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of Hong Kong

A Project entitled

**The effect of physical exercise participation on adaptive behavior in children with  
Intellectual Disability: a case report on hiking**

Submitted by

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*Declaration*

I, Cheng Hoi Kin , declare that this research report represents my own work under the supervision of Assistant Professor Dr TSE, Choi Yeung Andy, and that it has not been submitted previously for examination to any tertiary institution.

Signed \_\_\_\_\_

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24<sup>th</sup> April, 2019

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## **Abstract**

This thesis is a case report which conducted two phases to find out the relationship between motivation on physical exercise participation and the changes of adaptive behavior for children with mild Intellectual disability (ID). As there is growing attention on special education on children with ID, the purpose of the present study is to investigate if there are effects by physical exercises on adaptive behaviors in children with ID. The 1<sup>st</sup> phase was a survey and we had 54 data collected with questionnaires (see appendix I & II for more information), Adaptive Behaviors total score (ABS) had been generated which composed by 16 questions survey. ABS then compared with another questionnaire about motivation with 14 questions on physical exercise to find out the correlation between the level of ABS and motivation on physical exercise for children with ID. It was significant to find that motivation on physical exercise participation correlates with the improvement on adaptive behavior in children with ID in the 1<sup>st</sup> phase. Therefore, 2<sup>nd</sup> phase was a case report on the observation of how hiking activities changed the adaptive behavior of children with ID. 4 participants had been observed for 5 times of hiking activities to find out their improvement on adaptive behavior after intervention. The observation results shown that hiking with high motivation enhance adaptive skills acquisition in children with ID. This implied that hiking is a useful physical exercise for children with ID to participate and they will learn a lot in that process.



## **CHAPTER 1**

### **INTRODUCTION**

This case report aims to find out the correlation between the motivation of physical exercise participation and improvement of adaptive behavior. Moreover, it focusing on hiking as a physical exercise and observe the effect towards the behavioral changes after several hiking activities. The project assessed the change of adaptive behavior of children with ID through at least 5 hiking experience. Ultimately, the project is aimed at providing evidence to support the usefulness of hiking experiences to children with ID in Hong Kong and globally.

#### **1.1 Define children with mild intellectual disability and adaptive behavior.**

According to American Association on Intellectual and Developmental Disabilities, AAIDD (2007), Individuals with Intellectual Disabilities (ID) has IQ below 70 are slower to learn new skills and concepts than normal children. Hong Chi Association (2004) stated that significant limitations both in intellectual functioning and in adaptive behavior were observed among them, they need much more time to equip new adaptive skills, which refer to the tasks of daily life, such as communicating with others, or being able to take care of one's own needs when comparing to general public. With the assistance of a supportive educational system, they are often able to live independently as adults. Adaptive behavior refers to the ways and skills of individuals that allow them to function effectively every day at home, school, work, and in the community in order to meet their personal needs as well as deal with the natural and social demands to their living environments. Furthermore, adaptive behavior of a person was thought to be more important than scores from an intelligence test (Oakland & Harrison, 2011).

In Hong Kong, the prevalence rate of ID with IQ below 70 was reported by the Census and Statistical Department (2014) as 1.0 to 1.4%, around 80% of them were slower than average to learn new skills and they were defined as individuals with mild ID. Although ID is not curable

through medical measures, improvement in environmental conditions and the presence of diversified support could improve an individual's ability to meet the daily routine demands of life. Through life functioning, adaptation, proper training and guidance, adaptive skills of individuals with ID could be improved and their personal potential may be fully achieved and lead them to a meaningful life (Luckasson et al., 2002). Therefore, developing adaptive skills is important to children with ID.

### 1.2 Current methods to enhance adaptive behavior of children with ID

Various therapeutic services can improve adaptive behavioral skills of a person with intellectual disability like occupational therapy to improve self-care ability, employment activities and skills etc. According to Hong Chi Association (2010), it helped to enhance their independence in living and integration into the community through tailor-made activities and by the use of adaptive aids. Some children with ID might also need individualized program of services and developmental therapies like Speech therapy and Physical therapy to improve receptive and expressive languages skills and self-locomotion (Marrus & Hall, 2017). However, these treatments were highly costed and not cost efficient in school settings.

### 1.3 The value of physical exercise for children with ID

In this study, physical exercise was defined as any bodily movement produced by skeletal muscles that require substantial energy expenditure. In general, the systematized programs of physical exercise promoted consistent and significant benefits for people with ID (Pestana, et al., 2018). There were some journals shown adaptive behavior of children with ID could also be enhanced through physical exercise. Physical exercises are possible ways to enhance adaptive behavior of children with ID with minimum cost. Physical exercise provides positive effects for individuals with ID by increasing their quality of daily living, getting over with their disabilities, socialization with the positive motivation and also strengthen their

communication with the people around them (Yılmaz, Şentürk & Demir, 2015). In the research of Güvendi & İlhan (2017), the effect of physical exercises positively affected their emotional adjustment, self-management and socialization for the individuals with intellectual disability. The process of physical activities collects their attention, to show initiative and to make contact with their friends by encouraging participation to the activities. Adaptive behavior could be enhanced by physical exercises.

