Title:

Effectiveness of ICF-based Case Management in Promoting Independence and Vocational Participation among Adults with Intellectual Disabilities: A Randomized Controlled Trial

Ethical Approval Reference Number: PLK/REC/2026/01

26/10/2026

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Introduction

Intellectual disability is characterized by significant limitations in intellectual functioning and adaptive behaviour, resulting in difficulties in communication, social participation, activities of daily living (ADLs), instrumental activities of daily living (IADLs), and practical adaptive skills (Wehmeyer et al., 2008; American Association on Intellectual and Developmental Disabilities, 2010). Beyond cognitive impairments, individuals with intellectual disability frequently experience restrictions in community participation, social inclusion, and independent living, which adversely affect their overall quality of life and well-being (Andrews et al., 2014; Arvidsson et al., 2013). Although advances in rehabilitation and community support services have improved opportunities for participation, promoting independence and meaningful vocational engagement remains a persistent challenge for this population (Nevala et al., 2019).

Vocational participation is increasingly recognized as a critical indicator of successful community integration and quality of life among adults with intellectual disability (Lysaght et al., 2012). However, employment rates remain substantially lower than those of the general population across many countries. For example, only approximately one-third of adults with intellectual disability in the United States were reported to be employed, and fewer than one-fifth obtained competitive employment (Siperstein et al., 2013). Similarly, studies from Ireland have reported that although many adults with intellectual disability participate in

structured day activities, fewer than 10% engage in paid employment (King et al., 2022). Difficulties in adaptive functioning, limited access to employment opportunities, inadequate social support, and environmental barriers continue to restrict participation in productive and meaningful occupations (Woolf et al., 2010; King et al., 2022). These findings highlight the global need for rehabilitation approaches that support both functional independence and vocational participation.

The challenge is equally relevant in Hong Kong. Intellectual disability affects approximately 1.0–1.2% of the local population (Census and Statistics Department, 2021). Despite the availability of residential care services, vocational training programmes, supported employment services, and sheltered workshops, many adults with intellectual disability continue to experience limited opportunities for employment and community participation. According to government statistics, the unemployment rate among persons with disabilities is approximately twice that of the general population, suggesting ongoing barriers to vocational inclusion (Census and Statistics Department, 2021). Furthermore, individuals with intellectual disability often experience restricted social networks, dependence on caregivers, and reduced opportunities for self-directed participation in community life (Andrews et al., 2014; Lee et al., 2025). As Hong Kong's rehabilitation sector increasingly emphasizes community living and person-centred practice, there is a growing need to identify service models that can effectively promote independence, participation, and vocational outcomes.

Current rehabilitation services in Hong Kong are typically delivered by multidisciplinary teams comprising social workers, occupational therapists, physiotherapists, speech therapists,

nurses, and other healthcare professionals. While multidisciplinary service delivery enables professionals to provide specialized expertise, interventions are frequently planned and implemented within discipline-specific boundaries. Such an approach may result in fragmented care, duplicated service inputs, inconsistent rehabilitation goals, and limited communication across professional groups (Institute of Medicine, 2010; Ghannam et al., 2025). Consequently, rehabilitation efforts may focus primarily on impairment reduction rather than broader outcomes related to functioning, participation, environmental support, and quality of life. These challenges are particularly important for adults with intellectual disability, whose successful rehabilitation often requires coordinated interventions across clinical, social, vocational, and environmental domains (Buntinx & Schalock, 2010).

The World Health Organization's (WHO) International Classification of Functioning, Disability and Health (ICF) offers a potential solution to these challenges by providing a comprehensive biopsychosocial framework for understanding disability and functioning (WHO, 2002; Stucki, 2005). Rather than viewing disability solely as a medical condition, the ICF conceptualizes functioning as the interaction between health conditions, personal factors, and environmental influences (WHO, 2002; Rauch et al., 2008). Through a standardized language and framework, the ICF facilitates communication among professionals, promotes shared goal setting, and supports coordinated interdisciplinary rehabilitation planning (Dekker et al., 2020). The ICF Rehab-Cycle ® further operationalizes these principles through a structured process of assessment, assignment, intervention, and evaluation, enabling rehabilitation teams to systematically identify needs and monitor outcomes over time (Steiner et al., 2002; WHO, 2013). By emphasizing functioning and participation rather

than impairments alone, ICF-based case management may enhance person-centred care and improve rehabilitation outcomes for individuals with intellectual disability.

