

RGC Ref. No.: UGC/FDS23/H04/21 <p>(please insert ref. above)</p>
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**RESEARCH GRANTS COUNCIL
COMPETITIVE RESEARCH FUNDING SCHEMES FOR
THE LOCAL SELF-FINANCING DEGREE SECTOR**

FACULTY DEVELOPMENT SCHEME (FDS)

Completion Report
(for completed projects only)

<p><u>Submission Deadlines:</u></p> <ol style="list-style-type: none"> 1. Auditor's report with unspent balance, if any: within <u>six</u> months of the approved project completion date. 2. Completion report: within <u>12</u> months of the approved project completion date.
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Part A: The Project and Investigator(s)

1. Project Title

Effectiveness of Traditional and Modern Taekwondo Training on Behavioural, Physical and Motor Skills Development among Children with Autism Spectrum Disorder

2. Investigator(s) and Academic Department(s) / Unit(s) Involved

Research Team	Name / Post	Unit / Department / Institution
Principal Investigator	Dr. KWOK Heather Hei-man / Lecturer	College of International Education / School of Continuing Education, Hong Kong Baptist University
Co-Investigator(s)	Prof. BAKER Julien Steven / Director (Former post: Director and Professor)	Institute for Population Health, and Medical Informatics (Former serving unit, department and institution: Department of Sport, Physical Education and Health / Hong Kong Baptist University)
	Dr. GAO Yang / Associate Professor	Department of Sport, Physical Education and Health / Hong Kong Baptist University
	Dr. ZHANG Dexing / Research Assistant Professor	JC School of Public Health and Primary Care / The Chinese University of Hong Kong
	Ms. YIP Wai-chi / Lecturer	School of Continuing Education / Hong Kong Baptist University

	Ms. IP Yuen-ying / Lecturer	School of Continuing Education / Hong Kong Baptist University
Others	N/A	

3. Project Duration

	Original	Revised	Date of RGC / Institution Approval (must be quoted)
Project Start Date	01 Jan 2022	/	
Project Completion Date	31 Dec 2023	/	
Duration (<i>in month</i>)	24	/	
Deadline for Submission of Completion Report	31 Dec 2024	/	

4.4 Please attach photo(s) of acknowledgement of RGC-funded facilities / equipment.

Please see Appendix 1.

Part B: The Final Report

5. Project Objectives

5.1 Objectives as per original application

1. To compare the effectiveness of programmes based on traditional and modern taekwondo training on the behavioural, physical and motor skill development of children with autism spectrum disorder (ASD). We hypothesise that a traditional taekwondo training programme would have a greater impact on the behaviour development of children with ASD than a modern taekwondo programme, while no significant mean differences would be observed between the two programmes in physical and motor skill development.
2. To evaluate the effectiveness of traditional and modern taekwondo training programmes based on achievement goal theory for improving the behavioural development of children with ASD. We hypothesise that both taekwondo training approaches will have a positive impact on the behavioural development of children with ASD.
3. To evaluate the effectiveness of traditional and modern taekwondo training programmes based on achievement goal theory for improving the physical development of children with ASD. We hypothesise that both taekwondo training approaches will have a positive impact on the development of physical attributes in children with ASD.
4. To evaluate the effectiveness of traditional and modern taekwondo training programmes based on achievement goal theory for improving the motor skills development of children with ASD. We hypothesise that both taekwondo training formats will have a positive impact on the development of motor skills in children with ASD.
5. To evaluate the retention of traditional and modern taekwondo training programmes based on achievement goal theory for improving the behavioural development of children with ASD. Participants will be required to take part in the outcome measures after the 16-week follow up to identify potential improvement, regression, or maintenance of the interventions.
6. To evaluate the retention of traditional and modern taekwondo training programmes based on achievement goal theory for improving the physical development of children with ASD. Participants will be required to take part in the outcome measures after the 16-week follow up to identify potential improvement, regression, or maintenance of the interventions.

7. To evaluate the retention of traditional and modern Taekwondo training programmes based on achievement goal theory for improving the motor skills development of children with ASD. Participants will be required to take part in the outcome measures after the 16-week follow up to identify potential improvement, regression, or maintenance of the interventions.

5.2 Revised objectives

Date of approval from the RGC: N/A

Reasons for the change: N/A

5.3 Realisation of the objectives

(Maximum 1 page; please state how and to what extent the project objectives have been achieved; give reasons for under-achievements and outline attempts to overcome problems, if any)

The realisation of the objectives set forth in this research project hinges on a systematic and structured approach to assessing the effectiveness of traditional and modern taekwondo training programmes for children with Autism Spectrum Disorder (ASD). Each objective is designed to yield comprehensive insights that can inform both theory and practical application in sports interventions. To achieve this, 113 participants were invited to take part in this study and randomly allocated into the traditional taekwondo group, modern taekwondo group and wait-list control group. After the data collection and cleaning procedure, valid data from 92 participants was obtained in this study (traditional taekwondo group: 31; modern taekwondo group: 28; wait-list control group: 33) for further analysis.