#### 1.4 Reason to choose Hiking as the target observation exercise

In the 2<sup>nd</sup> phase, observations were done to find out the changes of adaptive behaviors for children with ID to clarify the results obtained from the 1<sup>st</sup> phase. Hiking was used as a target observation physical exercise as those special schools cooperated with each other to organize a team and prepared to participate Oxfam Trailwalker 2018. It was observable that there is a lack of opportunities for children with special educational needs to use their local natural environment (Blakesley, Rickinson & Dillon, 2013). Surrounded by the country parks and coastal areas, Hong Kong is a place, which is easily approaching to the local natural environment. Jim (1989) stated that Hong Kong was relatively small and compact size made a unique feature not found in Western countries. Many country parks in HK are situated quite near built-up areas; some are within walking distance or within day-trip distance. The routes of hiking were easier and relatively cheaper to approach as the public-transport links were well developed. Hiking is defined as a kind of leisure-time physical exercise for people participates in free time, based on their personal interests and needs (Phipps, 1991). Although the intensity of physical exercise and duration can be variables, it involves substantial energy expenditure (Howley, 2001). Stebbins (2004) defined hiking as pleasurable aerobic activity, which promotes good health. It engaged target heart rate that burns significant numbers of calories through the process and promotes holistic health of participants.

There was seldom study would take children with ID to investigate the effect of hiking on their improvement of adaptive behavior. The experiences of hiking to those children with ID were still unknown. Hiking could be another choice for children in being motivated to participate physical activities. Matson, Hattier & Belva (2012) state that hiking was proved to be useful in increasing self-care ability, social and communication skills which are the parts of adaptive behaviors. It would be beneficial to further equip them with capable ability to self-manage themselves.

## **CHAPTER 2**

### **METHODOLOGY**

#### **2.1 Participants**

The research was made in Sept to Nov 2018, Hong Kong. This study invited three mild to moderate special schools in total 45 male and 9 female students (N= 54) with intellectual disability diagnosed from the professionals based on the Autism Diagnostic Interview-Revised (ADI-R) and Wechsler Intelligence Scale for Children (WISC). Participants had average IQ 50-55 to 70 aged from 10-21 years who are maintaining their education in the public school of Hong Kong. Cognitive skills, adaptive life skills and social skills were the major impairment of participants. Participants selected are able to follow instructions; able to perform the requested physical intervention; no regular participation in physical activity other than school physical education classes for at least 6 months prior to the study and no history of reading disabilities according to parents. Besides, exclusion criteria listed as below: (1) with other medical conditions that limit their physical activity capacities (e.g., asthma, seizure, cardiac disease); (2) with a complex neurologic disorder (e.g., epilepsy, phenylketonuria, fragile X syndrome, tuberous sclerosis). All screening carried out by a psychologist. In addition to this formal screening, we collected parent ratings of autistic traits and autism behaviors using the Social Responsiveness Scale, Second Edition (SRS-2) and information for each participant from the parents, including records in after-school group therapy (e.g. occupation therapy, speech therapy) and medication usage.

In the 2<sup>nd</sup> phase, observations were done on 4 participants who participated a series of hiking trainings for preparing Oxfam Trailwalker 2018 as they were forming up as a team to participate further hiking activities in future. They performed more than 5 hiking experiences in autumn 2018 and only 5 hiking trainings were observed.

## 2.2 Procedures

The 1<sup>st</sup> phase was finding the effect of all physical exercises for the children with mild intellectual disability over the adaptive behavior scores by figured out in the pretest-posttest application group test model. With a frequency of three times a week and sessions of at least 30 minutes additional physical exercise other than Physical Education lesson and their own extra-curricular activities outside schools, participants were having physical exercises as intervention. Data from pre-test, post-test each participant attended two assessment that conducted before the intervention (T1: baseline) and immediately after the 2 months of physical exercise intervention (hiking, running, jogging etc.) (T2: post-intervention).

The 1<sup>st</sup> phase was an objective measurement on the effect of physical exercise for the children with ID over the adaptive behavior scores obtained in the surveys. Adaptive behavior total score (ABS) generated by using modified Adaptive Behavior Assessment System-II (ABAS-II), then compared with another questionnaire related to the motivation towards physical exercise participation to see whether ABS would correlate with the motivation on physical exercise participation for children with ID. Same data collecting procedure for pretest-posttest application was used as above.

The 2<sup>nd</sup> phase was observing the behaviors of children with ID during 5 hiking trainings with photo capturing and video recording as first handed resources. Each hiking session lasts for 6 hours in Autumn 2018 and staff-to-participant ratio is 1:1 to guarantee the safety of participants. Experienced physical education teachers and special education teachers led the training in every hiking activity. Observations during each hiking training was done in 5 consecutive Fridays to record the characteristics and behaviors of target participants. In this research, the hiking training program was designed with diversified natural environment in Hong Kong. 5 different trails included different stages of MacLehose Trail, Hong Kong Trail

and Wilson Trail with different level of challenges would be completed in hiking trainings. Those trails were well developed and common for beginners and passes through a variety of natural scenery including beaches and mountains. Parental approval and permission slips necessary for the study were taken from parents, school management and participants and finally past from the ethical committee.

### 2.3 Instruments

#### *Phase 1*

In the 1<sup>st</sup> phase, Adaptive Behavior Assessment System-II (ABAS-II) was referenced in assessing the changes of adaptive behavior of children with ID after physical exercise in this study. Richardson & Burns (2005) recommended ABAS-II as a well-suited assessment tool for diagnosis or classification of intellectual disability with convincing reliability and validity. Harrison & Oakland (2003) stated that ABAS-II provided a clearer and more accurate understanding of one's adaptive behavior and skills as it could generate scaled scores for diversified skill areas. Children aged between 12-18 were suitable to be rated by teacher or parents in using ABAS-II that fitted the target participants in this study. The ABAS-II is a norm-referenced assessment of adaptive skills that assist in intervention planning, to identify specific skill strengths and weaknesses, as well as to monitor an individual's development (Oakland & Harrison, 2011). According to Oakland & Harrison (2011), AAMR (2002) defined adaptive behavior and skills in most extensive way which is the collection of conceptual, social, and practical skills. 10 domains of adaptive behavior skills were suggested by AAMR (2002), specific aspects of functioning assessed include, communication, community use, functional activities, home living, health and safety, leisure, self-care, self-direction, social and work. However, only 4 domains of adaptive behavior skills were included in the questionnaires as they matched the potential effect brought by physical exercises. Some questions were short

