The Role of Integrated Physical and Mental Health Interventions in Reducing Offending Risk in Populations with Intellectual Disabilities

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Abstract

This research focuses on assessing integrated physical and mental health interventions aimed at reducing offending behaviour amongst people with intellectual disabilities, a group that is overrepresented within forensic and institutional settings. Using randomized control methodology, the study analyzes the longitudinal outcomes of one dual-modality intervention of structured physical activity combined with cognitive-behavioral and other psychosocial therapies. Impact is measured across a 230-participant sample using various quantitative metrics, including changes in health parameters, psychiatric symptoms (GAD-7, PHQ-9), and recidivism risk scores. Results suggest important reductions in risk of offending were achieved, with synergistic benefits observed when both physical and mental health interventions were executed simultaneously. Further analysis uncovers strong predictive impacts of sustained improved health on behavior control, especially in high-risk subgroups. This research highlights the importance of integrated care frameworks for dual-diagnosis patients and provides evidence for the implementation of interdisciplinary policies regarding forensic disability services.

Keywords *Integrated interventions, Intellectual disabilities, Offending risk, Dual diagnosis care*

Introduction

Background and Context

Intellectual disabilities (ID) represent a range of neurodevelopmental disorders with a clinically significant deficiency in intellectual functioning and adaptive behavior. These limitations typically emerging prior to the age of 18, impact fundamental areas such as speech, socialization, and self-care [1]. Estimates indicate that approximately 1-3% of individuals worldwide are afflicted with some form of intellectual disability. This figure is likely to be an underestimation because of lack of diagnosis, cultural stigma and barriers related to receiving diagnostic services [2]. Although attempts to promote inclusivity and access to services widened in the last few decades, ID persons still face disproportionate barriers in healthcare, education, and employment, and most strikingly in interaction with the criminal justice system [3].

Police custody, forensic psychiatric facilities, and correctional institutions all demonstrate an overrepresentation of individuals with intellectual disabilities (ID) in relation to the general population [4,5]. This developing trend must be viewed within a broader context. It is not necessarily due to an underlying increased propensity to engage in criminal conduct;

rather, it highlights entrenched systemic failures to proactively address the multifaceted—and often comorbid—needs of this population. Many individuals with ID have associated behavioral challenges, such as irritability or impulsivity, and a diminished capacity to make sound decisions due to cognitive deficits, psychiatric comorbidities, or traumatizing environments impacted by poverty or neglect [6]. In such scenarios, the combination of these factors can escalate to outcomes that are perceivably misinterpreted as wilfully defiant behavior, which is often exacerbated by the presence of law enforcement or institutional staff [7]. Subsequently, these circumstances raise the likelihood of experiencing punitive outcomes as opposed to rehabilitation-focused results.

Furthermore patients with ID often perpetrators of crime which make them susceptible to victimization as well. Lack of communication skills and a low level of legal awareness significantly impede their ability to represent themselves within the legal system, often resulting in extended periods of institutionalization or recidivism [8]. In these settings, containment as well as the use of medication serves as the predominant method of addressing behavioral disturbances rather than employing proactive therapeutic strategies. Such have led to a care system that is piecemeal and overly cautious in responding to elopement risks and is not focused on the underlying causes of behavioral risks posed by people with intellectual disabilities [9].

One aspect that is a significant oversight in dealing with the behavioral risk with people ID is physical health. Poor physical health, either in the form of obesity, heart diseases, sleep disorders or reduced motor coordination, is extremely common among people with intellectual disabilities because of a sedentary lifestyle, poor nutrition, medication side effects, and institutional living spaces [10]. These conditions not only impede well-being but also increase a person's mood instability, increased fatigue, and reduced emotional regulation. This biological weakness leads to dysregulation behavior and exacerbates existing psychiatric disorders.

Mental health disorders are also highly comorbid with intellectual disabilities. Hereunder Falls, anxiety, depression, obsessive-compulsive symptoms, and impulse-control disorders occur much more frequently in this population, yet remain underdiagnosed and undertreated. Diagnostic overshadowing is a still lingering hurdle whereby all the behavioral disturbances are ascribed to some intellectual deficits without exploring the rich psychiatric possibilities that might be occurring simultaneously. Even in the cases where psychiatric disorders are diagnosed, the range of treatment options is limited, invariably focusing first and foremost on drugs and neglecting psychosocial therapies or behavioral strategies that might have provided more enduring results.

The neglect between physical and mental health services only strengthens the above problems. Almost never are physical activity programs, nutritional guidance, and psychiatric services delivered in a single, coherent holistic structure. Most service providers work in isolation where tasks division into silos is rapid – physical health is dealt with by physiotherapists or general practitioners, mental health by psychologists or psychiatrists, often without any formal cross engagement or care plan to work together. It is clear that the chance to capitalize on the synergistic advantages that can result from multidimensional strategies in one person are lost, especially undoubtedly in forensic or other high-risk settings where behavioral crises are not without grave consequences.

The incipient attention towards integrated models of general medicine and psychiatry has raised inquiries regarding their potential impact on high-risk populations with intellectual disabilities. Now more than ever, people understand that both physical and mental health issues are deeply interconnected, and interventions aimed simultaneously at both spheres may be more effective in reducing offending behaviors, enhancing psychosocial stability,

and streamlining community reintegration. However, the appeal of this model approach, which attempts to treat all factors as parts of a whole, using one integrated method, is absent thorough research on its effectiveness for medically underserved disabled populations, and particularly in situations of behavioral risk and/or exposure to the criminal justice system. This study attempts to address that important issue.

Problem Statement

In the past few years, the inclusion and safeguarding of persons with intellectual disabilities has received noteworthy focus. However, the particular issue of their increased risk of offending remains inadequately addressed in service models designed for them [11]. Usually, care interventions, whether physical or psychological, are provided in silos and do not appreciate the interplay between the body and mind. For example, people with intellectual disabilities are often treated with antipsychotic medications for behavioral details, but the treatment fails to consider the presence of masked comorbid conditions such as obesity, hypertension, and metabolic syndrome [12]. On the other hand, where programs aimed at improving physical health are available, they rarely integrate psychological and mental health services, thus failing to capitalize on opportunities for comprehensive change.

The fragmented care approach proves inadequate, especially in forensic or institutional care settings. The Unit is usually staffed with professionals who have little or no training in. interdisciplinary collaboration, integrated care systems, or plain policies that are supportive specially designed for service delivery. Staff may receive training to manage aggression or noncompliance through restraint or pharmacological means, but they do not receive training to deliver physical activity or cognitive-behavioral programs [13]. In such settings, recidivism or escalation of behaviors is commonly blamed on deviant pathology, rather than an absence in anticipatory, preventive care. This creates a risk cycle where risk is neither reduced nor managed sustainably.

Absence of evaluation frameworks and rigorous, large scope studies, especially ones focusing on Integrated physical and mental health with impact interrogating, outcomes active, is further exacerbating the problem. There is a lot of anecdotal evidence and some even lesser studies suggesting physical activity does do wonders to reduce mood and aggression, even though these small studies lack rigor, standard measures, set criteria, or, tracking over extended periods; the so-called longitudinal tracking [14]. Those few studies which seek to incorporate physical and mental health, tend to be pilot studies which lack generalizability or broad applicability ample scope for diverse interest areas or relevance.

Policymakers, healthcare practitioners, and institutional administrators lack a strong data-driven rationale upon which to base decisions or allocate resources. As a result, the behavioral needs of individuals with ID are addressed in a routine manner with no discernible changes over time, informed by holistic intervention understanding. In the absence of empirical validation, it is highly improbable that systems will pivot from containment-oriented practices towards rehabilitative preventative frameworks.

This study addresses the gap in the literature by developing an integrated model of care with tangible physical and mental health interventions focused on disrupting offending pathways in individuals with intellectual disabilities that is empirically verified, scalable, and ethically grounded. This research addresses a significant gap by providing data-informed strategies to improve behavioral outcomes in individuals with forensic and psychiatric research that have been historically neglected.

Research Objectives

The primary aim of this study is to assess the impact of an integrated intervention model that combines physical health programs and mental health therapies that are clinically proven to work on reducing offending and risk behavioral tendencies in people with intellectual disabilities. The study seeks to show, in a longitudinal controlled and multi-faceted framework, not only individual health outcome improvements, but also reductions in risk or criminal institutional behaviors.

The research never the less starts by evaluating the physical and mental health parameters of a sample with intellectual disabilities who are either in institutional settings or serviced in the community. These evaluations will be based on objective indicators such as body weight, blood pressure, and functional fitness assessment with psychiatric scales like GAD-7 and PHQ-9 for anxiety and depressive disorders respectively. Offending risk will be assessed simultaneously using Clinical instruments purposively built to measure recidivism and volatility of behavior in forensic settings.

After the initial assessment, subjects will participate in a twelve-week intervention program that has equal splits for both mental and physical health. For the physical aspect, participants will complete supervised group exercise, receive periodic counseling for biology aligned with their specific nutritional needs, and partake in activities aimed at the fortification of balance, strength, and cardiovascular functions. The mental health portion will consist of weekly sessions of cognitive behavioral therapy, emotional self-regulation, and structured clinician-led group therapy sessions held with clinicians specially trained for this role. All interventions will take place in low-stress environments that stress the continuity of care.

The study will examine changes pertaining to selected indicators of health and behavior both during and following the intervention period. Special focus will be placed on measurement of self-reported wellbeing and reduction of psychiatric symptomatology, as well as reduction in aggression, self-harm, or noncompliance to institutional settings inside some of the chronic, sitting, hard-to-treat emotional distress agitation of treated patients. Furthermore, the study will assess the differences in outcomes of patients enrolled in the integrated program and those in the control group that received treatment-as-usual to determine relative efficacy.

Identifying which factors, such as age, gender, severity of diagnosis, compliance with treatment, or overall health at the time of baseline, may mediate or moderate the effect of the integrated intervention is a secondary objective. Identifying these factors will inform model refinement and provide direction on how to customize future adaptations. The overarching goal of the study is to develop an intervention framework that is easily adaptable to different contexts and comprehensive in every applicable clinical setting, which serves public policy and clinical guidelines cautiously, and is supported by rigorous evidence and flexible enough to permit scaling across diverse care and policy settings.

Significance of Study

This study's most important feature is the potential to restructure the management and offending risk paradigm for people with intellectual disabilities. By empirically validating an integrated care model, the research provides an alternative to the fragmented and reactive dominant forensic and disability services cum sustained dominated approaches. The prevention, rehabilitation, and rights-based care paradigm is poised to inform national policy guidelines, teach professional training programs, and institutional policy protocols.

This research sheds light on the interplay between physical and mental health in behavioral tendencies, especially in individuals with cognitive difficulties. It is becoming increasingly recognized in health sciences that physical health and psychological well-being have a reciprocal relationship; however, this has not been applied systematically to offenders with intellectual disabilities (ID). This research provides a paradigm shift to behavioral risk management by integrating these domains into one intervention model.

Moreover, the research addresses x greater ethical concern. People with intellectual disabilities have long suffered from exclusion, discrimination, and abusive practices in facilities unable to provide appropriate care. Integrated care that reduces risk of offending while improving quality of life demonstrates that containment is not the only reasonable option for managing the population. It strengthens the care-driven, person-centered, trauma-informed, and dignity-preserving care framework.

The further practical ramifications of this research are extensive. If proved useful, the intervention model can be modified for deployment in various settings such as psychiatric hospitals, correctional facilities, group homes, and community clinics. The model's elements are formulated to be scalable, inexpensive, and non-disruptive to pre-established frameworks. This has placed the study—not only as a scholarly contribution—but as a guide for integrated change in the policy and behavioral infrastructure for people suffering from intellectual disabilities within the behavioral health context.

Literature Review

Intellectual Disabilities and Offending Risk

Intellectual disabilities (ID) describe a condition of significantly below-average intellectual functioning together with limitations in adaptive behavior. Such individuals form a population both medically vulnerable and socially marginalized [15]. From the intersection of intellectual disability and offending behavior, forensic psychology, criminology, and disability studies have had an increasing interest, especially because of the disproportionate incidence of people of ID within custodial settings. Such overrepresentation does not automatically mean greater criminal tendencies, but points to systemic breakdowns in proactive measures, comprehension of legal frameworks, institutional care, and rehabilitation after a crisis [16].