Objective 1:

To compare the effectiveness of programmes based on traditional and modern taekwondo training on the behavioural, physical and motor skill development of children with autism spectrum disorder (ASD).

- Objective 1 was fully achieved
- All participants took part in 3 physical tests and the Test of Gross Motor Development 3 (TGMD-3) at baseline and after the interventions. Besides, the participants' change in behaviors development before and after the interventions were collected by questionnaires which were filled in by parents.

Objective 2-4:

To evaluate the effectiveness of traditional and modern taekwondo training programmes based on achievement goal theory for improving the behavioural, physical and behavioral development of children with ASD.

- All objectives were fully achieved
- The data collection methods were the same as those mentioned in objective 1. Participants' performances in each testing item were collected one week before and one week after the 16-week taekwondo intervention. Paired-t test was used to analyse the data and identify the presence of significant mean difference between the results of pretest and posttest.

Objective 5-7:

The fifth to seventh objectives of this study focus on the retention of the gains achieved through the interventions.

- All objectives were fully achieved.
- After a 16-week follow-up period, participants underwent the same assessments to determine the sustainability of their improvements in physical, motor skills and behavioral outcomes.

5.4 Summary of objectives addressed to date

Objectives <i>(as per 5.1/5.2 above)</i>	Addressed <i>(please tick)</i>	Percentage Achieved <i>(please estimate)</i>
1. To compare the effectiveness of programmes based on traditional and modern Taekwondo training on the behavioural, physical and motor skill development of children with autism spectrum disorder (ASD). We hypothesise that a traditional Taekwondo training programme would have a greater impact on the behaviour development of children with ASD than a modern Taekwondo programme, while no significant mean differences would be observed between the two programmes in physical and motor skill development.	✓	100%
2. To evaluate the effectiveness of traditional and modern Taekwondo training programmes based on achievement goal theory for improving the behavioural development of children with ASD. We hypothesise that both Taekwondo training approaches will have a positive impact on the behavioural development of children with ASD.	✓	100%
3. To evaluate the effectiveness of traditional	✓	100%

and modern Taekwondo training programmes based on achievement goal theory for improving the physical development of children with ASD. We hypothesise that both Taekwondo training approaches will have a positive impact on the development of physical attributes in children with ASD.		
4. To evaluate the effectiveness of traditional and modern Taekwondo training programmes based on achievement goal theory for improving the motor skills development of children with ASD. We hypothesise that both Taekwondo training formats will have a positive impact on the development of motor skills in children with ASD.	✓	100%
5. To evaluate the retention of traditional and modern Taekwondo training programmes based on achievement goal theory for improving the behavioural development of children with ASD. Participants will be required to take part in the outcome measures after the 16-week follow up to identify potential improvement, regression, or maintenance of the interventions.	✓	100%
6. To evaluate the retention of traditional and modern Taekwondo training programmes based on achievement goal theory for improving the physical development of children with ASD. Participants will be required to take part in	✓	100%

the outcome measures after the 16-week follow up to identify potential improvement, regression, or maintenance of the interventions.		
7. To evaluate the retention of traditional and modern Taekwondo training programmes based on achievement goal theory for improving the motor skills development of children with ASD. Participants will be required to take part in the outcome measures after the 16-week follow up to identify potential improvement, regression, or maintenance of the interventions.	✓	100%

6. Research Outcome

6.1 Major findings and research outcome

(Maximum 1 page; please make reference to Part C where necessary)

This research aims to assess the effectiveness of traditional and modern taekwondo training programmes for children with Autism Spectrum Disorder (ASD). 113 participants were recruited from 15 local schools and 1 NGOs for participating in the pretest, posttest, follow-up test and a 16-week taekwondo training. After the data cleaning procedure, valid data from 92 participants was obtained in this study (traditional taekwondo group: 31; modern taekwondo group: 28; wait-list control group: 33) for further analysis.

The first objective of this study aims to compare the effectiveness of traditional and modern taekwondo training on the behavioral, physical, and motor skill development of children with ASD. Other than the performance in vertical jump test, no statistically significant mean difference was identified in physical and motor skill parameters when comparison was made between the two groups. For the behavioral development of children with ASD, participants in the traditional taekwondo group performed significantly differ in the frequency of aggressive behavior and frequency of stereotypical behavior as compared to the participants in modern taekwondo group. Participants in traditional taekwondo group demonstrated a greater improvement in these two parameters after the intervention.