extracted from ABAS-II and the questionnaire was designed and modified based on the questions in ABAS-II. Respondents had to rate the behavioral frequency of various skills by himself or herself, using a four-point rubric of *not able*, *never*, *sometimes*, and *always*, grouped together into skill areas and domains. Improvements of the score in pretest to posttest were count as the improvement of adaptive behavior. Adaptive behavior total score (ABS) had been generated which composed by 16 questions and these questions were divided into 4 domains in *Self-care*, *Self-direction*, *Social Skills* and *Functional Activities*.

According to Oakland & Harrison (2011), *Self-care* is the skills needed for personal care including eating, dressing, bathing, toileting, grooming, and hygiene. Sample questions in this study were asking participants how often they will (1) drink water when they feel thirsty by themselves, (2) clean their hands and faces when they needed by themselves, (3) wear appropriate amount and types of clothes and (4) be capable to handle slight injury by themselves.

Secondly, *Self-direction* skills needed to be independent, responsible, and self-control, including starting and completing tasks, keeping a schedule, following time limits, following directions, and making choices. Sample questions in this study were asking participants how often they will (1) persist to complete the task assigned and not to give up, (2) pay attention to the changes of environment like weather and flow of people, (3) well prepared personal gear like water bottles, clothes and food etc. and (4) self-motivate to meet the planned goals.

Furthermore, *Social Skills* is to interact and get along with others, including having friends, showing appropriate emotions, assisting others by using manners. Sample questions in this study were asking participants how often they will (1) be active and feel good to get along with others in group activities, (2) always take the initiative to help others and willing to help others if requested, (3) take care of personal belongings and make others feel reliable and (4) get along with people that you are not familiar with.



Last but not least, *Functional Activities* is the skills needed for functioning in the community, using of community resources, shopping skills, and getting around in the community. Sample questions in this study were asking participants how often they will (1) be confident to walk alone to pass through the street or village, (2) go out alone without get lost, such as going to school, going home, gymnasium, going to the hospital etc., (3) get on and transfer by public transports to arrive a place independently and (4) estimate the time based on the environment such as weather, people activities, etc.

Hutzler & Korsensky (2010) stated that the level of motivation positively affects physical exercise participation for children with ID. There were 2 aspects with diverse factors that affect the level of motivation on physical exercise participation which were personal and environmental correlates. Examples of personal factors were self-efficacy, self-esteem, self-concept or task orientation. And environmental factors were peer support, family support, attendant support or peer modelling. Questionnaire was built according to the above personal and environmental factors. In this stage written questionnaires were used, which had to be conducted face-to-face. Scales included in the surveys encompassed self-perception, self-efficacy, social support on physical exercise participation. Sample questions were (1) feeling great during physical exercise, (2) feeling great to participate physical exercise with friends, (3) I felt relaxed after exercise, (4) after taking exercise, I will be more concentrate on my class after physical exercise (5) I want to participate physical exercise everyday etc. Respondents had to rate their feeling about exercise in pretest-posttest application by himself or herself, using a five-point rating scale of *strongly agree*, *agree*, *neutral*, *disagree* and *strongly disagree*.

## Phase 2

In the 2<sup>nd</sup> phase, direct and traditional live observation methods had been used in order to collect the first-handed data in 5 different hiking trainings. Short video tapes and photographs

were recorded by using electronic devices during the hiking processes. Observations were individually made, taking into account the characteristics of each participant, based on information obtained through conversations and behavior observed in hiking process, total observation time was 30 hours. Data collection began with an intervention begins to determine the baseline or pre-intervention level of the behavior. When an intervention plan had been implemented, data collection continued for 5 hiking trainings. The changes of adaptive behavior for children with ID observed by comparing their behavior from 1<sup>st</sup> training to last training.

#### 2.4 Data Analysis

Descriptive statistic was used for demographic variables and bivariate correlations were conducted between the adaptive behavior total score (ABS) and the physical exercise participation patterns. A p-value of less than 0.05 was considered statistically significant. Analyses were performed using SPSS V 21 (Chicago, IL).

**CHAPTER 3****RESULTS****3.1 Demographic variables**

The demographic variables of the participants (N=53) in 1<sup>st</sup> phase were shown in Table 1.

**Table 1** *Sample demographic information*

|                      | N  | Minimum | Maximum | Mean     | Std. Deviation |
|----------------------|----|---------|---------|----------|----------------|
| Age                  | 54 | 10.00   | 21.00   | 15.3704  | 2.50506        |
| Height               | 47 | 132.00  | 182.00  | 163.7447 | 11.34339       |
| Weight               | 47 | 27.00   | 99.50   | 56.8404  | 17.16817       |
| Working memory index | 54 | 0.00    | 8.00    | 3.0566   | 2.15206        |
| Valid N (listwise)   | 54 |         |         |          |                |

**3.2 Phase 1**

Results revealed that the adaptive behavior total score is significantly correlated with the motivation of physical exercise participation ( $r = 0.36$ ,  $p = .01$ ). The result shown that children with ID with higher motivation would have better adaptive behavior.