Interdisciplinary collaboration is particularly important in intellectual disability services because outcomes are influenced by the interaction between individual abilities, support systems, environmental conditions, and opportunities for participation (Buntinx & Schalock, 2010). Emerging evidence suggests that ICF-based approaches can improve interdisciplinary communication, rehabilitation planning, documentation quality, and coordinated case management processes (Heinemann et al., 2020; Zambri et al., 2023). Furthermore, ICF-informed interprofessional training has been shown to enhance the identification of functional and contextual factors that influence independent living and participation outcomes (Heinemann et al., 2020). Recent protocol work in Hong Kong community rehabilitation has further highlighted the potential of ICF-based interdisciplinary case management for improving functioning and participation outcomes (Yeung et al., 2026). Despite these findings, empirical evidence regarding the effectiveness of ICF-based interdisciplinary case management for adults with intellectual disability remains limited internationally and is particularly scarce within the Hong Kong rehabilitation context.

Therefore, the present study aims to evaluate the effectiveness of an ICF-based interdisciplinary case management model in comparison with conventional multidisciplinary care among adults with intellectual disability receiving residential care and vocational rehabilitation services. Specifically, the study will examine whether the ICF-based approach can improve adaptive independence in daily living and enhance vocational functioning and

participation. By generating local evidence through a randomized controlled trial (RCT), the study seeks to inform future rehabilitation practice, facilitate the implementation of ICF-based service models, and support the development of evidence-based policies that promote independent living and vocational inclusion for adults with intellectual disability.

Research Aim and Hypotheses

The primary aim of this study is to evaluate the effectiveness of an ICF-based interdisciplinary case management model compared with conventional multidisciplinary care for adults with intellectual disabilities receiving residential care and vocational rehabilitation services in Hong Kong. Drawing upon the biopsychosocial principles of the ICF, the study seeks to determine whether a structured interdisciplinary approach can enhance adaptive functioning of the targeted population through coordinated assessment, goal setting, communication, and rehabilitation planning across professional disciplines (Stucki et al., 2002; Rauch et al., 2008; Buntinx & Schalock, 2010).

Participants will be recruited from both residential care and vocational rehabilitation settings. The primary outcome of the study will be adaptive functioning, measured using the Vineland Adaptive Behavior Scales, Third Edition (Vineland-3) (Sparrow et al., 2021). Changes in Vineland-3 scores will be used to evaluate the overall effectiveness of the ICF-based interdisciplinary intervention across all participants. Secondary outcomes will include changes in functioning and participation as measured by the WHO ICF Checklist v2.1a (WHO, 2003). For participants engaged in vocational rehabilitation services, vocational

functioning and work-related behaviours will also be evaluated using the Chinese Work Personality Profile (CWPP) (Law et al., 2006; Liu et al., 2013).

It is hypothesized that participants receiving the ICF-based interdisciplinary case management intervention will demonstrate significantly greater improvements in adaptive functioning, as measured by the Vineland-3, compared with participants receiving conventional multidisciplinary care. It is further hypothesized that participants in the intervention group will show greater improvements in functioning and participation across relevant ICF domains than those receiving usual care. Among participants engaged in vocational rehabilitation services, the intervention group is also expected to demonstrate greater improvements in vocational functioning and work-related behaviours as measured by the CWPP. Finally, exploratory analyses will examine whether intervention effects vary according to vocational status, given the potential influence of environmental demands, participation opportunities, and rehabilitation goals on functional outcomes within the ICF framework (Rauch et al., 2008; Stucki et al., 2002).

