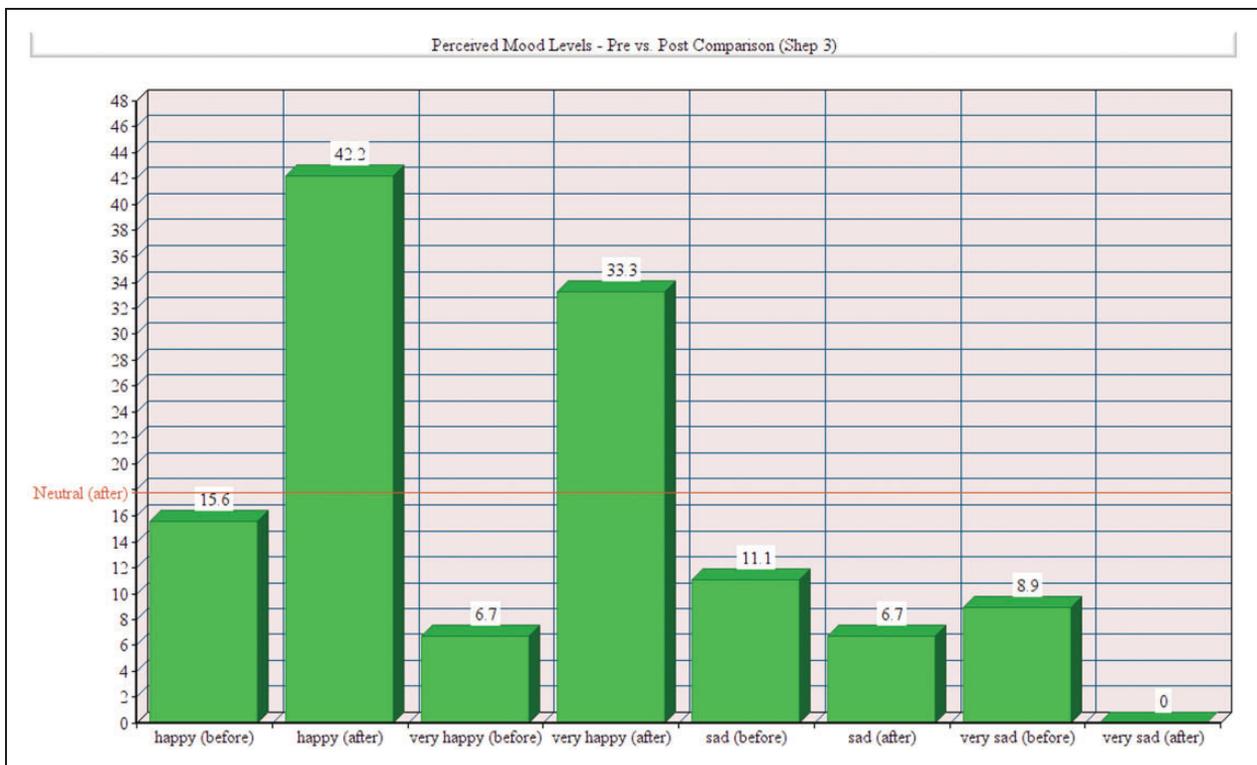


Figure 4. Shepardson 3 Comparison of Patient Perceived Mood Level Changes Before Versus After Exercise Session, Answering the Question “How Would You Rate Your Mood?” $P < .001$ (Wilcoxon Signed-Rank Test).

extent) catatonia, and suicidality, whether in the form of active intent or ideation. These aspects are reflected in some of the answers pertaining the perceived effectiveness or helpfulness of the interventions offered.