**3.3 Phase 2**

As adaptive behavior of children with ID correlates with their motivation in physical exercise participation was proved in the 1<sup>st</sup> phase, further study on motivation of physical exercise participation improves adaptive behavior for children with ID by subjective measure was used. By direct observations for 4 participants from the 1<sup>st</sup> hiking training to the last hiking training for children with ID, there were observable improvement of adaptive behavior. From the first hiking training, all 4 participants have high motivation as it was the first time for them to go out from the classroom and got to natural environment. The motivation level of participants kept increasing from the first to last training as they knew that they were trained

for Oxfam Trailwalker 2018. They also claimed that they would like to conduct physical exercise everyday.

There were four cases to study and participants were named as W,X,Y,Z with high motivation to show the improvement in different aspect of adaptive behavior after a series of hiking training (see appendix III for more information). 4 domains in adaptive behaviors about Self-care, Self-direction, Social Skills and Functional Activities were focused to observe. Improvement in the domain of self-care were obvious in all 4 cases. W was a case observed with improvement on Functional Activities, X was a case observed to have improvement on Self-direction and Y,Z were observed improvement on Social Skills.

## **CHAPTER 4**

### **DISCUSSION**

#### **4.1 Common features in all 4 cases**

Through conversation with all 4 cases in the last training, they felt comfortable and willing to hike from time to time as they knew that hiking brought them benefits such as physical health, emotion and bring them joy. Therefore, their motivation level in hiking trainings kept increasing.

In the domain of Self-care in adaptive behavior, 4 participants got further improvement in this adaptive skill. At the beginning of the trainings, participants were capable to drank water by themselves when they felt thirsty, cleaned their hands and faces when they needed by themselves and wear appropriate amount and types of clothes. The basic self-care skills were able to perform because these actions are necessary for them to survive and they equipped these skills which necessary for them to be able to live independently and successfully within their community in future (Kishore, Astbury, Mason, & Talbot, 2010).

Further improvement in self-care adaptive skills were observed among them, after several hiking training with different routes, length and challenging level, participants well-prepared their own equipment and suitable clothing during hiking training with sufficient food and drinks, being active to perform Self-Check and conduct Peer Check for personal gears before startup, pointed out basic gears needed while hiking, and shown responsibility to environment by leaving no traces after having food and drinks in the hiking trails and took care of their personal belongings. Self-care adaptive skills improved after several hiking trainings by increasing learning opportunities that outside classroom and teachers provided educational instruction in naturally occurring community environments, which provides students with “real life experiences” (Dubberly, 2012). Moreover, participants with high motivation learnt from

teachers and parents through hiking process by their modeling, prompting and reinforcing. According to Downing (2010), when the student begins to perform the skill successfully, the teacher assistance should fade, and their adaptive skills enhanced and consolidated. Participants were capable to self-care independently after several hiking trainings.

#### 4.2 Case 1

In the case of participant W, secured the sense of relatedness with parents was observed at the beginning of hiking training, W frequently used his own mobile phone to call his parents to updates where he was and what he had done in hiking training process. Facing a new and natural environment made W unpeaceful and high dependent on parent was observed for W. Aldersey (2012) stated that family is the first and most enduring unit of society and it usually influence the formation of personality and the growth for children with ID, family members often continue to provide invaluable support throughout their lifespan. In the research of Guralnick et al.,(1995) showed that parents of children with ID place importance on adaptive behavior development and the attitude of parents influences the training of the children with ID and might alter adaptive behavior acquisition (Beckett-Edwards, 1994). Parents has the closest relationship with children, and they gain sense of security and relatedness with live connection through different ways made them feeling better. After several hiking training there was reduced in dialing frequency to parents from time to time until last training and he compromised with teacher not to disturb his parents by frequent phone call. In further hiking training, W got lost in MTR station, he was capable to use his mobile phone to reunite with the team. W was highly depending on his parent to gain sense of security, after several hiking experiences, his adaptive behavior improved in the domain of functional activities that is functioning in the community and capable to perform some tasks independently if asked.

#### 4.3 Case 2

In the case of participant X, improvements on Self-direction skills were observed, at the beginning of training, he underestimated the difficulties of training and did not prepare enough food and water for a 6 hours journey of hiking. In the process of hiking, he began self-talk (talking about the time at different moments) and started to repeat others speaking and single words. Patti, Andiloro & Gavin (2008) stated that individuals with ID were observed to engage in self-talk or 'private speech' that make them work out situations, express inner feelings, and entertain themselves. In certain situations, either positive or negative self-talk occurred to individuals during periods of stress or conflict or to motivate themselves. X was having self-talk about the time possibly reflected the stress in long journey of hiking or other issues. Observing the individual for any change in the quality or content of their self-talk, such as an increase or decrease in volume, or any expressions of fear or anger was important in this case.

In further training, X was adapted to the length and challenges in hiking activities, he was being passionate and having high motivation after arrived a checkpoint and yelled “We are succeeded” like celebration after completed a goal. During hiking process, he sang several songs repeatedly to entertain everyone, especially himself. Although self-talk behaviors remained, positive self-talks were observed, and he brought joy to the team and started to motivate others. Enhancements on Self-direction adaptive skills were observed.

#### 4.4 Case 3

In the case of participant Y, improvement on Social skills were observed. Y seldom talked with people and kept quiet in whole process of hiking training, teachers were afraid he could not express his tiredness and needs during hiking training. Kendall & Owen (2015) stated that individuals with ID can experience communication difficulties that vary from problems expressing psychological experiences to being unable to produce speech. Problems might arise due to a lack of comprehension and a lack of verbal skills and affecting provision of

psychosocial support (Tuffrey-Wijne & McEnhill, 2008). Cogher (2005) stated that communication occurs when two or more people correctly interpret each other's language and/or behavior. People with intellectual disabilities will have some difficulties in communication with others. For example, their speech was difficult to understand, they had problems in expressing themselves because of limited vocabulary and sentence formulation skills (Iacono and Johnson, 2004). X was able to react with teachers' instructions and questions by action but seldom use his speech to react with teachers throughout all hiking trainings.