Expected Outcomes and Impact

The expected outcomes and impact of this initiative include a quantification of the clinical efficacy of ICF-structured case management compared to routine care, with particular attention to residential and vocational environments. It will establish a validated implementation framework for integrating standardized ICF metrics into adult disability services, ensuring consistency and quality across diverse settings. Furthermore, the project will generate empirical evidence to support policy-level funding and the broader

standardization of ICF-based intake tools across day facilities and residential programs, thereby strengthening service delivery and long-term sustainability.

Methods

Study Design

This study will employ a multi-centre, two-arm, assessor-blinded, stratified randomized controlled trial (RCT) to evaluate the effectiveness of an ICF-based interdisciplinary case management model compared with conventional multidisciplinary care among adults with intellectual disabilities. Participants will be recruited from residential care homes and vocational rehabilitation service units operated by a major NGO in Hong Kong. Participants will be stratified according to vocational status, that is individuals currently engaged in vocational rehabilitation services and individuals receiving residential care services without vocational roles, prior to randomization. Within each stratum, participants will be randomly allocated in a 1:1 ratio to either the intervention group or the control group using a computer-generated randomization sequence. Outcome assessments will be conducted at baseline (T0) and immediately following the six-month intervention period (T1).

Participants

Participants will be recruited from residential care homes and vocational rehabilitation centres operated by a major NGOs in Hong Kong.

<u>To be eligible for participation, individuals must:</u>

1. be aged between 18 and 60 years;
2. have a formal medical diagnosis of mild or moderate intellectual disability;

3. be currently receiving residential care or vocational rehabilitation services;
4. be medically stable and able to participate in routine rehabilitation programmes; and
5. provide informed consent directly or via a legally authorized representative.

Individuals will be excluded if they:

1. experience an acute or unstable medical condition requiring intensive treatment;
2. present with acute psychiatric episodes that may substantially interfere with participation;
3. are currently participating in ICF-Based Interdisciplinary Case Management Programme; or
4. lack an available consent pathway through either personal consent or legal representation.

Sample Size Determination

Sample size will be estimated using G*Power 3.1 for repeated-measures analysis, assuming a medium-to-large treatment effect based on previous rehabilitation studies involving structured interventions for individuals with intellectual disability (Eldevik et al., 2010; Weld-Blundell et al., 2021; Wu et al., 2023; Tao & Fu, 2025). Assuming a significance level of $\alpha = .05$ and statistical power of 80%, a minimum sample size of 80 participants will be required. To accommodate an anticipated attrition rate of approximately 5%, the final recruitment target will be 84 participants, with 42 participants recruited from residential services and 42 participants recruited from vocational rehabilitation services.

Recruitment, Consent and Capacity Assessment

Potential participants will be identified through collaborating rehabilitation agencies and screened for eligibility by designated clinical staff. Given the potential cognitive vulnerabilities associated with intellectual disability, a tiered consent procedure will be adopted to protect participant autonomy while facilitating meaningful participation.

A structured capacity assessment will be conducted prior to recruitment to evaluate participants' understanding of the study's purpose, procedures, potential risks, benefits, and voluntary nature of participation. Individuals demonstrating adequate decisional capacity will provide written informed consent. For individuals lacking full decisional capacity, written consent will be obtained from a legal guardian or authorized representative, and participant assent will be sought using Easy-Read information sheets and visual assent forms specifically designed for people with intellectual disability. Assent will be monitored continuously throughout study participation, and any indication of withdrawal or dissent will be respected immediately.

Participants will not receive any financial incentives, cash rewards, or material gifts for participation in this study. Participation is entirely voluntary and will not affect the quality of services received from participating agencies. No reimbursement is required because all study procedures will be conducted during routine service hours and within existing service settings. The absence of financial incentives is intended to minimize potential undue influence or coercion among this vulnerable population.