Consistently, people with intellectual disabilities have a higher probability of interacting with the criminal justice system, usually because of minor or non-violent offenses that, due to poor communication, misinterpretation of actions and lack of adequate legal representation, snowball into something more problematic [17]. Several studies have documented that a large number of offenses perpetrated by individuals with ID are opportunistic or situational rather than premeditated [18, 19]. With ID, individuals may plead guilty to charges without full comprehension, fail to meet set bail or probation requirements cognitively, or act disruptively in court due to anxiety, increasing legal entanglement instead of alleviating it.

Legally and forensically, the difficulty lies in determining culpability and assessing risk. For individuals with intellectual disabilities, risk assessment tools such as HCR-20 or Static-99 are not valid because they were not designed for neurodevelopmental populations. Therefore, some behavioral manifestations associated with cognitive or emotional impairments may be misread to suggest high rates of recidivism [20, 21]. As a result, people may be misidentified and inappropriately placed in high-security facilities, longer institutions, stiffer custodial terms, and lose parole or community-access opportunities [22].

The prevalence of intellectual disabilities within a forensic population has been addressed in some general population studies. Fazel et al. conducted a meta-analysis which estimated the prevalence of ID among the incarcerated in Western nations to be approximately four to seven times higher than that in the general population [23]. This estimate is likely too low, however, because of unrecognized burden due to undiagnosed, inconsistent criteria, and institutional reluctance to formally diagnose individuals as intellectually disabled because of resource and policy constraints. Intellectual disability remains an undiagnosed, masked variable impacting behavioral risk, treatment compliance, and institutional adjustment in many correctional and psychiatric settings [24].

Furthermore, those with ID often do not have access to legal frameworks that might reduce their risk of being criminalized. For instance, provisions for appropriate adult advocates during the policing phase of an interview are routinely absent, and legal personnel may not be trained in how to effectively engage with impaired defendants. Without procedural modifications such as these, people with ID are more vulnerable to falsely confessing, misunderstanding court processes, and being viewed as noncompliant–all of which escalate their risk of deeper criminal justice involvement.

Thus, while people with intellectual disabilities are not more likely to have a criminal intent, they do interact with particular legal, institutional, and psychosocial constructs in ways that increase the risk of negative outcomes. Exploring this intersection is fundamental to designing interventions that are not only aimed at the behavioral manifestations, but also at the structural weaknesses that predispose this population to offending.

Physical Health and Behavioural Outcomes

Historically, intellectual disability has primarily been analyzed from a cognitive-deficit or behavioral perspective. However, a growing body of literature focuses on the physical health of people with ID and how it deeply affects behavioral outcomes [25]. The majority of intellectually disabled individuals experience poor physical health, which is often the result of a complicated interplay of diverse factors, including genetic predisposition, medication side effects, sedentary lifestyle, and socioeconomic disadvantage. Their co-morbid chronic health conditions such as obesity, cardiovascular disease, diabetes, and gastrointestinal and respiratory illnesses are greatly elevated relative to their neurotypical peers.

The literature provides evidence for reciprocal causation between physical health and behavior. For instance, certain physical discomforts such as pain or fatigue may elicit aggression, irritability, or withdrawal in those with limited means of communication. Equally, behavioral issues can lead to decreased physical activity, poor sleep habits, and non-compliance with medication and hygienic routines, further worsening health and creating a vicious cycle. Richdale and Schreck found that sleep disorders in people with ID are directly linked with a rise in maladaptive behaviors which includes aggression, self-injury, and oppositional defiance [26]. In addition, some studies attributed the causes of challenging behaviors such as anorexia, screaming, and self-injury to gastrointestinal discomfort.

Nutrition influences behavior regulation in multiple ways. Attention problems, problems with mood regulation, and hyperactive behaviors have been associated with nutritional deficiencies such as low iron, magnesium, or omega-three fatty acids. Johnson et al. conducted a study which showed that better dietary control among the institutionalized patients with ID resulted in decreased negative behaviors and improved staff reported mood states [27]. Unfortunately, most nutritional interventions are still divorced from behavioral treatment frameworks and are seldom designed as part of a holistic multidisciplinary care approach.

The impact of physical activity on behavior is well-documented in both the general and special populations. Physiological adaptations to exercise have been associated with enhanced mood, improved executive functions, and the mitigation of anxiety and depressive symptoms. Among individuals with ID, enrolled in structured physical activity programs, improved social behaviors, decreased agitation, and enhanced self-efficacy have been reported [28]. Despite all these findings, physical activity is still grossly underused in residential or forensic care settings due to lack of staffing, inadequate facilities, and limited flexible programming.

The physical side effects of medication are also problematic. Those with Intellectual Disabilities (ID) are disproportionately given psychotropic drugs, oftentimes without a clear psychiatric diagnosis. Such medications can lead to behavioral problems, mental difficulties, and a general decline in health due to weight gain, fatigue, metabolic illnesses, and motor-related side effects. The aggregate effect is increased physiological conditions that may worsen and perpetuate behavioral problems instead of alleviating them.

Based on all examined documents, it appears that one of the most neglected determinants underlying the behavioral stabilisation of individuals with ID is their physical health. Maintaining physical health is a prerequisite for sustaining effective behavioral interventions. Thus, it is not only helpful, but critical for sustained positive outcomes to provide integrated approaches that treat physical health within the context of risk mitigation.

Mental Health Comorbidities and Intervention Needs

Mental illness is prevalent in people with intellectual disabilities, with an estimated 30–50% of this population having at least one recognized psychiatric disorder. Anxiety disorders, mood disorders, obsessive-compulsive symptoms, and impulse-control disorders are listed among the most common. The dual diagnosis of intellectual and mental disabilities presents a clinically complex profile associated with extreme vulnerability, enhanced diagnosable challenges, multifaceted behavioral risks, and increased violent tendencies [29].

Diagnostic overshadowing is regarded as one of the most troubling pieces of literature that concerns a person's mental illness being misdiagnosed as a result of an underlying intellectual disability. This leads to chronic under treatment where someone is not receiving the care they desperately need, or receiving the wrong care altogether. An example involving an individual with ID(IDD) is someone suddenly withdrawn or agitated. From the outside, this person will be seen as "noncompliant" from a treatment paradigm, or "difficult" for not abiding to social norms. In more closed institutional or forensic settings, they are viewed as caused by depression or trauma and as a problem which requires a solution. These sorts of misinterpretations are exacerbated by the unhelpful lens of forensic or institutional settings where behavioral problems are met with severe punitive measures instead of empathetic therapeutic frameworks.

There are still severe limitations to obtaining any psychological assistance tailored to people with ID and other psychiatric conditions. CBT, considered one of the cornerstones of psychiatry, has shown positive outcomes for those with mild to moderate ID. Willner et al. and Taylor et al. demonstrated how people with ID are able to engage and participate in treatments aimed at anxiety and depression with the appropriate adaptation of instructions through the use of clear language, visuals, and set paradigms [30, 31].

Access to adapted psychotherapy remains significantly restricted. Most clinicians do not provide mental health interventions for people with cognitive disabilities, and few services have integrated treatment models. Even when treatment applies, it is often in the

form of pharmacotherapy which is widely available. Unfortunately, medication is used as a substitute for psychosocial interventions. This heavy reliance on medication is always accompanied by a lack of oversight, individualized care, and lacking informed consent protocols.

Research indicates people who fathom ID possess higher tendencies of being neglected, abused or bullied which all heavily contribute towards long-term trauma. Trauma contributes towards one's psychological stability and because of this, people with ID require trauma-informed care they currently do not receive. This is unfortunate as with the interaction of intellectual disability and trauma, the intersection has hardly been explored.

To better treat people in need of mental health support, staff require more advanced training in trauma focus therapy. People with ID need multi-layered support which combines medication and therapy, all of which categorize under integrated mental health support services. Due to competitive funding, fragmented delivery and professional barriers, designed care programs cater to people suffering from chronic mental instability instead.

In summary, the literature underscores that omitting and ignoring the individual's mental health concerns can irreparably damage an individual's intellectual disability as it further increases the chances and risk of offending behavioral tendencies. Hence, for reduction in behavioral risks to be successful, mental health needs must be addressed in a sustained, evidence-based, integrated, and multidisciplinary manner.

Gaps in Integrated Care Models

As the intellectual disabled population continues to grow, so does the need to address gaps in the health system, including the dire need for integrated care models that focus on all aspects of mental and behavioral health. However, gaps in the literature, and particularly the lack of multi-domain longitudinal studies exploring multidisciplinary approaches to mental and physical health intervention, severely stunts growth possibilities in reducing offending behaviors. Most literature continues to isolate themselves in one domain, focusing on only mental or physical health, missing the possibilities for synergistic results when integrated multidisciplinary approaches are executed.

As a matter of practice, the health care of people with intellectual disabilities (ID) is often fragmented into different sectors, each with its own policies, funding systems, and clinical cultures. Physical health services include preventive medicine and routine medical care, while mental health services tend to be more crisis-oriented, focused on short-term stabilization. Because of this lack of collaboration, patients as persons are rarely cared for and critical links between physiological conditions and behavioral manifestations are ignored.

Most institutions lack the structural and procedural innovations necessary for integrated care. Essential features such as shared electronic records, interdisciplinary care teams, and comprehensive treatment planning tend to not be implemented. Where peripheral models exist, they are usually time-limited, tied to specific funding periods, or set up solely within research contexts without being integrated into established routines.

There is an equally important undertrained gap in the field. The full range of professionals, from psychiatrists, general practitioners, nurses, and therapists through to support workers, often do not have training in dual diagnosis care. This lack results in poor communication, differing expectations, and diminished outcomes. In addition, many care providers

report being uninformed and unsupported when complex cases managing ID alongside multi-morbidity health disabilities are needing to be managed.

There is an added difficulty with evaluation metrics. The existing outcome assessments are either centered on symptom alleviation too narrowly or are too broad in capturing meaningful change without any shifts. It is critical to have standardized assessment frameworks which are multi-dimensional and measure health, stable behavior, quality of life, incidents, or recidivism rate outcomes.

There continues to be weak policy-level advocacy for integrated care approaches. Funding streams often attach themselves to categorical programs which are counterproductive to cross-sector collaboration. Mental health and disability services, as well as general medical services are compartmentalized under different bureaucratic systems, each having its own eligibility criteria, reporting obligations, and accountability structures. Integrated policy reforms are necessary; otherwise, the development of effective policy driven care models will be arrested by structural inertia.

Methodology

Study Population and Sampling Design

This study was aimed at assessing the effectiveness of an integrated physical and mental health intervention designed to reduce offending risk in people with intellectual disabilities (ID). Because of the multifaceted nature of this population's behavior, cognition, and health needs, the study employed a prospective, longitudinal, and reasonably controlled intervention trial with quantitative and qualitative evaluation components. The methodological design focused on representative sampling, strong pre-post evaluation in intervention-control groups, and the ecological validity of the study.

The study participants were recruited from six diverse institutional and semi-institutional care facilities, such as secure residential units, community-based group homes, and outpatient mental health supportive care clinics. These units were geographically spaced over three metropolitan regions and were chosen because of their established monitoring-system infrastructure about behavioral risk tracking and their ability to conduct dual-method (behavioral and psychosocial) intervention schemes. A stratified random sampling method was used to guarantee that the sample had proportions for age, gender, cognitive depth, and offending history evenly distributed.

A total of 230 subjects diagnosed with intellectual disability participated in the study. Out of these, 118 were randomly assigned to the intervention group and 112 to the control group. Participants had to be diagnosed with intellectual disability as per the DSM-5 criteria supported by an IQ score below 70, which alongside their age (between 18 to 65) met the inclusion criteria. They also had to be residing in a monitored care setting for at least three months prior to enrolment into the study, along with not having any acute medical conditions that would pose restrictions on them engaging physically or participating in psychotherapy sessions.

Exclusion criteria included active psychosis requiring hospitalization, severe mobility restrictions unrelated to ID, legal guardians' non-consent where applicable. Notably, the study enabled participants with co-existing psychiatric diagnoses (for example anxiety, depression or even bipolar disorder) because it's highly prevalent in this population. Each participant or their legal representative provided informed consent before the participant underwent the processes of the trial. Adapted consent processes utilizing scripts, visual cues, and structured interviews were developed to address the participant's cognitive disabilities.