Argyle (1988) stated that non-verbal communication is five times more influential than verbal communication. Non-verbal communication could be another way for children with ID who have difficulties in express themselves verbally and it include facial expressions, touch, gestures, interpersonal spacing and posture. After several hiking training, although Y seldom talked, he used non-verbal communication to show his care to others by sharing food and hold the hands with peers. It was observable that he felt good to get along with others in group activities.

#### 4.5 Case 4

At the beginning of training process, Z was active to greet everyone he met even if other hikers. Z was talented with sports skills and abled to complete the task with teachers' instruction, but he had poor tolerance and patience to peers and did not want to wait for peers who walked slower and blamed them would make them slow. Poor verbal and social skills were observed in the first 3 trainings, problems in expressing themselves because of limited vocabulary and sentence formulation skills (Iacono and Johnson, 2004). This would make his peer feel unwell in the hiking process.



Improvement on Social skills were observed on participant Z in further trainings. In the training group, there was a child with ID and visual impairment, Z was assigned to take care him by holding his hand together and acted as a blind stick to guide and support him in hiking training. It was a challenge to him and improve his social skills by providing helping hands to the peer with visual impairment. Opportunities were provided to Z to improve his social skills by interacting and getting along with others in need, showing appropriate emotions in training process and assisting others by using appropriate manners (Oakland & Harrison, 2011). Eisenberg and Harris (1984) defined social skills as a set of developmentally related abilities that contribute to an overall level of social competence. The component skills include roles of perspective taking, interpersonal problem solving, moral judgment, self-control and communication facility. In the case of Z, giving a responsibility for him to take care other promote his learning in social skills, he was able to control himself to provide support to other and reduced his inappropriate language used. As he knew there were diversified abilities and characteristics among teammates in hiking training, he became patient and caring to those in needs.

### **Limitations**

Firstly, lacking prior research studies on children with ID and hiking limited the research process, more studies on children with ID and hiking should be focused in future. Secondly, study method may leave room for personal influence and bias during data collection in observation and completing surveys. Observation in phase 2 were subjective to observer and more in-depth interview should be included in future studies. Moreover, Sample size were small in this study as it was difficult to find out special schools to involve and let their student to spend time participate hiking trainings. There were not enough resources to provide manpower to organize trainings with larger sample size. Lack of female sample for comparison in the

findings in phase 2 as there were only male participants in hiking training make the study only focusing on male participants in phase 2.

## **Conclusion**

Motivation of children with ID on physical exercise participation enhancing their adaptive behavior acquisition in 4 domains. When reviewing motivational correlates of physical exercise in children with ID, Hutzler and Korsensky (2010) found that self-perception of perceived competence, social acceptance, self-concept, self-esteem, self-efficacy and well-being were key factors to lead them participate physical exercise. Intrinsic motivation which represents the most autonomous motive in the continuum, and it refers to engaging in an activity because of the pleasure and satisfaction derived from participation (Deci & Ryan, 2000) led children with ID willing to participate physical exercise and improvement in adaptive behavior. According to the Self-Determination Theory (SDT), individuals have innate psychological needs to be competent, autonomous, and to feel socially related (Deci & Ryan, 1985). For the improvement of social skills in adaptive behavior, Pastorfield (2005) found that making new friends as well as gaining social support from family and peers were acted as main contributors to motivation. Oral appreciation from teachers and peers was a motive for them to improve adaptive behavior. It helped them to gain social relatedness and feel good to communicate, participate physical exercise with peers and improve their adaptive behavior to learn how to get along with peers. Hiking is a pleasurable aerobic activity for children with ID to participate outside school settings and let them breath some fresh air in Hong Kong. It is beneficial in increasing self-care ability, social and communication skills in different hiking experiences (Matson, Hattier & Belva, 2012). Therefore, providing opportunities for children with ID to participate hiking activities is another possible way to help children with ID acquire adaptive skills other than staying at school.

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## References:

- Alberto, P., & Troutman, A. (2012). *Applied behavior analysis for teachers* (9th ed.). Columbus, OH: Pearson.
- Aldersey, H. M. (2012). Family perceptions of intellectual disability: Understanding and support in Dar es Salaam. *African journal of disability*, 1(1).
- American Association on Intellectual and Developmental Disabilities (2007). The renaming of mental retardation: Understanding the change to the term intellectual disability. *Intellectual and developmental disabilities*, 45(2), 116-124.
- American Association on Mental Retardation (AAMR) (2002). *Mental retardation: Definition, Classification, and Systems of Support*, 10th edn., Washington, DC: AAMR.
- Argyle, M. (1988). *Bodily Communication*, Methuen & Co. Ltd, London.
- Beckett-Edwards, J. (1994) 'Caregivers' Expectations of Future Learning of Dependents with a Developmental Disability', *Journal of Pediatric Nursing* 9(1): 27–32
- Blakesley, D., Rickinson, M., & Dillon, J. (2013). Engaging children on the autistic spectrum with the natural environment: Teacher insight study and evidence review. Natural England Commissioned Reports, NECR116. London, UK: *Natural England*.
- Cogher, L. (2005) Communication and people with learning disabilities. In: Grant G, Goward P, Richardson M, Ramcharan P (eds). *Learning Disability: a Life Cycle Approach to Valuing People*. Open University Press, Maidenhead: 260-84
- Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied behavior analysis* (2nd ed.). Columbus, OH: Pearson.
- Deci, E.L., & Ryan, R.M. (1985). *Intrinsic motivation and self-determination in human behaviour*. New York, NY: Plenum Press.