The analysis of the results obtained yielded a clear idea on the patient-perceived positive changes in both psychological and physical terms. On the Shepardson 3 Unit, to the question “Did the exercise group improve your mood?” 93.2% of patients responded affirmatively. For “Are you pleased with the way your body feels now?” the positive responses amounted to 93.0% (Table 1). Very similar outcomes for Shepardson 6, with 90.6% for “Are you pleased with the way your body feels now?” and 96.8% for “Did the exercise group improve your mood?” Another very important aspect is found in the future-oriented motivation strategies thereby implemented, with the majority of subjects expressing interest in continuing a fitness routine. This is exemplified in the affirmative answer to “After attending this group, do you think you will exercise more?” with 97.6% for Shepardson 3 and the totality of patients on Shepardson 6 (100.0%) (Table 1). The willingness/readiness of patients to make room for physical exercise in their therapeutic schedule has resulted in an overall positive effect for the therapeutic environment as a whole. This also presented the advantage of better scheduling strategies for the therapeutic offerings on both units. In particular, classic Cognitive Behavioral and Dialectic Behavioral psychotherapy modalities combined with integrative approaches such as exercise and nutrition (beside the already offered approaches such as art therapy, mindfulness/meditation, T'ai Chi Chuan, music therapy, etc.) corroborated the general amelioration of increased well-being following each session, as in well-established multidisciplinary models.¹⁵ This provides evidence for a mind–body perspective, already utilized effectively in inpatient psychiatry. Furthermore, the development of an exercise space provided an improvement from the perspective of a more therapeutically nurturing environment. In particular, having an exercise room with natural light and natural scenery-based tiles and decorations specifically designed for this study, supported a more balanced and positive atmosphere, as evidenced by research,^{16–18} especially given the fact that the inpatient psychiatry unit still does not have any source of natural light (beside relatively small windows in patients’ rooms) in shared therapeutic areas or any open spaces where to socialize and interact. The implementation of exercise and nutrition education also contributed to a better interaction within the Multidisciplinary Treatment Team (Psychotherapists/GTs, Psychiatrists, Nurses, and Social Workers) and between departments, particularly thanks to the internship and volunteering opportunities from UVM students in the fields (academic departments)

of exercise and movement science, psychology, medicine, nursing, social work, and human development, who took active part in the exercise sessions, as evidence by the analysis reported in the patient–provider satisfaction surveys/focus groups, inclusive of all multidisciplinary treatment team members.^{19,20} Moreover, this strategy also benefited patients and community-at-large via the development of health-improving strategies for outpatient activities. From the perspective of patient satisfaction and responses, mood ratings (before and after), perceived physical conditions, and the connection to general well-being and differential diagnosis have been described through positive correlations in the graphs (Figures 1–4) and Table 1.

Discussion and Conclusion

Confirming the results from multiple studies,^{21–23} physical exercise and nutrition education may be a helpful way to reduce symptomatology linked to mental health disorders in the context of inpatient psychiatry by targeting anxiety, depression, anger, psychomotor agitation and muscle tension and addressing stressors and triggers and to develop a more balanced and integrated sense of self.²⁴ The achieved improved state of Mind–Body Flexibility (which could be simplified as “Changing Body via Changing Mind” and vice versa) allowed patients to better understand, monitor, and control their psycho-physical well-being. Of course, the intrinsic therapeutic value of patient–provider relationship remains essential for positive outcomes in this setting.^{25,26} This is especially true in the case of therapeutic interventions based on the notion of “leading by example,” whereby informed practices supported by evidence-based scientific recommendations (in our case, not only in areas of psychological assessment and treatment, but more specifically in physical exercise and nutrition) are directly demonstrated in person to the patients in the context of a group setting. Beyond standard deviations and outliers, and other variables, including statistically relevant effectors within the placebo versus nocebo-effects parameters, are therefore important to emphasize the importance of positive reinforcements in the form of empowering, self-nurturing, self-awareness-raising strategies, common to standard practices in positive psychology, motivational interviewing,²⁷ and health/wellness coaching.²⁸

Limitations

The primary limitations of this study were the relatively small sample size ($N = 100$) versus specificity of inpatient psychiatry population (psychiatric vs general medical needs/nondiagnostic identifiers). Less significant limitations included: (1) room/space restriction due to the

architectural structure of the inpatient psychiatry units were the study has been conducted, (2) variations and differences in attendance rates and survey completion due to psychophysical comorbidities and complications, and (3) ontologically relevant factors connected to the complexity of diagnostic presentations and their effect on the ability to interact and respond appropriately to the expectations of both exercise and nutrition sessions.

Future Studies

In addition to verifying the reliability of the results and outcomes evidenced via surveys and questionnaires administered to the patient population in larger groups over a longer course of treatment (also inclusive of the same level of comparative analysis provided by focus groups research studies, aimed at monitoring patient-provider relationship across multidisciplinary treatment team members), more studies will be needed to better identify specific exercise types, sets, repetitions, routines, as well as specific nutrition versus dietary recommendations, particularly in the context of an individualized, patient-centered strategies, which takes into account physical structures, strengths, and limitations, as well as ethnic, cultural, and religious backgrounds.

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Declaration of Conflicting Interests

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