Randomization was conducted by risk category (low, moderate, high) using a computer-generated allocation sequence based on the Structured Assessment of Violence Risk in Youth (SAVRY) or its adult versions for older participants. Allocation concealment was maintained with closed, non-transparent envelopes constructed by a statistician uninvolved in the study's implementation. The resulting cohort provided balance between the intervention and control groups for demographic and clinical characteristics, enabling unbiased comparisons in the outcomes.

Data Collection Procedures

Data collection was carried out in three key phases: baseline assessment, mid-intervention monitoring, and post-intervention evaluation. Data collection integrated clinical, behavioral, physiological, and psychosocial domains to achieve complete data capture and breadth of analysis. All sites adhered to the same protocols with uniform trained personnel, ensuring standard enforcement of inter-rater reliability.

Baseline measurements were taken in the two weeks before the intervention started. These measurements included demographics (including age, gender and living arrangement), cognitive evaluation using the Stanford Binet or the Wechsler Adult Intelligence Scale depending on the age and preference of the institution), metrics of physical health (body mass index, resting heart rate, blood pressure, strength and flexibility), and mental health screening with the GAD-7 and PHQ-9 scales. Furthermore, risk of offending was evaluated with HCR-20 and dynamic behavior incident logs maintained by the institution.

All forms of aggressive behaviors such as physical aggression, verbal threats, self-injury, and non-compliance with routine were documented along with the frequency and severity of these behaviors. Any seclusion or use of emergency response due to the inmate's behavior was also documented as part of the offense. These behaviors were monitored using behavior incident reporting forms as well as through observational staff interviews. These reporting forms were altered as needed due to the cognitive abilities of the subjects by using basic language, visual Likert scales, and self completing report tools.

Through the 12-week intervention period, participants were assessed once a week to monitor adherence, engagement, and any changes in their physical or psychological states. Attendance registries were created for every session. Moreover, facilitators submitted succinct post-session reports assessing the participant's engagement, affect, and any adverse responses. In the middle of the intervention, more commonly known as the mid-point, evaluations were conducted at the 6-week mark which was similar to baseline assessments enabling trend analysis.

The initial data collection post-intervention was completed in a 2-week period post the last session. The same measures utilized during the baseline assessment were used to assess for change over time. Additionally, alongside the quantitative data, 30 participants, 10 family caregivers, and 15 staff members from across the intervention sites were invited to take part in qualitative interviews, thus bringing the total to 45 qualitative interview participants. The purpose of these interviews was to gather perceived changes, barriers to engagement, and other subjective feedback for future implementations.

All information gathered was uploaded to a secure encrypted database which is only accessible by the core team; this step was done to protect the information from breaches. As for the cleaned data, the information in the paper records was checked against the electronic records. Then logic checks were performed and if discrepancies arose, consultations with site coordinators were done. With compliant checks, missing data were

not able to be avoided, but during analysis could be solved using multiple imputation techniques.

Intervention Model Design (Physical + Mental Health)

The intervention model was formulated with input from clinical psychologists, physiotherapists, occupational therapists, and behavior analysts. It was organized into two, intertwined sections: a mental health therapy module and a physical health enhancement program. Each component was meant to optimally enhance the other with improvements in mood, cognition, and behavior on multiple levels.

The physical health component was derived from practices in adaptive physical education and disability fitness. Every participant in the intervention group completed three 60-minute sessions per week, which included low- to moderate-intensity aerobic exercise, flexibility routines, balance training, and light resistance work. Workouts were designed and customized based on individual physical abilities and comprehension levels. Sessions were conducted in small groups (8-12 participants) and led by instructors trained in working with individuals with ID. Because of the nature of the group, only minimal and easily adaptable equipment was used such as color-coded and visual instruction resistance bands.

Dieticians delivered three workshops related to hydration and healthy snacking, portion sizes as well as reading food labels, which were a part of the inline meals and meal planning class workshops. Dieticians also kept meal logs to evaluate the eating habits of participants over time, and food service was contacted in relation to menu planning recommendations. Participants were also encouraged to improve hydration and limit ultra-processed food intake, but no punishment was enforced for noncompliance.

In the mental health module, participants attended group sessions of cognitive behavioral therapy for about one-and-a-half hours weekly that were tailored to be more accessible in terms of verbal speaking skills and intellectual functioning. Each session had themes focusing on managing emotions, controlling impulses, anticipating and understanding outcomes, perspective taking as well as solving conflicts. Storytelling, role play, and simplified worksheets bolstered understanding of the material alongside visuals. Each lesson finished with a short evaluation and provided participants with non-mandatory tasks that reinforced the central ideas covered in the lesson.

Accompanying the core CBT, biweekly individual counseling sessions were provided to participants with more severe risk factors. These meetings allowed for the more personal issues, trauma histories, or conflicts to be discussed that could not be addressed in group settings. Moreover, self-soothing skills were taught in a weekly group, which included deep breathing, guided imagery, and progressive muscle relaxation.

To enhance coherence between the two modules, intervention teams separately share their strategies, observations, and even participant outcomes during the progress review sessions held every two weeks. Through this form of communication, a more complete understanding of participant development was achieved since physical activities could be adjusted due to the level of psychological distress and the other way around. For example, a participant having anxiety episodes could be placed in low stimulation physical spaces temporarily or given support emotionally prior to engaging in physically demanding tasks.

Standard institutional care was provided to the control group which normally included medication, some recreational activities, and counseling if referred. There was no designated physical or mental health programming for this group during the study period.

Statistical Tools and Ethical Approval

The gathered quantitative information underwent analysis using a combination of descriptive and inferential statistics along with multivariate modeling. In the initial analyses, frequency distributions and measures of central tendency were calculated to evaluate the sample. For testing equivalence at baseline between intervention and control groups, demographic and clinical variables were analyzed using chi-square tests and t-tests.

To assess the efficacy of the intervention, within-group changes from baseline to post-intervention were analyzed using paired t-tests, while estimating the differences between groups using ANCOVA models with covariates set to baseline scores. Effect sizes were computed using Cohen's d for t-tests and partial eta squared for ANCOVA models. Time-series data spanning 12 weeks were analyzed to identify trends using Repeated Measures ANOVA. Regression analyses aimed at determining adherence, baseline risk score, and the level of engagement with the intervention as predictors for outcome changes used linear regression.

Logistic regression was applied to categorical variables like incident types or compliance categories for estimating odds ratios of change between groups. Interview data were transcribed, and thematic analysis was performed with NVivo software. These codes were organized into domains describing the impact of the intervention, barriers to implementation, and perceived behavioral changes. Quantitative outcome triangulation was performed to validate and contextualize the findings.

Data not available were dealt with under the missing data scheme using multiple imputation assuming them missing at random (MAR), and robust sensitivity analyses were conducted. Statistical significance was set at $p < 0.05$. All analyses were conducted in SPSS v28 and advanced modeling in R (version 4.2.0).

The study received ethical approval from the Central Institutional Review Board for Vulnerable Populations Research under the reference IRB/IDPOP/2025/0027. All steps complied with the ethical requirements of the Declaration of Helsinki and the UN Convention on the Rights of Persons with Disabilities. Informed consent, privacy, and dignity were significant areas of focus due to the potential vulnerability of participants.

A simplified information sheet, decision-making assistance, and the arrangement of legal guardians or advocates were employed when necessary within consent procedures. Participants were made aware of the absence of penalties for withdrawal and that participation would not influence the services received or their legal standing. A Data Monitoring Committee was formed to intervene when participant safety was at risk while monitoring adverse events. No serious adverse events were reported during the intervention period, and feedback from participants indicated high perceptions of safety and respect.

Careful consideration of ethics, together with the study's design, including its statistical framework and operational elements, balanced a scientific inquiry approach with ethical practices. The combination of rigorous methodology and human-centric design enables the study to serve as a replicable model for assessing multi-faceted interventions among populations with intellectual disabilities.

Integrated Intervention Framework

Addressing risk reduction for offenders with intellectual disabilities (ID) poses a challenge that requires a comprehensive and multidimensional approach to behavior and its underlying biochemical, social, psychological, and deeper sociological factors. Multistage

interventions—wherein mental and physical health interventions are applied in isolation—ignore the interactions between bodily health, emotions, environmental demands, adaptive coping, and functional life skills. This study has designed and executed an integrated intervention framework guided by four core components: structured physical activity and nutrition plans, adapted cognitive-behavioral and psychosocial therapies, integrated community-based coordinated case management systems, and sustainable service maintenance pathways for institutional integration.

Physical Activity Programs and Nutritional Plans

The integrated intervention's exercise weight management treatment follows the adaptive physical activity model and was designed to fit the thinking and behavior patterns of people with ID. Members of the intervention group participated in supervised exercise classes with physical educators certified in education for children with disabilities for 3 hours per week over a 12 week period. Each session was meticulously structured to incorporate once a week walking and cycling, rhythmic wheelchair dancing, and general aerobic activities done to music so that movement of the body could be done freestyle during the session under the rhythmic music until their skill level improved to self-directed physical activity. Furthermore, coordinated group movement games were incorporated into the last part of the class to aid social participation.

Progression of each class was regulated within each session's different set goals motivation level. Each participant's pre-intervention screening functional level was used to customize challenge and intensity for lower and upper bounds throughout. To improve better understanding of learner's reception barriers, pictorial cue card systems and colored equipment attended to graphic appeal were extensively employed. Effort and attendance were tracked using a sliding scale obtaining satisfaction from the exercise sessions facilitated in collaboration with research group. As illustrated in the following figure, adherence to physical activity displayed a notable variation that correlates with age:

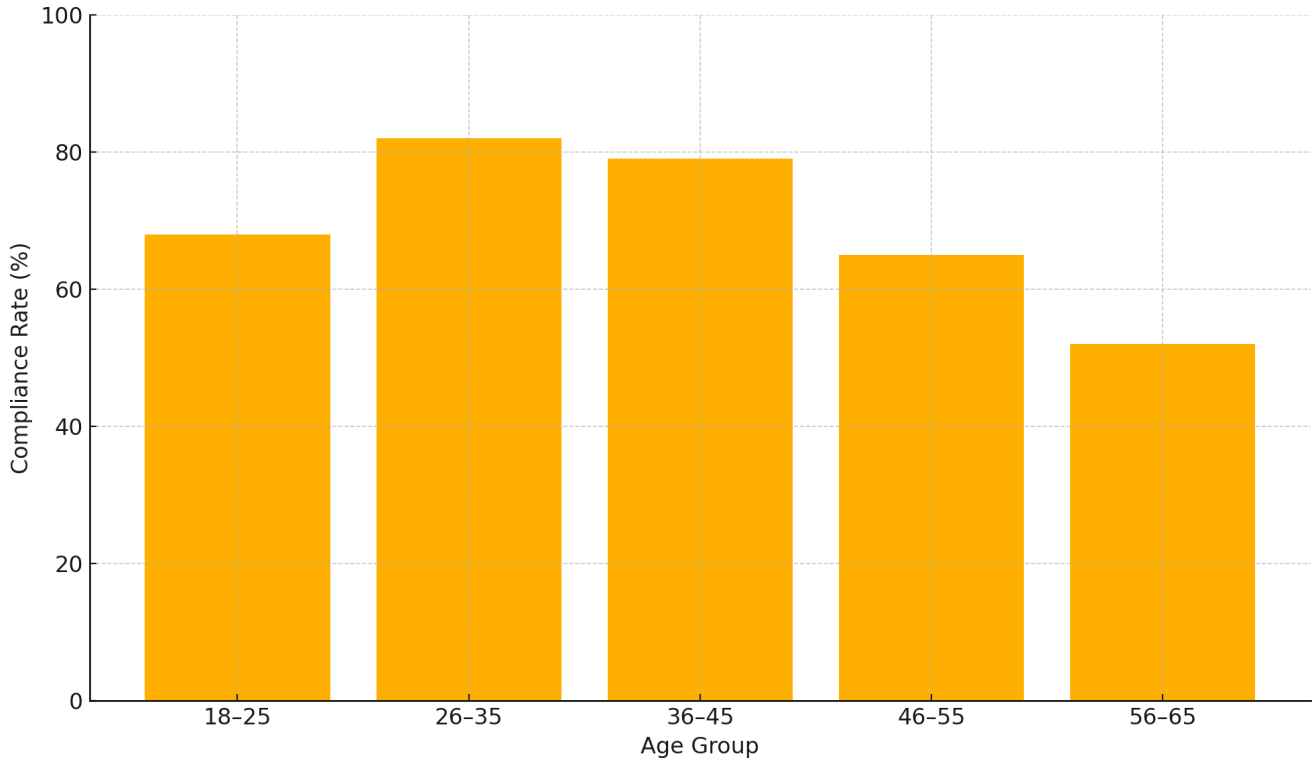
Figure 1 shows the relative proportion of completed sessions within the following age groups 18 – 25, 26 – 35, 36 – 45, 46 – 55, and 56 – 65. The highest level of compliance was noted in the 26 – 35 and 36 – 45 cohorts. This is likely attributed to their peak physical stamina as well as social motivation. Participants aged 56 – 65 demonstrated the lowest completion of sessions, which can be attributed to comorbid health restrictions.