- Deci, E.L., & Ryan, R.M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11, 227–268.
- Downing, J. E. (2010). *Academic instruction for students with moderate and severe intellectual disabilities in inclusive classrooms*. Corwin Thousands Oaks, CA: Corwin Press.
- Dubberly, R. (2012). Community-based instruction (CBI) as a component of a successful transition plan for students with intellectual disabilities. *Journal of the American Academy of Special Education Professionals*, 35-46.
- Dumas, J. E. & Lafreniere, P.J. (1993) ‘Mother–Child Relationships as Sources of Support or Stress: A Comparison of Competent, Average, Aggressive, and Anxious Dyads’, *Child Development* 64 (6): 296–318 .
- Dumas, J. E., & LaFreniere, P. J. (1993). Mother-child relationships as sources of support or stress: A comparison of competent, average, aggressive, and anxious dyads. *Child development*, 64(6), 296-318.
- Edwards-Beckett, Joy. "Caregivers' expectations of future learning of dependents with a developmental disability." *Journal of pediatric nursing* 9.1 (1994): 27-32.
- Einfeld, S. L., Ellis, L. A., & Emerson, E. (2011). Comorbidity of intellectual disability and mental disorder in children and adolescents: A systematic review. *Journal of Intellectual and Developmental Disability*, 36(2), 137-143.
- Eisenberg N, Haris, JD (1984). Social Competence - A Developmental Perspective. *School Psychology Review*; 13(3): 267-277.
- Güvendi, B., & İlhan, E. L. (2017). Effects of adapted physical activity applied on intellectual disability students toward level of emotional adjustment, self-managing and the socialization: Parent and teacher interactive research. *Journal of Human Sciences*, 14(4), 3879-3894

- Harris, J. C. (2010). *Intellectual disability: A guide for families and professionals*. Oxford University Press.
- Harrison, P., & Oakland, T. (2003). Adaptive behavior assessment system (ABAS-II). San Antonio, TX: The Psychological Corporation.
- Hong Kong Hong Chi Association, (2004) 'To Know More – Understanding the mentally handicapped' (2004) p. 2.
- Howley, E. T. (2001). Type of activity: resistance, aerobic and leisure versus occupational physical activity. *Medicine & Science in Sports & Exercise*, 33(6), S364-S369.
- Hutzler Y., Korsensky O. (2010). Motivational correlates of physical activity in persons with an intellectual disability: a systematic literature review. *Journal of Intellectual Disability Research*, 54(9), 767-786.
- Iacono, T. & Johnson, H. (2004) Patients with disabilities and complex communication needs. The GP consultation. *Aust Fam Physician* 33(8): 585-9
- Jim, C. Y. (1989). Changing patterns of country-park recreation in Hong Kong. *Geographical Journal*, 167-178.
- Güvendi, B., & İlhan, E. L. (2017). Effects of adapted physical activity applied on intellectual disability students toward level of emotional adjustment, self-managing and the socialization: Parent and teacher interactive research. *Journal of Human Sciences*, 14(4), 3879-3894.
- Kendall, K., & Owen, M. J. (2015). Intellectual disability and psychiatric comorbidity: challenges and clinical issues. *Psychiatric Times*, 32(5), 60-63.
- Kishore, M., Astbury, G., Mason, T., & Talbot, P. (2010). Life skills. *SAGE key concepts series: Key concepts in learning disabilities*. London, UK: Sage UK.
- Luckasson, R., Borthwick-Duffy, S., Buntinx, W. H. E., Coulter, D. L., Craig, E. M., Reeve, A., Schalock, R. L., Snell, M. E., Spitalnik, D. M., Spreat, S., & Tasse', M. J. (2002).

- Mental retardation: Definition, classification, and systems of supports (10th ed.).  
Washington, DC: American Association on Mental Retardation
- Marrus, N., & Hall, L. (2017). Intellectual Disability and Language Disorder. *Child and adolescent psychiatric clinics of North America*, 26(3), 539-554.
- Matson, J. L., Hattier, M. A., & Belva, B. (2012). Treating adaptive living skills of persons with autism using applied behavior analysis: A review. *Research in Autism Spectrum Disorders*, 6(1), 271-276.
- McQuire, C., Hassiotis, A., Harrison, B., & Pilling, S. (2015). Pharmacological interventions for challenging behaviour in children with intellectual disabilities: a systematic review and meta-analysis. *BMC psychiatry*, 15(1), 303.
- Oakland, T., & Harrison, P. L. (Eds.). (2011). *Adaptive behavior assessment system-II: Clinical use and interpretation*. Academic Press.
- Pastorfield, C. (2005). Healthy athletes (No. 29). University of Illinois at Chicago: Special Olympics.
- Patti, P., Andiloro, N., & Gavin, M. (2008). Parent/carer ratings of self-talk behaviour in children and adults with Down syndrome in Canada and the United Kingdom.
- Pestana, M. B., Barbieri, F. A., Vitório, R., Figueiredo, G. A., & Mauerberg-deCastro, E. (2018). Effects of physical exercise for adults with intellectual disabilities: a systematic review. *Journal of Physical Education*, 29.
- Phipps, M. L. (1991). Definitions of Outdoor Recreation and Other Associated Terminology.
- Richardson, R., & Burns, M. (2005). Adaptive Behavior Assessment System (2nd Edition) by Harrison, P. L., & Oakland, T. (2002). San Antonio, TX: Psychological Corporation. *Assessment for Effective Intervention*, 30(4), 51-54.
- Stebbins, R. A. (2004). Pleasurable aerobic activity: A type of casual leisure with salubrious implications. *World Leisure Journal*, 46(4), 55-58.