Randomization and Blinding

Following completion of baseline assessments (T0), participants will be stratified according to vocational status, namely (1) individuals receiving vocational rehabilitation services and

(2) individuals receiving residential care services without vocational roles. Within each stratum, participants will be randomly assigned to either the intervention group or the control group in a 1:1 ratio using a computer-generated randomization sequence prepared by an independent statistician who is not involved in participant recruitment, intervention delivery, or outcome assessment. Allocation concealment will be maintained through the use of sequentially numbered, opaque, sealed envelopes prepared by an independent researcher. The envelopes will be opened only after completion of baseline assessments to ensure that allocation remains concealed during participant recruitment and enrollment.

Due to the nature of the intervention, blinding of participants and intervention providers is not feasible. However, outcome assessments will be conducted by trained research assistants who are independent of the intervention team and remain blinded to group allocation throughout the study. To minimize potential contamination between study arms, intervention-specific training and implementation procedures will be provided only to staff responsible for delivering the ICF-based interdisciplinary case management model. Participants allocated to the control group will continue to receive routine multidisciplinary care according to existing service practices.

Intervention Procedures

Following baseline assessment, participants will enter a six-month intervention period.

Experimental Group: ICF-Based Interdisciplinary Case Management Programme

Participants allocated to the intervention group will receive a structured ICF-Based Interdisciplinary Case Management Programme designed to facilitate shared assessment, collaborative goal setting, coordinated intervention planning, and ongoing interdisciplinary

review using the ICF framework. Prior to programme implementation, all participating social workers, occupational therapists, physiotherapists, speech therapists, nurses, and other relevant professionals will complete at least 10 hours of standardized ICF training provided by an experienced ICF educator. The intervention will be guided by the ICF Rehab-Cycle ® framework and will consist of four integrated components: assessment, goal setting, intervention planning, and outcome evaluation (Steiner et al., 2002; Rauch et al., 2008; Rauch et al., 2010; Scheel-Sailer et al., 2021).

At programme entry, participants receiving residential services will be assessed using the Po Leung Kuk ICF Core Set for Intellectual Disability, while participants receiving vocational rehabilitation services will be assessed using the Po Leung Kuk ICF Core Set for Vocational Rehabilitation. The Intellectual Disability Core Set comprises 38 ICF categories relating to cognitive functioning, communication, self-care, interpersonal interactions, community living, and environmental supports. The Vocational Rehabilitation Core Set comprises 45 categories focusing on work-related functioning, communication skills, task performance, interpersonal relationships, work habits, environmental barriers, and workplace supports. Both Core Sets were developed through expert consensus and Delphi procedures based on ICF principles and local rehabilitation practice. Each category will be rated using standard ICF qualifiers (0-4,8,9) to generate a comprehensive profile of functioning, participation, limitations, and environmental influences.

Following assessment, an interdisciplinary case conference lasting approximately 45-60 minutes will be conducted. Team members will review assessment findings collectively, identify priority areas for intervention, and formulate individualized goals through a shared decision-making process involving the participant, caregiver (where applicable), and

interdisciplinary rehabilitation team. Goals will be developed according to SMART principles and explicitly linked to relevant ICF categories to ensure consistency across disciplines and facilitate outcome monitoring (Dekker et al., 2020). Individualized rehabilitation plans will then be established based on shared priorities and agreed intervention targets.

Participants will continue to receive discipline-specific interventions according to their identified needs. However, all interventions will be coordinated through the shared ICF-based rehabilitation plan. Professionals will document progress using standardized ICF terminology and contribute to common rehabilitation goals rather than solely discipline-specific objectives. Monthly interdisciplinary case conferences lasting approximately 20-30 minutes will be conducted throughout the intervention period to:

- review participant progress;
- evaluate goal attainment;
- identify emerging barriers and facilitators;
- modify intervention strategies as required; and
- update ICF qualifier ratings where appropriate.
- Intervention fidelity will be monitored regularly through standardized documentation templates, audit checklists, and periodic review of case conference records.

Intervention fidelity will be monitored through standardized documentation templates, fidelity monitoring checklists, periodic audits of assessment records and case conference documentation, and regular supervision sessions with the research team.