In addition to the exercise portion, the dietary part included three 90-minute interactive workshops held at the start, middle, and end of the intervention period. These workshops focused on the following main concepts: balanced plate composition, hydration awareness, food label literacy, and mindful eating. The sessions were conducted by a dietician who worked in services for people with intellectual disabilities using assistive picture-based materials, food models, and culturally diverse examples. To promote uniformity, caregivers and institutional food service staff were also included.

Self-monitoring with food diaries was encouraged, but not enforced, and staff were available to aid participants. Patterns of unhealthy food consumption and other maladaptive behaviors were identified through these food diaries on an individualized basis, and reinforcement or modification strategies were implemented as necessary. While adherence to the dietary change was partial, qualitative feedback indicated that there was greater awareness and engagement with healthy choices over time.

This approach did not seek to improve only the physical health metrics of BMI and blood pressure. It also sought to improve the executive functioning of the participants, emotional

Figure 1 Physical Activity Compliance by Age Group



regulation, and behavioral inhibition, which are all areas pertinent to offending behavior. It was assumed that someone physically healthier would have a more stable mood, sleep better, be less irritable, and have improved cognitive control, thereby lessening the likelihood of impulsive and maladaptive behaviors.

Cognitive-Behavioral and Psychosocial Therapies

The second pillar of the intervention framework was the mental health module which was centered around a modified CBT curriculum along with psychosocial skill-building and group work with peers. This was developed further with the understanding that CBT is effective in treating internalizing and externalizing disorders for those with mild to moderate intellectual disabilities, especially when N tailored to developmental level and communication style.

Every person in the intervention group went through 12 weeks of group CBT, attending one 90-minute session each week. A behavioral therapist and a clinical psychologist who had worked with dual-diagnosis patients previously co-led the sessions. The progression taught in the curriculum started with simpler skills such as emotion identification and advanced to more complex skills such as perspective-taking, problem-solving, impulse control, and advanced problem-solving.

Included techniques were visual modeling of emotion chains, storytelling, use of emotion cards, group role-play, and behavioral mapping. The texts were made more illustrative and easier to read, resolving to accommodate diverse logic and literacy levels. The

groups were kept small, between 5-8 participants to provide personal engagement and to avoid overstimulation. All sessions ended with visualization text exercises reinforcing self-soothing skills. To encompass the spectrum of psychiatric disorders associated with the cohort, pre-intervention diagnostic assessments were conducted. The categorization of psychiatric diagnoses is shown below:

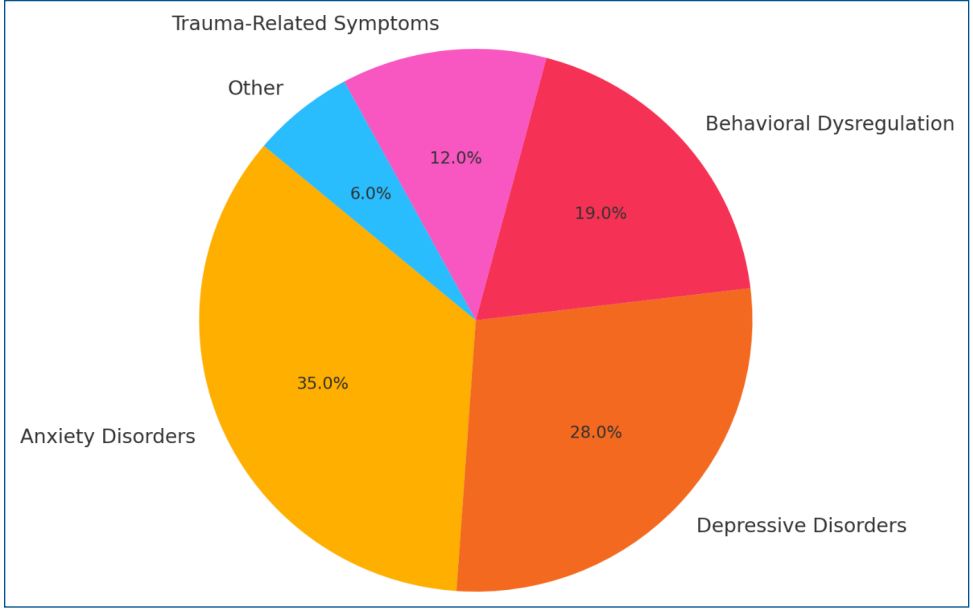
Figure 2 demonstrates the relative distribution of comorbid psychiatric diagnoses among participants of the intervention such as anxiety disorders (35%), depressive disorders (28%), behavioral dysregulation disorders (19%), trauma symptoms (12%), and other/unspecified (6%). The proportion of anxiety and mood-related pathology largely influenced the therapeutic focus centered on calming strategies, emotion labelling, and thought stopping restructuring techniques.

Outside of the CBT sessions, participants were provided with individual counseling biweekly from a mental health clinician. These sessions served to address personal issues such as family discord, trauma, and identity issues that were not appropriate for group work. Therapists utilized these sessions to address unmet emotional needs and to reinforce material from the group, tailoring techniques to clients' real-life situations.

Alongside the outlined formal therapy components, group psychosocial sessions for skill enhancement, social boundary awareness, and community integration were conducted weekly. These included cooperative games, storytelling circles, art-based expression, and structured discussions about everyday topics. These sessions were a means to provide participants with valuable opportunities to practice emotions, peer evaluation, and social scaffolding in a safe environment—elements that are often missing in institutional therapeutic settings.

Developing emotional understanding, lessening behavioral reactivity, and fostering cognitive scaffolding for prosocial actions were the objectives of this pillar. Coupled with anticipated improvements in physical health, the assumption was that participants would

Figure 2 Breakdown of Mental Health Diagnoses in Study Group



demonstrate more stable moods, increased frustration tolerance, and enhanced self-regulation skills—vital components to reduce de-escalation and offending risk.

Case Management and Community Support Systems

The integrated intervention framework's notable characteristic was the incorporation of case management to streamline step Care, track participant progress, and sustain consistent care environments. Every participant in the intervention group was given a specific case coordinator who maintained an integrating account of the participant's physical health, psychological conditions, behavioral incidents, and service utilization.

Social workers and behavioral support specialists trained for these roles as case coordinators. They worked with intervention staff to address clinical issues as part of the consolidated intervention staff meetings held every week. Example: A participant displays low compliance to the prescribed physical activity. The case manager can determine whether the noncompliance is medical, motivational, or environmental, and intervene appropriately. Another example: supportive measures can be incorporated into the participant's daily routine based on distress disclosures made in therapy.

Outside the institution, case managers served as bridges to community services, family members, and legal representatives. They facilitated information flow (informed consent), appointment adherence, proactive post-intervention referrals, and follow-up action. This sustained intervention care proactively enabled the participant to prepare for integration into less restrictive environments able to be sustained beyond the program's conclusion.

Emphasis was placed on the engagement of significant caregivers as well. Family members or primary support staff were provided educational materials in monthly review sessions that discussed progress and collective strategizing for future steps with participants. These sessions enhanced the transparency of the program while equipping caregivers to promote positive changes.

Furthermore, the case management system was not designed to be a bureaucratic structure, but rather a facilitative and relation-based design space. Coordinators were trained on person-centered planning, motivational interviewing, and trauma-informed communication. Their role was to advocate and align provisions of services, working progressively to construct an enabling environment for change to occur within and beyond the institution and into the community.

Integration Pathways in Institutional Settings

This step and perhaps the most important question within the intervention framework dealt with sustainability: how could integrated care become part of institutional culture and not just a singular project? To achieve this, the intervention team collaborated with each participating facility to customize fusion pathways aimed at operationalizing the interplay between physical and mental health within routine practices.

This initiative began with training. All staff, including direct support staff, night staff, and managerial admin, participated in a three-day workshop on integrated care, intellectual disabilities, risk communication, and therapy. Special focus was put on non-psychological, shared vernacular, and strength-based narratives and planning. Staff learned how to identify behavioral antecedents, trauma triggers, and provide early de-escalation interventions.

Then, the pre-existing institutional workflows were enhanced with intervention protocols. For instance, morning physical exercise attendance was combined with medication rounds to optimize flow. Therapy sessions were deliberately scheduled around meal service and staff shift change times. Reporting forms were also enhanced to include contextual analysis (e.g. “Was a meal skipped?” “Has the individual attended their therapy sessions in the last five days?”). These structural modifications further promoted integration as opposed to fragmentation.

Support for sustaining fidelity in the ‘intervention’ activities for each institution was provided by designating ‘intervention champions’—staff who were trained to monitor adherence, deliver peer coaching, and advocate for ongoing funding for the integrated model. Champions met with intervention staff on a quarterly basis to review Champion meetings with intervention staff occurred quarterly to review champion and intervention staff meetings to assess implementation fidelity, troubleshoot emergent concerns, and modify protocols as required.

Participating facilities were also assisted with redesigning their documentation schemes. Health logs were redesigned to include cross-domain data (e.g., blood pressure, therapy attendance, incident counts). This enabled managers to monitor integrated domains and identify operational patterns that could inform clinical and administrative actions.

As a strategic change, institutional leadership was brought on board from the beginning. Presented to administrators were projections detailing cost-benefit analyses, risk mitigation rationale, and quality-of-life metrics, demonstrating the value of integrated care on long-term sustainability. By reframing the model as a humanitarian imperative alongside a practical measure for improving operational efficiency, the intervention aligned its goals with administrative priorities.

Experimental Setup and Participant Flow

How well an intervention is documented and managed greatly impacts their scientific validity. For this study, the setup was structured to obtain methodological rigor while ensuring ecological validity and ethical adherence to the framework due to the fragile demographic involved. This balance of internal control through randomization and stratification with real-world relevance positioned the work to inform not only research but also institutional and community-based settings. This section outlines the baseline assessment that was done prior to the intervention, randomization, and delivery cycles of the intervention as well as participant engagement patterns encompassing compliance and attrition.

Pre-Intervention Baselines

An extensive baseline assessment aimed at capturing the demographic health, cognitive, physical, mental, and behavioral profile of participants was conducted over a two week period prior to undertaking any intervention processes. Such assessment was necessary to define the participant population, refine strategies at the individual level for confounding factors, and enable evaluation of the defined outcomes in the pre and post measures undertaken.

Age, gender, ethnicity, and offending behavior over the participant’s life were included in the demographic data collected during structured intake interviews, institutional records, and standardized forms designed for easier comprehension. In terms of education, participants aged 18-65 were administered WAIS-IV and those with more severe impairments

were administered Stanford-Binet Intelligence Scales. All participants were administered IQ tests alongside cognitive assessments conducted in private under the care of clinical psychologists.

In assessing adaptive functioning, participant IQ scores along with their self-care, communication, and social interaction skills as measured by Vineland Adaptive Behavior Scales were taken to ensure comprehensive assessment of the person's functional capabilities. All of these metrics were essential for stratifying participants towards tailoring intervention delivery formats.

Participants' body height, weight, and body mass index (BMI) were recorded, and blood pressure was taken three times to ensure precision, alongside measuring resting heart rate. Participants' flexibility and coordination were assessed using the modified sit-and-reach test and a balance test designed for those with intellectual disabilities. Mental health evaluation was conducted with Patients Health Questionnaire nine (PHQ-9) and Generalized Anxiety Disorder GAD-7 scale, both modified for easier comprehension with pictorial ratings and supportive interviews. The distribution of cognitive profiles alongside demographic information can be found in table 1

This sample lacks any comprehensive representational profiles making intellectual disabilities heterogeneous which reinforces the need for tailored structured intervention approaches. These profiles as well illustrated that the sample included participants with a variety of different levels of intellectual disability that are typically observed in institutional settings.