- Svarstad, H. (2010). Why hiking? Rationality and reflexivity within three categories of meaning construction. *Journal of Leisure Research*, 42(1), 91-110.
- Tuffrey-Wijne, I., & McEnhill, L. (2008). Communication difficulties and intellectual disability in end-of-life care. *International journal of palliative nursing*, 14(4), 189-194.
- Turner, M. (1999). Annotation: Repetitive behavior in autism: A review of psychological research. *Journal of Child Psychology and Psychiatry*, 40 (6), 839–849.
- Williams, M. (2015, July 29). Hiking in Hong Kong – 5 best trails to enjoy with your children. *SCMP*. Retrieved April 49, 2018, from <http://www.scmp.com/magazines/48-hours/article/1843425/five-best-hong-kong-hikes-young-children>
- Yılmaz, A., Şentürk, U. &Demir, E. (2015). Content Analysis of the Applications Toward Physical Activity in Mentally Handicapped. *AcademicSocial Researches Magazine*, 3(13), 312-327.



**Appendix I****About self care ability/ adaptive behavior**

請於下列問題圈上合適的描述 (請相關老師作答)。

|                |   | 題目                         | 不能 | 行為發生頻率             |           |                    |
|----------------|---|----------------------------|----|--------------------|-----------|--------------------|
|                |   |                            |    | 需要時<br>從不 或<br>幾乎不 | 需要時<br>有時 | 需要時<br>總是 或<br>幾乎是 |
| Self-care      | 1 | 感到口渴時會主動飲水                 | 0  | 1                  | 2         | 3                  |
|                | 2 | 完全自己洗手洗臉，洗得乾淨（打水、洗、使用肥皂）等  | 0  | 1                  | 2         | 3                  |
|                | 3 | 自己能穿各種季節衣服稍加提醒，自己能穿各種季節的衣服 | 0  | 1                  | 2         | 3                  |
|                | 4 | 自己能處理簡單外傷如包紮割破的手指等         | 0  | 1                  | 2         | 3                  |
| Self-direction | 5 | 做事持之而行，不會容易灰心放棄            | 0  | 1                  | 2         | 3                  |
|                | 6 | 留意到身邊的環境變化，如天氣、人流等         | 0  | 1                  | 2         | 3                  |
|                | 7 | 把自己的個人裝備收理好，如把帽子、水樽收好。     | 0  | 1                  | 2         | 3                  |



|                          |    |                             |   |   |   |   |
|--------------------------|----|-----------------------------|---|---|---|---|
|                          | 8  | 自我鼓勵完成所訂立的目標                | 0 | 1 | 2 | 3 |
| Social Skill             | 9  | 在集體活動中主動和別人交往，相處融洽          | 0 | 1 | 2 | 3 |
|                          | 10 | 經常主動幫助別人。當被請求時會願意幫助別人       | 0 | 1 | 2 | 3 |
|                          | 11 | 照管妥當個人物品，讓別人覺得非常可靠          | 0 | 1 | 2 | 3 |
|                          | 12 | 與不熟識的人相處                    | 0 | 1 | 2 | 3 |
| Functional activities    | 13 | 自行往返近街或近村                   | 0 | 1 | 2 | 3 |
|                          | 14 | 單獨外出不迷路，如（上學、回家、體育館、去醫院等等。） | 0 | 1 | 2 | 3 |
|                          | 15 | 自行乘搭和換乘公共交通工具               | 0 | 1 | 2 | 3 |
|                          | 16 | 根據周圍事物估計時間（如天氣、人物活動等）       | 0 | 1 | 2 | 3 |
| Numbers of circles count |    |                             |   |   |   |   |
| Total Score              |    |                             |   |   |   |   |



**Appendix II**

一星期做多少次運動（30 分鐘或以上）

A 0 次 B 1-2 次 C 3-4 次 D 5 或以上

1 非常不同意； 2 不同意；3 一般；4 同意；5 非常同意

| 問題                       | 1 | 2 | 3 | 4 | 5 |
|--------------------------|---|---|---|---|---|
| 1) 我做運動時會感到開心。           | 1 | 2 | 3 | 4 | 5 |
| 2) 我很喜歡做運動。              | 1 | 2 | 3 | 4 | 5 |
| 3) 我經常做運動。               | 1 | 2 | 3 | 4 | 5 |
| 4) 如果因為天氣關係令我無法做運動會感到失落。 | 1 | 2 | 3 | 4 | 5 |
| 5) 學校鼓勵我去參加運動。           | 1 | 2 | 3 | 4 | 5 |
| 6) 學校要我做運動，令我培養到做運動的習慣。  | 1 | 2 | 3 | 4 | 5 |
| 7) 我喜歡自己一個做運動。           | 1 | 2 | 3 | 4 | 5 |
| 8) 我喜歡跟不同朋友一起做運動。        | 1 | 2 | 3 | 4 | 5 |
| 9) 運動過後我會感到心情放鬆。         | 1 | 2 | 3 | 4 | 5 |
| 10) 我做運動時識到很多不同的朋友。      | 1 | 2 | 3 | 4 | 5 |
| 11) 做運動之後令到我上課時更專心。      | 1 | 2 | 3 | 4 | 5 |
| 12) 運動後我會很疲倦。            | 1 | 2 | 3 | 4 | 5 |
| 13) 我每日都想去做運動。           | 1 | 2 | 3 | 4 | 5 |
| 14) 我希望可以參加更多運動。         | 1 | 2 | 3 | 4 | 5 |