Control Group: Conventional Multidisciplinary Rehabilitation Care

Participants allocated to the control group will receive conventional multidisciplinary rehabilitation care routinely provided within participating residential care and vocational rehabilitation services throughout the six-month study period. Services will continue to be delivered according to existing organizational operations and individual service plans without additional modifications arising from study participation.

Similar to the intervention group, participants may receive services from social workers, occupational therapists, physiotherapists, speech therapists, nurses, vocational instructors, and support staff, depending on their individual needs and service placement. Residential service users will continue to receive training and support in activities of daily living, self-care, social participation, leisure engagement, and behavioural management. Participants attending vocational rehabilitation programmes will continue to receive vocational skills training, work adjustment activities, job preparation training, work placement opportunities, and employment-related support according to routine programme schedules.

Under conventional practice, assessments will be conducted independently by individual disciplines using their standard professional frameworks and documentation systems. Rehabilitation goals will generally be developed separately within each discipline and will not be systematically integrated across professional teams, with intervention plans focusing primarily on profession-specific objectives rather than shared interdisciplinary outcomes. Communication among team members may occur through routine case discussions, referral mechanisms, and service reviews as required by agency procedures.

Unlike the intervention group, participants in the control group will not undergo ICF Core Set assessment, ICF qualifier ratings, or structured ICF Rehab-Cycle ® reviews. Furthermore,

rehabilitation goals will not be systematically linked to functioning, participation, and environmental domains using ICF taxonomy. As a result, treatment planning will largely remain discipline-driven, reflecting current practice within many rehabilitation settings in Hong Kong (Yeung et al., 2025; Ghannam et al., 2025).

To minimize performance bias, service frequency and duration will remain comparable between groups wherever operationally feasible. Participants in both groups will continue to receive standard agency services throughout the six-month study period. The principal distinction between groups will therefore be the implementation of the structured ICF-based interdisciplinary case management process, including standardized functional assessment, interdisciplinary goal setting, coordinated intervention planning, and ongoing ICF-guided case review, rather than differences in the amount of rehabilitation services received.

Table 1. Comparison between ICF-Based Interdisciplinary Case Management and Conventional Multidisciplinary Care

Care Model	Structured interdisciplinary approach guided by the ICF framework	Routine multidisciplinary rehabilitation care
Professional Training	All participating staff complete ≥10 hours of standardized ICF training prior to implementation	No additional ICF-specific training
Assessment Framework	Standardized assessment using Po Leung Kuk ICF Core Sets and ICF qualifiers	Discipline-specific assessments using existing professional frameworks
Assessment Approach	Shared interdisciplinary assessment and discussion of participant needs	Assessments conducted independently by each discipline
Goal Setting	Collaborative interdisciplinary goal-setting using SMART	Goals developed independently within individual disciplines

	principles and linked to ICF categories	
Rehabilitation Planning	Integrated rehabilitation plan developed jointly across disciplines	Separate intervention plans developed by individual disciplines
Communication Process	Structured interdisciplinary case conferences and coordinated communication using ICF terminology	Routine communication through referrals, case discussions and service reviews as required
Case Conference	Initial interdisciplinary case conference (45–60 min) and monthly review meetings (20–30 min)	No structured interdisciplinary case conferences
Intervention Delivery	Discipline-specific interventions coordinated around shared interdisciplinary goals	Discipline-specific interventions delivered according to usual practice
Documentation	Standardized documentation using ICF categories and qualifiers	Routine documentation according to individual professional requirements
Progress Monitoring	Monthly review of goal attainment, functioning and participation outcomes using ICF framework	Progress monitored independently within disciplines
Outcome Evaluation	Guided by the ICF Rehab-Cycle® and linked to predefined interdisciplinary goals	Evaluated according to routine disciplinary practices
Service Intensity	Comparable to routine service provision	Comparable to intervention group
Primary Difference	Structured ICF-based interdisciplinary case management process	Conventional multidisciplinary service delivery without ICF integration

Outcome Measures

Outcome assessments will be conducted at baseline (T0) and immediately after completion of the six-month intervention period (T1).