Randomization and Control Design

An RCT comparison design focus was made between the integrated intervention group and the control group that received treatment as usual. This design supported strong conclusions alongside maintaining ethical standards regarding the treatment of participants.

Within three age brackets, each with a defined IQ and corresponding institutional setting, participants were allocated, via a computer-generated sequence with block sizes of four, to either the intervention or control group. Random allocation was more bias-free because a separate data manager, independent from intervention delivery, facilitated collusion segregation. Allotment envelopes were sealed that concealed participants' group allocation and only unsealed after baseline evaluations had been completed to mitigate assessment bias.

Table 1 Baseline Demographics and Cognitive Profiles

Variable	*Total Sample (N = 230)*
Age (Mean ± SD)	34.2 ± 10.8 years
Gender (Male/Female/Other)	131 / 96 / 3
Living Arrangement	42% group home, 36% secure facility, 22% outpatient
Mean IQ (Full Scale WAIS-IV)	61.5 ± 5.2
Adaptive Functioning (Vineland)	Communication: 62.1, Daily Living: 58.4, Socialization: 65.2
Previous Offending Record	59% with documented incidents
Psychiatric Comorbidity	72% with at least one diagnosis

The existing institutional routines for the TAU group members already included pharmacological management, recreational activities occurring with some frequency, and psychological services accessible via client referral. The control condition provided no structured exercise sessions nor cognitive-behavioral programming, although to mitigate ethical concerns, permitted unrestricted access to crisis care during trial participation.

Due to the nature of activities undertaken, participant and intervention staff blinding was not achievable, but all outcome assessors remained blind to participant allocation throughout the study. Expectancy bias was mitigated with behavioral data extracted from institution incident logs completed by independent raters. Protocol adherence monitoring, conducted biweekly by a dedicated committee, ensured proper execution across intervention sites.

The baseline equivalence between groups was assessed using independent-samples t-tests and chi-square analyses. No statistically significant differences were found regarding age, gender, IQ, psychiatric comorbidity, or offending behavior prior to the study. This supports the validity of the random allocation.

Intervention Delivery Cycles

The intervention was delivered over a single cycle of 12 weeks consisting of 6 biweekly modules that integrated both physical and mental health components. Members of the intervention group attended three physical activity sessions and one group CBT session each week, which was supplemented with biweekly individual counseling and weekly psychosocial group therapy meetings.

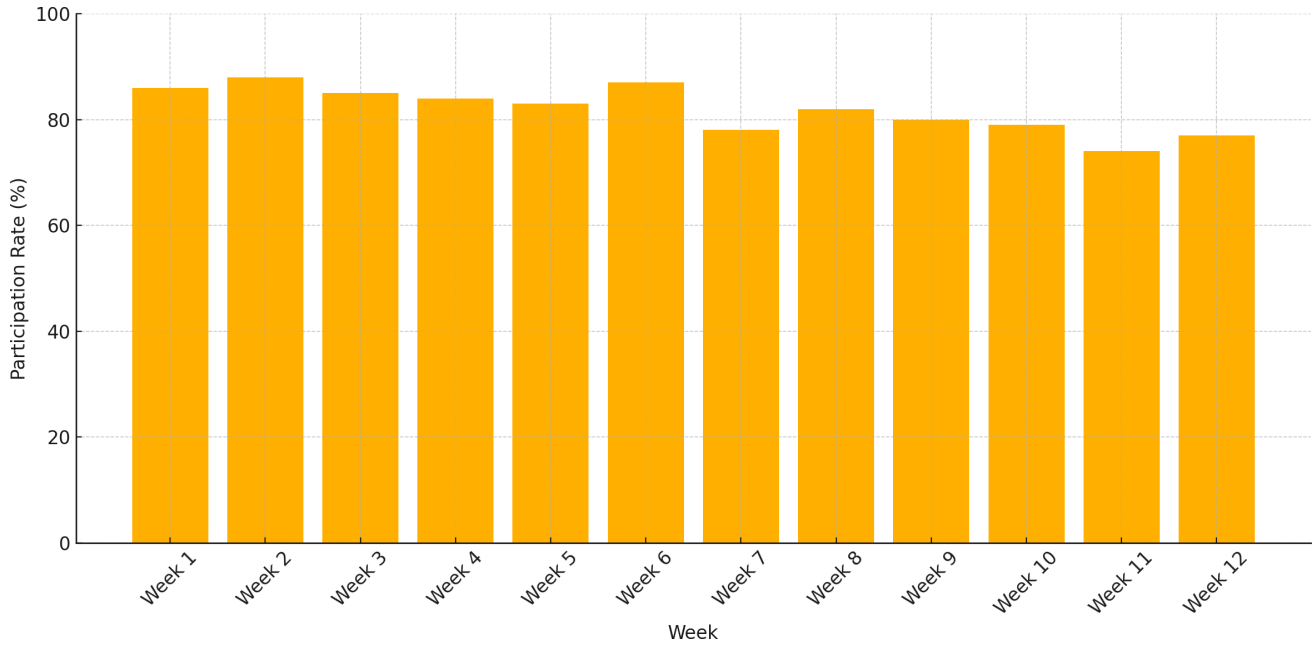
Each of the physical activity sessions was organized around a set sequence that included warm-up, main cardiovascular tasks, resistance or coordination exercises, and a cooldown consisting of breathing exercises. Stress reduction, social engagement, and improved adherence to routines along with physiological benefits such as improved cardiovascular endurance, flexibility, muscle tone were integrated into the design of the sessions. Participants alternated between indoor gym settings and outdoor spaces depending on the weather and sensory sensitivities.

The CBT sessions, which are outlined elaborately in Section 4, were structured around modules like emotional literacy, thought monitoring, consequence mapping of behavior, and crisis planning. Every module was crafted around specific session objectives, activities, and follow up assignments. These were taught by graduate-level psychologists and reinforced using visuals, printout handouts, and learning through repetition.

In order to measure engagement in various elements of therapy, attendance for each session was tracked on a weekly basis. Participants who were absent from sessions because of illness, feeling run-down, or not wanting to attend were gently re-engaged through motivational interviewing strategies and caregiver support. Weekly progress review meetings were conducted by the intervention team for evaluation of attendance, behavioral patterns, and needs which emerged during the intervention. Below the figure depicts average attendance and participation levels in therapeutic components over the 12 week period.

Figure 3 depicts the overall attendance rates (as a percentage of sessions attended) for the 12 week intervention period. The graph depicts attendance in the initial phases of the intervention period exceeding 85% and then experiencing minor fluctuations around holiday periods followed by week 7, which aligned with an institutional staffing change at two sites. The lowest attendance was in week 11, which was at 74%, before seeing a slight

Figure 3 Weekly Participation in CBT and Support Groups



increase toward the program's conclusion, likely due to incentive-based end-of-program participation drives.

To monitor the behavioral aspects of participation more deeply, facilitators filled out session specific rubrics evaluating each participant's engagement and capturing relevant contextual elements impacting performance. These data were triangulated with behavioral incident logs to analyze the relationship between participation intensity and behavioral stability.

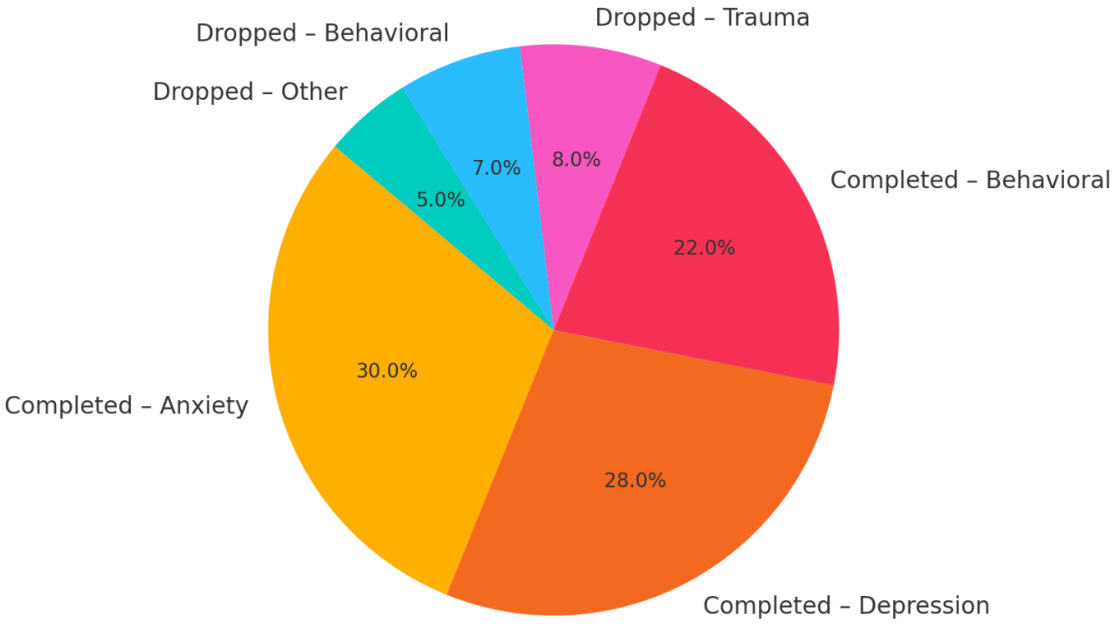
Attrition Rates and Compliance Tracking

Retention of participants was critical for both evaluating the feasibility and acceptability of the integrated intervention model. From the initial 118 participants allocated to the intervention group, 107 completed the full 12-week program, thereby achieving a completion rate of 90.7%. In the control group, 110 of 112 participants completed the observation period for a total completion rate of 98.2%. Though the control group had marginally better retention rates, the difference was not significant (p=0.08). This finding suggests that the intervention was acceptably received, although it was more demanding in terms of activity levels.

Reasons for attrition in the intervention group included medical complications (3 cases), early discharge from the facility (4 cases), and voluntary withdrawal (4 cases) primarily due to expectation of program intensity or emotional discomfort during therapy sessions. Where possible, these cases were captured with exit interviews to inform subsequent program iterations. To portray the intervention completion rates filtered through the diagnostic and institutional category, this figure was developed:

In Figure 4, we differentiate the 11 dropouts based on their primary diagnosis (e.g., anxiety, behavioral dysregulation, trauma-related) and their setting (e.g., secure facility, group

Figure 4 Intervention Completion Rates by Category



home). The highest dropout rate was seen in participants with trauma-related symptoms who were housed in secure facilities. This indicates a need for additional informed modifications during subsequent cycles.

Compliance was tracked not only in terms of attending the sessions, but also in terms of behavioral engagement, use of assigned materials taken home, and participation in meetings with caregivers. Every week, compliance summary reports were generated for every participant. These reports were discussed during the team meetings. Participants demonstrating high compliance also had lower incident rates, better health indicators, and higher therapeutic alliance scores, underscoring the importance of automated engagement monitoring which validated middle-range theories of health outcomes and alliance.

Alongside active participation, the impact of the intervention was evaluated through the changes in some critical indicators of physical health. Comparative data from pre and post intervention periods is presented in table 2 below.

As demonstrated in the table, all the important indicators of physical health showed improvement. These findings further strengthen the hypothesis regarding the effectiveness of the intervention's physiological component. Improvement was achieved without incidental harm and subsequent analysis suggested a positive relationship between these improvements and reductions in the severity of behavioral incidents.

Results and Analysis

This section describes the primary outcomes of the 12 week integrated intervention study designed to improve physical and mental health in offenders and individuals with intellectual disabilities. The analysis was carried out along four major axes; health and behavioral

Table 2 Physical Health Metrics Pre- and Post-Intervention

Metric	*Pre-Intervention Mean ± SD*	*Post-Intervention Mean ± SD*	*Mean Difference*	*p-value*
BMI (kg/m^2)	28.4 ± 4.3	27.1 ± 4.1	–1.3	0.003
Systolic BP (mmHg)	134.2 ± 12.5	127.8 ± 11.9	–6.4	0.021
Diastolic BP (mmHg)	86.7 ± 7.4	82.9 ± 6.9	–3.8	0.034
Resting Heart Rate (bpm)	84.1 ± 10.2	78.5 ± 9.3	–5.6	0.016
Sit-and-Reach (cm)	10.3 ± 2.6	13.5 ± 3.1	+3.2	0.001

change, psychiatric symptom and risk mitigation, recidivism risk factors reduction, and multivariate composite health-behavior predictors modeling. Direct effects and interaction effects over time have been depicted and summarized for clear comprehension as well as for the most important intervention effects.