謝謝你的回答

**Appendix III****Observation Notes for Subjective data Analysis**

| Hiking Training | Date            | Hiking Routes                                                                                         | Approximate Distance | Time Used |
|-----------------|-----------------|-------------------------------------------------------------------------------------------------------|----------------------|-----------|
| 1 <sup>st</sup> | 7th Sept, 2018  | Tai Ping Shan → Pok Fu Lam → Wan Chai Gap → Tai Fung Au → Quarry Bay (Hong Kong Trail)                | 20 km                | 6 hrs     |
| 2 <sup>nd</sup> | 14th Sept, 2018 | Shing Mun Reservoir → Needle Mountain → Lead Mine Pass → Shing Mun Reservoir (MacLehose Trail)        | 15 km                | 6 hrs     |
| 3 <sup>rd</sup> | 28th Sept, 2018 | Shatin Pass Road → Unicorn Ridge → Garter Pass → Kowloon Pass → Beacon Hill (MacLehose Trail)         | 20km                 | 6 hrs     |
| 4 <sup>th</sup> | 5th Oct, 2018   | Wong Nai Chung Reservoir Pass → Violet Hill → Tsin Shui Wan Au → The Twins → Stanley (Wilson Trail)   | 22 km                | 6 hrs     |
| 5 <sup>th</sup> | 12th Oct, 2018  | Pineapple Pass → Ho Pui → Lead Mine Pass → Sze Fong Shan → Tai Mo Shan → Chuen Lung (MacLehose Trail) | 15 km                | 6 hrs     |



| General Direct Observations |                                                                                                          |                                                                                               |                                                                         |                                                                                               |
|-----------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Hiking Training             | Pupil W                                                                                                  | Pupil X                                                                                       | Pupil Y                                                                 | Pupil Z                                                                                       |
| 1 <sup>st</sup>             | Stereotypic behavior (walking and looking around while waiting at roll call venue)                       | Self-talk (talking about the time at different moments)                                       | Admired by teachers because of his physical endurance and tolerance     | Curious to natural environment and always stared for the views                                |
| 2 <sup>nd</sup>             | Always want to call his parents for getting sense of security                                            | Excessive behavior (Repeatedly swinging the body) & non-stop self-talking like a radio player | Behavior deficits (less complex spoken language)                        | Inappropriate behavior (poor tolerance and did not want to wait for others who walked slower) |
| 3 <sup>rd</sup>             | Being active to holding hands with peers when they were asked for pairing up to take care their partners | Singing songs for everyone throughout the process                                             | Keep quiet through the whole training process                           | poor verbal and social skills                                                                 |
| 4 <sup>th</sup>             | Bargained with responsible teacher to call his parents to update where he was                            | Repeated others speaking                                                                      | Understood potential dangers in hiking                                  | Leave no traces after having food and drinks in the hiking trails                             |
| 5 <sup>th</sup>             | Got lost in MTR station and finally reunited with the team                                               | Passionate and having high motivation to complete every challenge                             | React to the situation (car and animals) and took good care for himself | Willing to challenge himself and provide helping hands to the peer with visual impairment.    |



| Observations on the change of Adaptive behavior |                                                                                                                                                                                                                                                                                                   |                                                                                                                                           |                                                                                                          |                                                                                                        |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Hiking Training                                 | Pupil W                                                                                                                                                                                                                                                                                           | Pupil X                                                                                                                                   | Pupil Y                                                                                                  | Pupil Z                                                                                                |
| Improvement on                                  | Self-care & Functional Activities                                                                                                                                                                                                                                                                 | Self-care & Self-direction                                                                                                                | Self-care & Social Skills                                                                                | Self-care & Social Skills                                                                              |
| At the Beginning                                | Always want to use his own mobile phone to call his parents to updates where he was with high frequency usage of mobile phones for getting sense of security                                                                                                                                      | Did not prepare enough food and water for a 6 hours journey of hiking, unexpected the difficulties of the task. Always need rest in team. | Kept quiet through the whole training process and not talking with others                                | Poor tolerance and did not want to wait for others who walked slower.<br>Poor verbal and social skills |
|                                                 | Drank water by themselves when they felt thirsty.<br>Cleaned their hands and faces when they needed by themselves.<br>Wear appropriate amount and types of clothes.                                                                                                                               |                                                                                                                                           |                                                                                                          |                                                                                                        |
| At Last                                         | Learnt to compromise with teacher to call his parents to update where he was.<br>Got lost in MTR station and able to reunite with the team                                                                                                                                                        | Was passionate and having high motivation after arrived a checkpoint. Yelled “We are succeeded”                                           | Understood potential dangers in hiking and would like to share food with peers although he seldom talked | Willing to challenge himself and provide helping hands to the peer with visual impairment              |
|                                                 | Knew and well-prepared own equipment and suitable clothing during hiking training with sufficient food and drinks.<br>Able to perform Peer Check for person gear before startup (pointed out basic gear needed while hiking).<br>Left no traces after having food and drinks in the hiking trails |                                                                                                                                           |                                                                                                          |                                                                                                        |

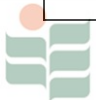




| Hiking Training | Photos of different hiking routes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 <sup>st</sup> | <div data-bbox="423 247 1184 823"></div> <div data-bbox="1196 247 1962 823"></div> <div data-bbox="423 858 1184 1431"></div> <div data-bbox="1196 858 1962 1431"></div> |



2<sup>nd</sup>





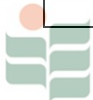








|                       |                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>5<sup>th</sup></p> | <div></div> |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



**End of Papaer**