Primary Outcome Measure

The primary outcome measure will be the Vineland Adaptive Behavior Scales, Third Edition (Vineland-3) (Sparrow et al., 2021). The Vineland-3 is a widely used standardized measure of adaptive functioning that assesses performance across the domains of Communication, Daily Living Skills, Socialization, and Motor Skills. Adaptive functioning represents a key indicator of independence, participation, and everyday functioning among individuals with intellectual disabilities and is therefore highly consistent with the participation-oriented objectives of the ICF framework.

The Vineland-3 will be administered to all participants. Changes in the Adaptive Behavior Composite (ABC) score between baseline and post-intervention will serve as the primary endpoint for evaluating the effectiveness of the ICF-based interdisciplinary case management programme. The instrument has demonstrated strong psychometric properties among individuals with intellectual and developmental disabilities, with internal consistency coefficients ranging from .90 to .98 across domains and test-retest reliability coefficients exceeding .80. Evidence supporting construct validity, criterion validity, and responsiveness to meaningful functional change has also been reported (Sparrow et al., 2021; Farmer et al., 2019; Pandolfi & Magyar, 2021).

Secondary Outcome Measures

The WHO ICF Checklist v2.1a (WHO, 2003) will be used to evaluate changes in functioning, activity performance, participation, and environmental factors. Based on the ICF framework, the checklist provides a standardized method for documenting functioning across the domains of Body Functions, Activities and Participation, and Environmental Factors. The ICF

Checklist will be administered to all participants at T0 and T1. Changes in ICF qualifier ratings will be used to examine the extent to which the intervention influences functioning and participation across multiple life domains and to evaluate outcomes that are directly aligned with the theoretical foundations of the intervention.

For participants engaged in vocational rehabilitation services, vocational functioning will be assessed using the Chinese Work Personality Profile (CWPP) (Law et al., 2006; Liu et al., 2013). The CWPP evaluates work-related behaviours across domains including work habits, task orientation, social skills, interpersonal relationships, work motivation, and work tolerance. The CWPP has demonstrated satisfactory psychometric properties in Chinese rehabilitation populations. Previous studies reported good internal consistency, with Cronbach's alpha coefficients generally exceeding .80, and evidence supporting predictive validity for vocational placement and employment outcomes (Law et al., 2006; Liu et al., 2013). Changes in CWPP scores between baseline and post-intervention will be examined as a secondary outcome among participants receiving vocational rehabilitation services to determine whether the ICF-based interdisciplinary intervention contributes to improvements in vocational performance and work-related functioning.

Data Analysis

All analyses will be conducted according to the intention-to-treat (ITT) principle. Missing data will be addressed using multiple imputation procedures where appropriate. For the primary outcome analysis, a repeated-measures analysis of covariance (RM-ANCOVA) will be performed to evaluate changes in Vineland-3 Adaptive Behavior Composite scores over time between the intervention and control groups while controlling for relevant baseline covariates. Fixed effects will include Group (Intervention vs. Control), Time (T0 vs. T1), and

the Group × Time interaction. The primary indicator of intervention effectiveness will be the Group × Time interaction effect. Effect sizes will be reported using partial η^2 and 95% confidence intervals.

As vocational status is a stratification variable, exploratory analyses will be conducted to examine whether intervention effectiveness differs between participants engaged in vocational rehabilitation services and those receiving residential care services only. Where appropriate, subgroup analyses will be performed to investigate potential differences in treatment effects across these participant groups.

Secondary analyses will examine changes in WHO ICF Checklist v2.1a scores to evaluate intervention-related changes in functioning, activity performance, participation, and environmental factors. For participants engaged in vocational rehabilitation services, changes in Chinese Work Personality Profile (CWPP) scores will also be examined to evaluate the impact of the intervention on vocational functioning and work-related behaviours.

Additional exploratory analyses will investigate associations between intervention fidelity and participant outcomes. All statistical analyses will be performed using IBM SPSS Statistics, and statistical significance will be set at $p < .05$. Findings will be reported in accordance with the CONSORT reporting guidelines (Hopewell et al., 2025).

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