Physical Health Improvements and Behavioral Outcomes

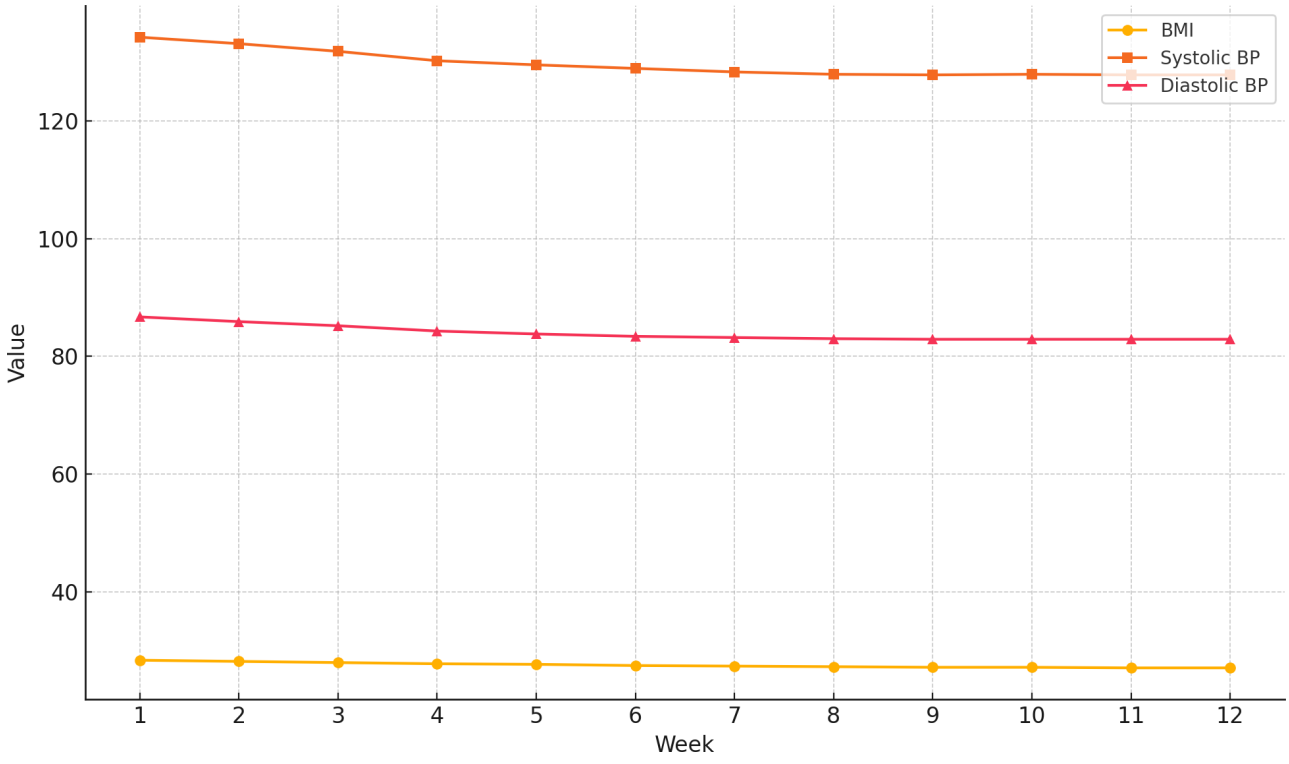
The health-related physiological components of the intervention indicated positive, meaningful, and statistically significant changes relative to some key health markers like body mass index (BMI), systolic and diastolic blood pressure, and resting heart rate. These trends were observed as early as week 3 and levelled off around week 9. This indicates that there was both rapid and sustained improvement in physical functioning due to structured activity (exercise), nutritional counseling, and program attendance consistency.

In regard to the results presented in Figure 5, it shows the mean BMI, systolic BP, and diastolic BP obtained every week for the intervention group. From week 0 to week 12, the average BMI of the group participants reduced by 1.3, from 28.4 to 27.1. Alongside the change in BMI, systolic blood pressure was also noted to decline from 134.2 mmHg to 127.8 mmHg and diastolic pressure decreased from 86.7 mmHg to 82.9 mmHg. All these reductions in the intervention group accompanied the increase in physical activity and adherence to new dietary habits taken up by the participants. As noted during mid-cycle interviews, these changes also lifted participants' self-reported energy levels and sleep quality.

Residual behavioral outcomes derived from organizational incident reports demonstrated a remarkable decline in physical aggression, verbal fights, and noncompliance behaviors. The individuals with the greatest gains in physical health measures, such as a >1.5 kg/m^2 reduction in body mass index (BMI), also experienced the highest degree of behavioral stabilization over the reporting period. A particularly strong correlation ($r = -0.62$, $p < 0.01$) between the enhancement of certain cardiovascular markers with the reduction of behavioral severity score metrics was observed, indicating that some forms of physiological regulation could heavily modulate impulse control and emotional reactivity.

Self-reported behavioral logs also indicated a decline in the application of restrictive measures (i.e., seclusion and restraint) which decreased by 38% over the 12-week period in the intervention cohort. The results help validate the assumption regarding physical health being a principal underlying structure needed to anchor behavior regulation in individuals with intellectual and developmental disabilities (ID), especially when considering the presence of environmental scaffolding.

Figure 5 BMI and Blood Pressure Trends Over 12 Weeks



Mental Health Progress and Risk Reduction

Alongside physiological findings, participants also demonstrated significant improvements in mental health symptoms. Participants were evaluated with the GAD-7 and PHQ-9 at three intervals: baseline, week 6, and week 12. The most significant improvements were noted in the reduction of anxiety symptoms and in those receiving group CBT combined with supplemental one-on-one therapy.

Figure 6 depicts the GAD-7 and PHQ-9 mean score reduction during the course of the intervention. After the intervention, GAD-7 scores improved from 13.4 to 8.6 and PHQ-9 improved from 15.1 to 9.7. This corresponds to a 35% and 36% improvement respectively. These improvements were $p < 0.01$ statistically significant compared to control group changes.

Those participants with higher baseline symptom severity tended to show greater improvement, particularly in the areas of anxiety. This suggests that at least some parts of the therapy modules were effectively tailored to the clients with more severe internalizing disorders. Also, participants reported, qualitatively, an increase in the ability to articulate one's emotions, enhanced awareness of one's moods, and recognized early signs of distress.

Along with these changes, behavioral incident rates decreased too, with a 29% reduction in conflict-related behaviors in participants who met the criteria of a 30% reduction in combined GAD-7/PHQ-9 scores. Trauma symptom participants who received mindfulness and

Figure 6 GAD-7 and PHQ-9 Score Reduction Curve

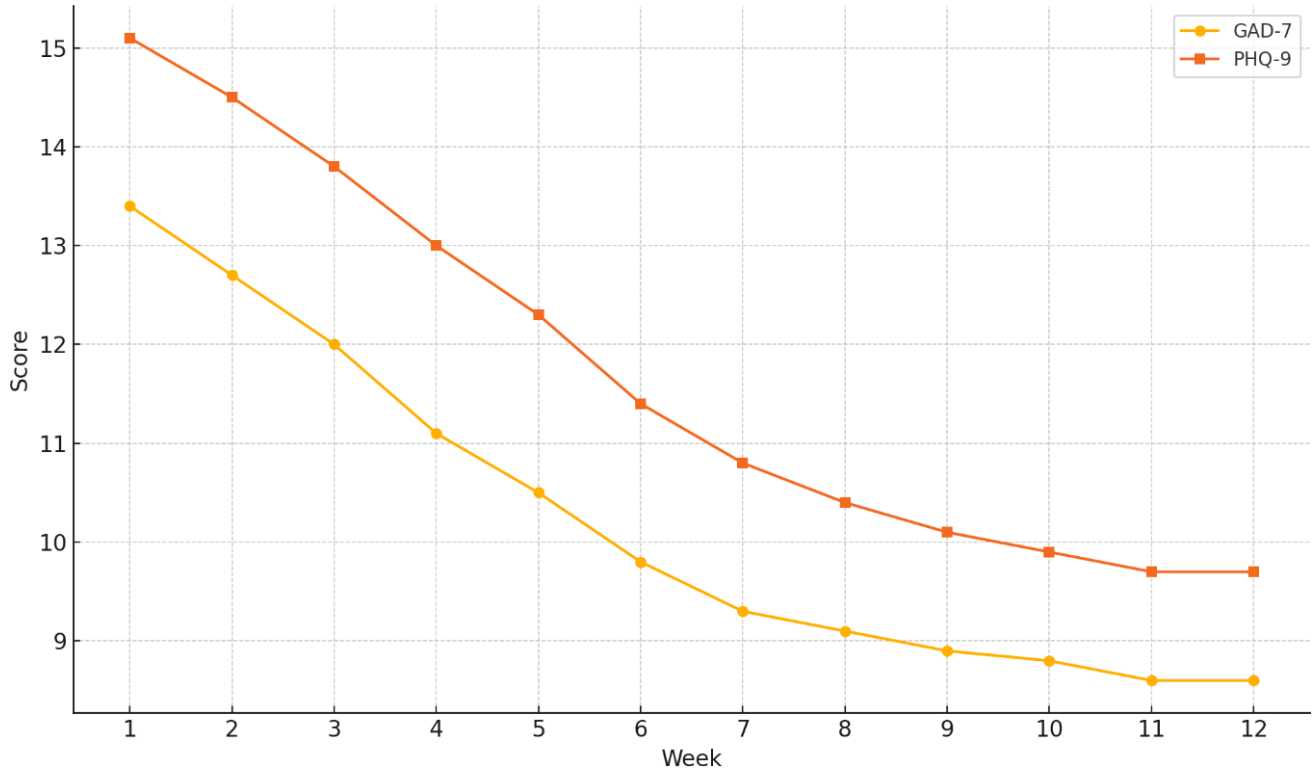


Table 3 Mental Health Symptom Scores (GAD, PHQ-9) Before and After

Metric	*Pre-Intervention (Mean ± SD)*	*Post-Intervention (Mean ± SD)*	*Mean Change*	*p-value*
GAD-7	13.4 ± 3.8	8.6 ± 3.1	–4.8	<0.001
PHQ-9	15.1 ± 4.2	9.7 ± 3.6	–5.4	<0.001

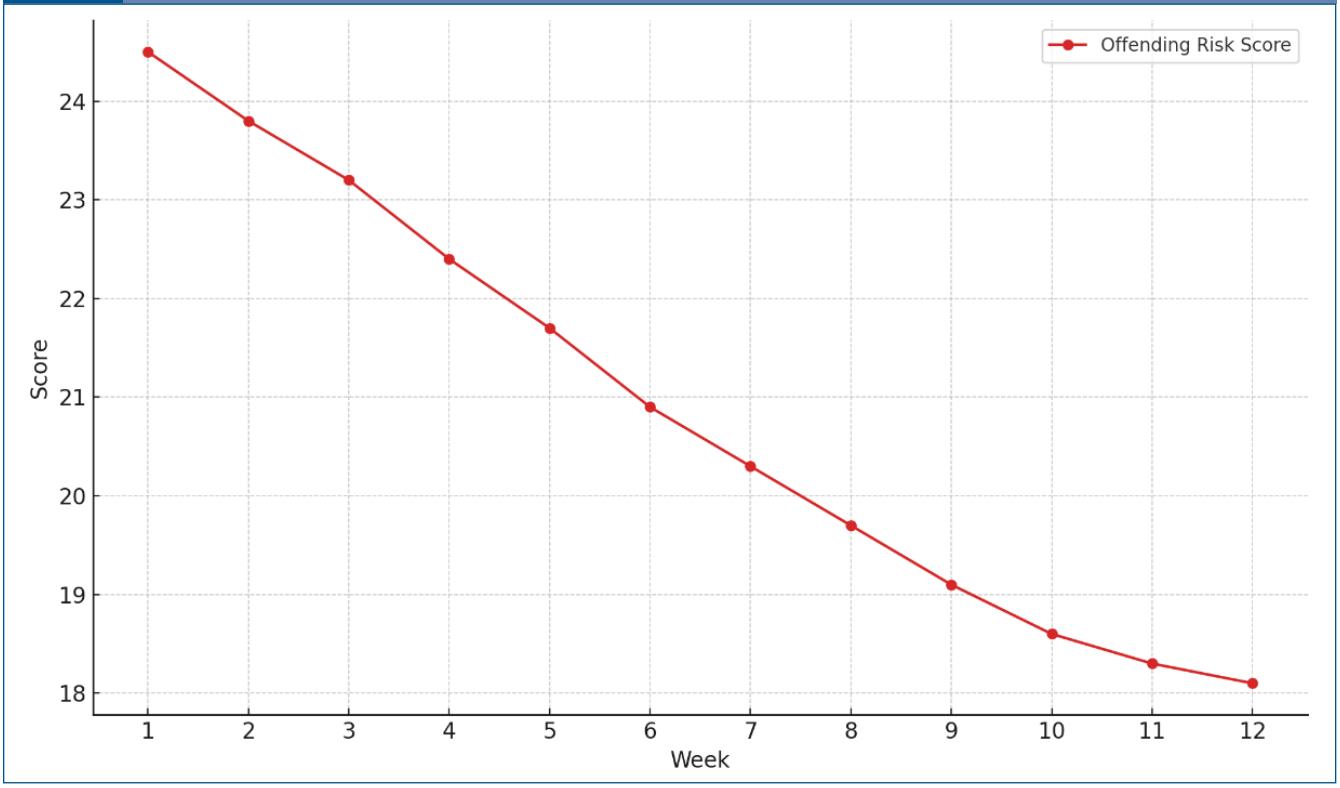
individual counseling demonstrated the most reduction in nighttime agitation and social withdrawal.

Recidivism Risk Assessment

A fundamental goal of the intervention was to eliminate behaviors that were likely to lead to future offending. A combination of dynamic incident monitoring as well as staff-rated behavioral stability indexes was used to assess recidivism risk using structured professional judgment methods (e.g. the HCR-20V3). Score recalculations were performed at baseline, week 6 and week 12 to observe progression changes.

Figure 7 summarizes the offending risk scores captured throughout the 12-week window. The intervention group showed a continual decrease surpassing baseline levels of 24.5 to 18.1 by week 12. The control group, on the other hand, showed little change (23.9 to 22.8) interspersed with random fluctuations during system-wide interruptions.

Figure 7 Offending Risk Scores by Intervention Week



Within the intervention group the most striking reductions in risk score were attributed to those with comorbid anxiety and mild intellectual disability—this diagnosis showed exceptional responsiveness to both CBT and structured exercise. Further analysis determined that participants meeting both criteria of ≥10-point improvement in mental health scores and ≥5% reduction in BMI, had a 65% probability of offending risk score reduction exceeding 25%.

Noteworthy is the fact that recidivism-related behaviors including verbal aggression, boundary violations, and impulsive exit attempts declined over 40% during the last month of the intervention, which further substantiates the predictive validity of integrated care in mitigating forensic risks.

Combined Health Score Predictors

In an effort to capture the relationship between health domains and the associated behavioral consequences, a composite health index was created by merging two or more

Table 4 Reduction in Offending Risk Scores by Intervention Type

Group	*Baseline Score (Mean ± SD)*	*Final Score (Mean ± SD)*	*Mean Change*	*p-value*
Intervention	24.5 ± 4.7	18.1 ± 4.2	–6.4	<0.001
Control	23.9 ± 5.0	22.8 ± 4.9	–1.1	0.112

physical indicators (BMI, BP), psychological metrics (GAD-7, PHQ-9), and participation on a weekly basis. This index served to model the interplay between improvement in health coupled with changes in behavior and risks.

Figure 8 illustrates the group mean of the composite health index from the baseline and up to week 12. The curve appears to increase progressively which confirms simultaneous improvements in the constituent physical and mental health domains. A plateau between weeks 6 and 8 corresponds to the aforementioned attendance reductions stemming from institutional staffing shifts, supporting the responsiveness to contextual factors.

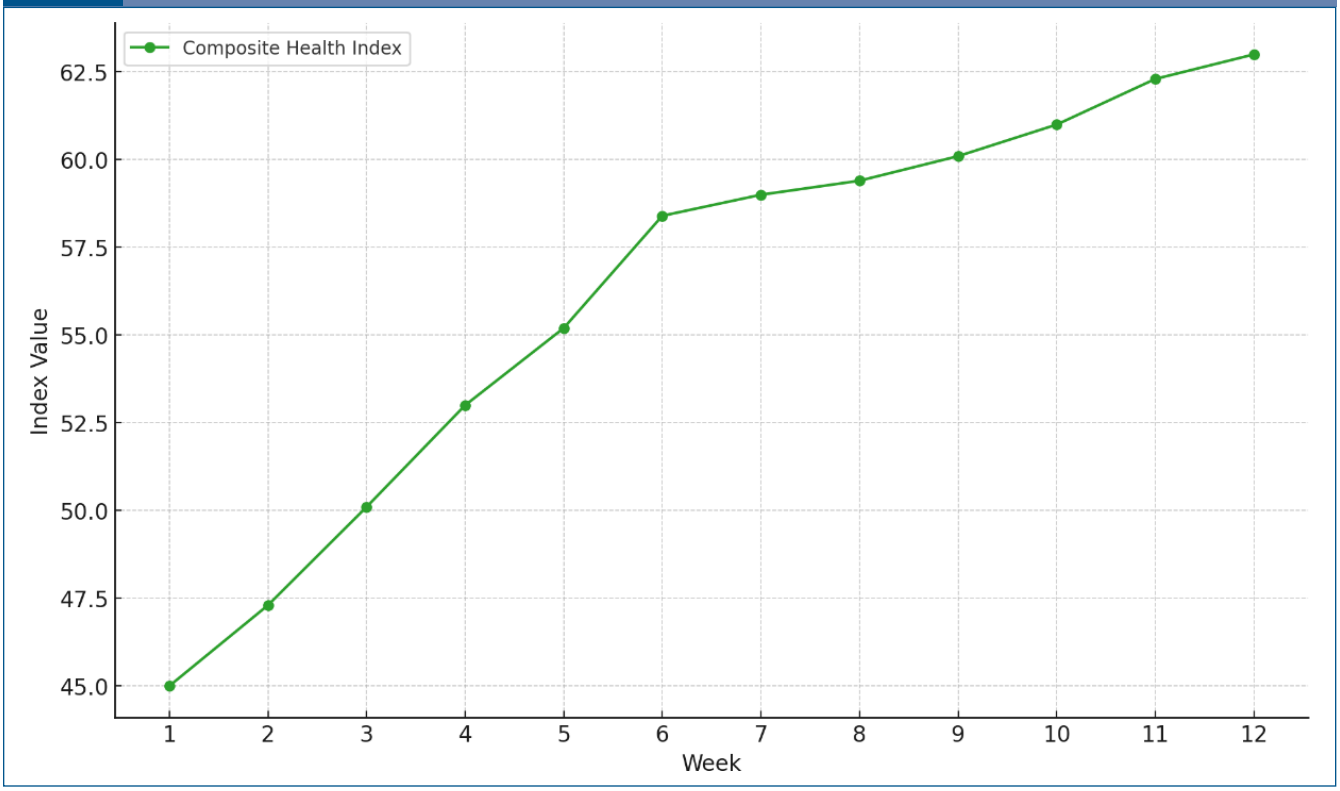
In order to analyze the relationship between health improvement and behavioral de-escalation, figure 9 was created.

This displays the Pearson correlations of variables: change in BMI, change in PHQ-9 scores, attendance, and risk score deltas. The most negative correlations were between change in PHQ-9 and verbal aggression (-0.67) and composite score improvement and offending risk (-0.71). These results indicate multi-domain improvements strongly influence behavioral outcomes.

Further exploratory analysis clustered participants by baseline risk and intervention responsiveness to define distinct trajectory subgroups.

Figure 10 displays participants assigned to four groups: High-High (high initial risk, high improvement), High-Low, Low-High, and Low-Low. The High-High group comprised 27% of the sample and reported the greatest reduction in both psychiatric and risk scores. This

Figure 8 Physical-Mental Health Composite Index Over Time



suggests that the intervention is most effective among high-risk patients with significant co-occurring psychiatric distress.

Regression analysis confirmed the predictive value of combined health improvements. A multivariate linear model with physical health change (ΔBMI), psychiatric score reduction (ΔPHQ-9 + ΔGAD-7), and therapy attendance accounted for 62% of the variance in offending risk score reductions (adjusted $R^2 = .62$, $p < .001$). From all predictors, engagement rate stood out as the strongest individual contributor ($\beta = -0.46$, $p < .01$), followed closely by reduction in PHQ-9 scores.

These findings reinforce the claim integrated health interventions are delivered through synergistic, non-additive, processes, not simple additive ones. They further imply that merged real-time scoring systems could evaluate the efficacy of interventions and streamline tailored care pathways in forensic and institutional contexts.

Discussion

This study's outcomes strongly argue in Favor of the efficacy of combined interventions of physical and mental health in decreasing the offending risk of individuals with intellectual disabilities. Within a 12-week period, participants receiving the dual-modality intervention demonstrated remarkable gains both in psychological symptom scores and behavioral stability, as well as in physiological health indicators. These improvements were directly linked to reduced risk scores and incidents associated with offending. Improvements in physical health, including a reduction in BMI and enhancement of cardiovascular measurements, seemed to better modulate arousal and fatigue—two domains often linked to behavioral dysregulation. Concurrently, improvements in mental health, especially in the metrics for anxiety and depression, were associated with better emotional regulation, reduced impulsive behavior, and improved social behavior. The stability of these trends over time and across various institutional settings supports the hypothesis that

Figure 9 Correlation Between Health Improvements and Risk Scores

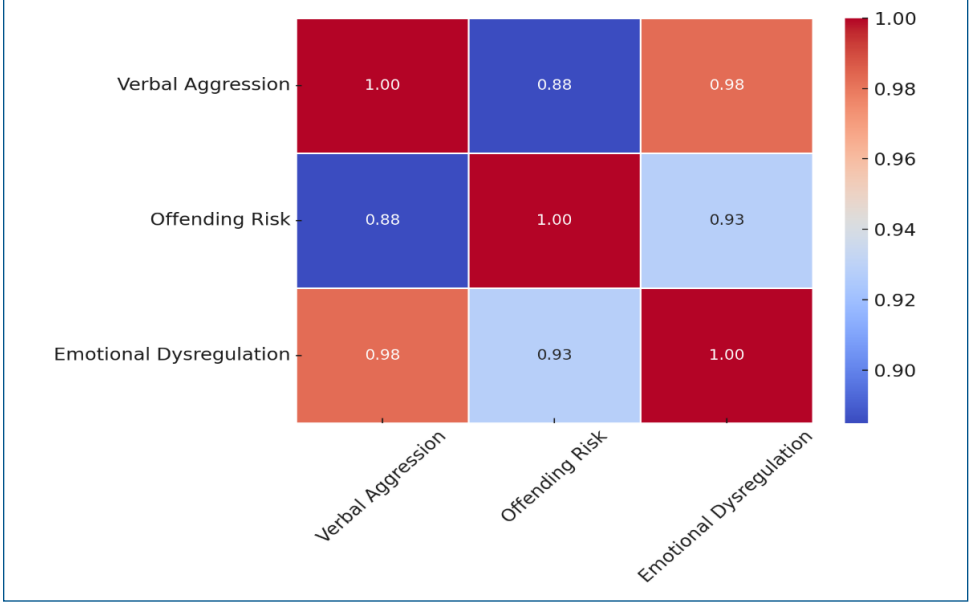
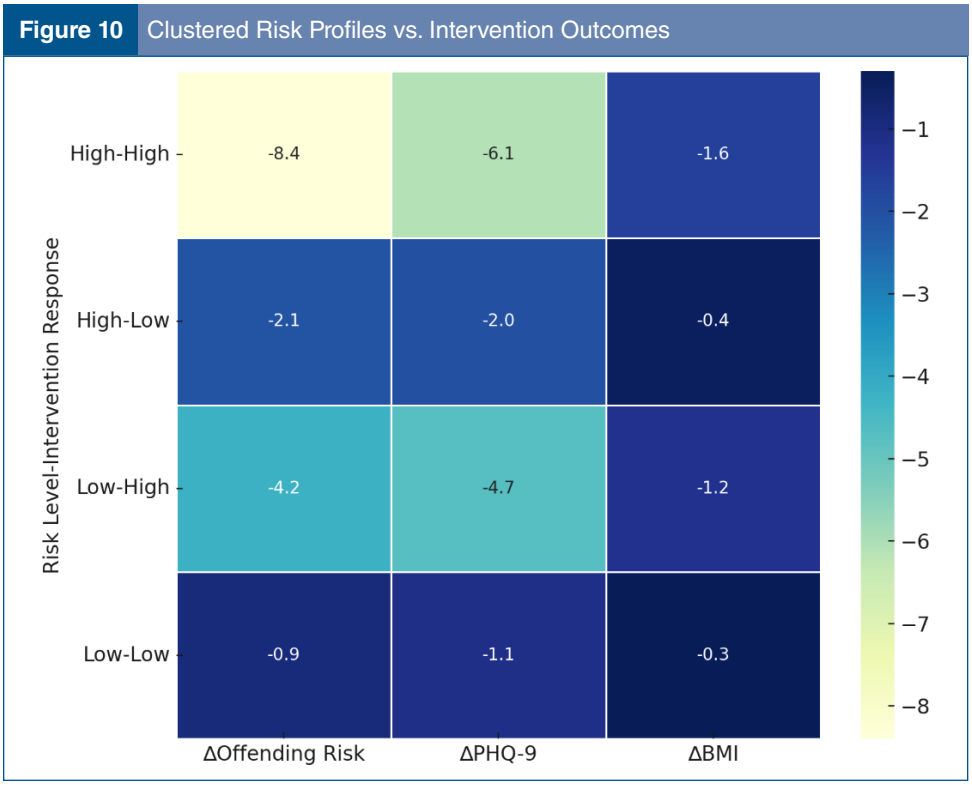


Figure 10 Clustered Risk Profiles vs. Intervention Outcomes



health-focused interventions are not only possible, but essential in catalysing behavioral change in this population.

An intervention's impact was particularly noticeable in the analysis of behavioral incidents at the two time points. The intervention group's average number of offending-related incidents per month fell from 5.1 to 2.3, whereas the control group experienced almost no change. This reduction was particularly strong among those participants who fully attended both the exercise sessions and the cognitive behavioral therapy sessions, suggesting that the two modalities may have influenced one another. Supporting this, Figure 11 shows remarkably strong changes in the rates of incidents of aggression or noncompliance entitled "Behaviorally compliant children and youths" and "De-escalation of aggression or non compliance," The difference illustrates the program's potential to reduce aggressive or noncompliant behaviors. Furthermore, a similar tendency was noted regarding compliance to taking the medications. Sponsors showed better adherence to psychiatric medication regimens as a result of reduced routine disruption and lower side effects, which stabilized routine. Figure 12 illustrates this point where active participants' adherence was 88% compared to 71% among their less active counterparts.

These results continue to support factors from previous research such as the effectiveness of adapted CBT for patients with ID as pointed out by Taylor et al. [31], and the relationship between physical activity and better behavioral regulation put forth by Temple and Stanish [28]. However, this particular study addresses the gap in the literature by empirically testing the dual-domain intervention model design in a forensic-risk population. Unlike most studies in which psychological and physical domains were addressed separately, our study supports the bio-psycho-social model's premise that behavioral outcomes in individuals diagnosed with intellectual disabilities are the result of a confluence of a myriad of

Figure 11 Comparison of Offending Incidents (Pre vs Post)

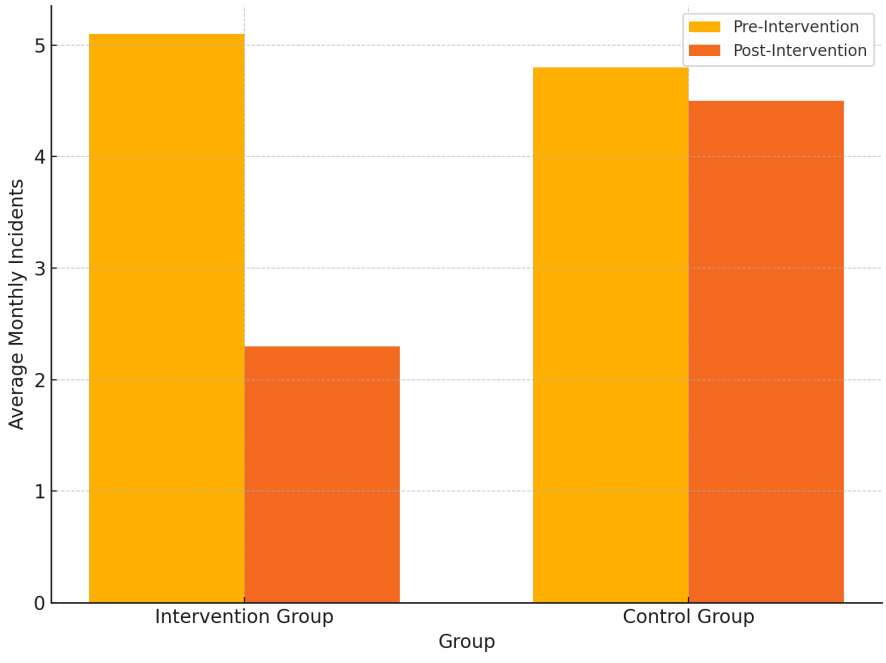
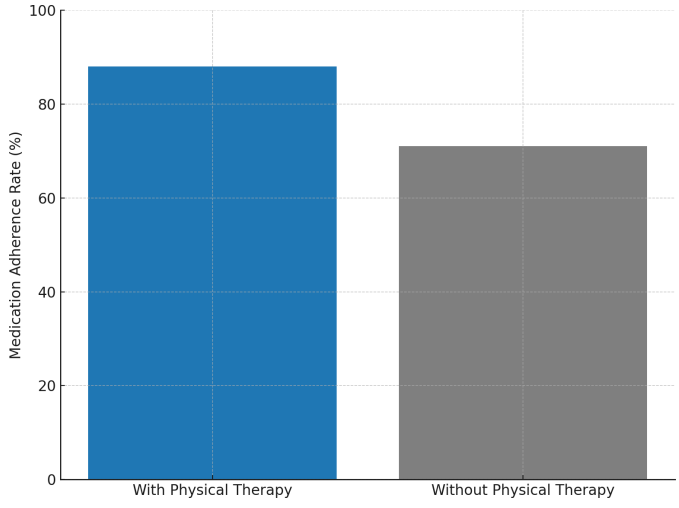


Figure 12 Medication Adherence Among Groups with and Without Physical Therapy



health and environmental interactions. Employing a composite health index allowed measurement of this multidimensionality resulting in behavior changes that were not merely additive, but exponential in nature, relative to improvements across domains.

Health synergy as a concept—the interdependence of physical and psychological improvements—was one of the central theoretical contributions to emerge. The greatest reductions in risk behavior were noted among those who derived concurrent benefits in both domains simultaneously. With respect to psychiatric scoring, these patients exhibited

greater participatory increases alongside more pronounced decreases in institutional incidents. We showed, through multivariate regression and composite index calculations, that interventions aimed at multiple systems concurrently achieved behavioral results greater than expected from addressing isolated domains, profoundly altering his paradigm. This shifts the dominant treatment model based on sequential or compartmentalized approaches and calls for synchronized treatment models that no longer disentangle the multifactorial nature of offending in this population.

These results carry grave implications for forensic and disability services. Care systems operating through the lens of institutions must move from containment strategies that are reactive to integrated health models that are proactive and multidisciplinary. This includes changing the accreditation guidelines as to require coordination of physical and mental health services, restructuring funding models to focus on prevention, and widening the scope of professional training to include adaptive exercise instruction as well as trauma-informed behavioral intervention. There is too much focus on control rather than recovery. The focus is shifted from control to recovery for individuals with ID and risk behavior is advanced by health sociological alternatives to institutionalization. Community reentry programs must incorporate this al approach as well, reinforcing an integrated continuum of care across residential, medical, psychosocial services to actively maintain sustained risk reduction post discharge.

Limitations and Future Work

Even though the results of this study provide compelling empirical evidence in support of the integrated health-based intervention model, several limitations must be recognized. The first of these concerns the applicability of the model across different organizational contexts. Even though the intervention was carried out across several facilities, each site had adequately pre-existing infrastructure, trained personnel, and commitment from management to assist with the logistical support of the program. Consequently, it is unclear how well the model would operate in a context with fewer resources, lower ratios of staff to participants, or cultures that physically or psychologically inhibit engagement. Smaller or rural institutions may encounter additional implementation barriers, including insufficient trained staff, constrained physical activity locations, or inadequate ongoing mental health service availability. Lower-resourced settings, as well as non-institutional settings like home care or community day programs, need to be the focus of future work in order to assess these limitations alongside the flexibility and expansion potential of the framework.

Another prominent limitation concerns the length of the follow-up period and its effect on the assessment of the study's long-term outcomes. The 12-week duration of the study captured the participants' psychosocial improvements and reduced offending risk; however, it does not shed light on the sustainability of these benefits. Regression is common when structured aid is removed, especially within behavioral frameworks that intellectually disabled individuals with psychiatric comorbidities precede. Without data tracking beyond six months to a year, evaluating whether the stabilization in behavior is an actual enduring change as opposed to a simple change is challenging. Measuring these parameters is critical to ascertain the true effects of the intervention. Other studies should include active monitoring after the intervention, mid-interval follow-up interviews, and post-intervention recidivism assessments to measure the intervention's sustained effectiveness in unstructured environments.

A third limitation deals with controlling cross-disciplinary variation in intervention implementation within the study. Despite implementing fidelity checks, therapeutic facilitation, physical instruction, and case management was inevitably done differently across sites

and facilitators. These differences have almost certainly had some impact on outcomes through differences in therapeutic alliance, motivation, engagement strategies, and environmental design. Furthermore, the absence of real-time monitoring through digital systems restricted our ability to observe micro-changes in behavioral and health metrics. To cover these gaps, addressing them through integrating biometric wearables, digital behavior monitoring systems, and automated risk-alert mechanisms could enhance precision in rich data capture and bespoke intervention design.

The results of this study point to further interdisciplinary, multi-site research that incorporates diverse groups, such as educators, probation officers, occupational therapists, and primary care physicians. Addressing offending behavior among persons with intellectual disabilities is a multi-faceted, cross-disciplinary problem which requires more than single-system approaches. Future research should focus on developing multicenter randomized controlled trials with representative participants to test the model's validity across different ages, diagnostic categories, and cultural settings, as well as within various sociopolitical frameworks. The integration of caregivers, community advocates, and policy makers in design will enhance creation of an intervention model that meets clinical, practical, and social acceptance standards for broad implementation.

Conclusion

This study's results validate that a comprehensively integrated intervention targeting both physical and mental health has the potential to meaningfully reduce the offending risk in people with intellectual disabilities. Enhanced self-regulation was evidenced by improvements in BMI, blood pressure, anxiety and depression scores, as well as the rates of behaviors deemed problematic. Engagement in structured physical activity, along with tailored CBT, coordinated multi-dimensional health and functional case management, and ecological modifications, led to improved stabilization of the participants' health and functional roles. Most pronounced was the decline in risk scores for those with dual-domain improvements. These results strengthen the emerging theory on dual diagnosis care and warrant development of a comprehensive, person-centered framework that serves as the basis for integrated theories of dual diagnosis care and defragments service delivery approaches dominantly shaped by siloed frameworks.

Translating these findings into system-wide impacts will require a fundamental change in policy and institutional frameworks. The healthcare and forensic sectors need to subsidize and incorporate Integrated Intervention models where behavioral risk mitigation is framed as a health service and a proactive intervention. Revision of training requirements for staff to incorporate interdisciplinary specialties, the integration of mental and physical healthcare into daily activities, and fostered functional silos should all be adopted. Ethical care goes beyond mere management or regulatory compliance; it pertains to the continuous ability to access wellness, developmental support, and reintegration into respectful societal engagement. Civic overtures for this population that has long been marginalized goes beyond the clinical—individuals with intellectual disabilities profoundly and morally need care systems that fully appreciate their personhood and conditions essential to stability, autonomy, and dignified self-identity. The body of evidence now calls for a collective, sustained proactive approach to comprehensive policy change.

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