This study also attempts to explore the effectiveness of both traditional and modern taekwondo training on the behavioral, physical, and motor skill development of children with ASD. For the physical development, significant improvements were identified in all testing items for participants in the traditional and modern taekwondo groups. Statistically significant mean difference was also obtained in locomotor skills for both traditional and modern taekwondo groups when comparison was made between the pre-test and post-test. Results supported that both traditional and modern taekwondo training served as an effective tool for children with ASD in developing their physical and motor skills. Although traditional and modern taekwondo training exhibited similar effectiveness in improving the physical and motor skills of children with ASD, the degree of effectiveness of the two training programmes on behavioral development was different. Participants from traditional taekwondo training demonstrated more significant improvements in behavioral development such as having a significant reduction in the frequency of self-injurious, aggressive, disobedience, stereotypical and inappropriate social behaviors. Besides, an improved emotional stability was also observed in participants from the traditional taekwondo group after the intervention. For participants from the modern taekwondo group, statistically significant mean difference was only revealed in the reduction of stereotypical and disobedience behaviors, and emotional instability.

The retention of the gains achieved through the interventions was also assessed in this study. After a 16-week follow-up period, participants underwent the same assessments to determine the sustainability of their improvements in physical, motor skills and behavioral outcomes. When comparison was made between the traditional and modern taekwondo groups, no statistically significant difference was revealed in the retention of outcomes.

7. Layman's Summary

(Describe in layman's language the nature, significance and value of the research project, in no more than 200 words)

In Hong Kong, reports have described a high prevalence of autism spectrum disorder (ASD) among children. This neurodevelopmental disorder is associated with impairments in social interaction, communication, stereotypic behaviors, and delay in motor learning. Although medical and therapeutic treatments are commonly used for children with ASD, exercise was found to have advantages over these treatments as it can be operated at a lower cost with positive impacts covering more dimensions, and delivered to a large group of individuals at the same time.

In this study, children with ASD engaged in either traditional or modern forms of taekwondo training for 16 weeks. The inclusion of taekwondo etiquette is the major difference between the two interventions and this element was removed in the modern taekwondo training. Findings in this study support that both forms of training improve the physical and motor developments of children with ASD at similar level. However, children in traditional taekwondo group exhibited greater improvement in behaviours development than those children in modern taekwondo group. Significant reduction in self-injurious, stereotypical, and aggressive behaviors, and emotional instability was identified in the traditional taekwondo group. For the modern taekwondo group, reduction in stereotypical behavior and emotional instability were observed.

Part C: Research Output**8. Peer-Reviewed Journal Publication(s) Arising Directly From This Research Project**

(Please attach a copy of the publication and/or the letter of acceptance if not yet submitted in the previous progress report(s). All listed publications must acknowledge RGC's funding support by quoting the specific grant reference.)

The Latest Status of Publications				Author(s) (denote the corresponding author with an asterisk*)	Title and Journal / Book (with the volume, pages and other necessary publishing details specified)	Submitted to RGC (indicate the year ending of the relevant progress report)	Attached to this Report (Yes or No)	Acknowledged the Support of RGC (Yes or No)	Accessible from the Institutional Repository (Yes or No)
Year of Publication	Year of Acceptance (For paper accepted but not yet published)	Under Review	Under Preparation (optional)						
2023				Kwok, H.H.M*, Ip, Y.Y., & Yip, W.C.	Proceedings of GSRD International Conference, Japan, 1-8	No	Yes (Appendix 2)	Yes	No

9. Recognized International Conference(s) In Which Paper(s) Related To This Research Project Was / Were Delivered

(Please attach a copy of each conference abstract)

Month / Year / Place	Title	Conference Name	Submitted to RGC (indicate the year ending of the relevant progress report)	Attached to this Report (Yes or No)	Acknowledged the Support of RGC (Yes or No)	Accessible from the Institutional Repository (Yes or No)
Dec/ 2023/ Kyoto, Japan	Effects of a 16-week Theory-based Taekwondo Program on Physical Fitness and Behavioral Development in Children with Autistic Spectrum Disorder: A Randomized Controlled Trial	International Conference on Physical Education and Sport Science	No	Yes (Appendix 3)	Yes	No

17-19 July 2025/Rhine-Ruhr, Germany	Effects of Taekwondo Training on Motor and Behavioural Development in Children with Autistic Spectrum Disorder	FISU World Conference (Submitted)	No	No	Yes	No

10. Whether Research Experience And New Knowledge Has Been Transferred / Has Contributed To Teaching And Learning

(Please elaborate)

The research experience and new knowledge have been transferred to the public including sports coaches, teachers and parents through four major events.

The research experience and new knowledge obtained in this study were shared with students at undergraduate and postgraduate levels in the following courses.

1. SRLP3005 Individual Differences in Cognition, Learning and Skill Acquisition
2. SLM 7090 Development and Management of Sport and Leisure Services for Different Target Groups

11. Student(s) Trained

(Please attach a copy of the title page of the thesis)

Name	Degree Registered for	Date of Registration	Date of Thesis Submission / Graduation
N/A			

12. Other Impact

(e.g. award of patents or prizes, collaboration with other research institutions, technology transfer, teaching enhancement, etc.)

1. In June 2022, Dr. Kwok (PI) was invited by the Community Team Sports Office from the Hong Kong Federation of Youth Groups to present a lecture about teaching sports skills to children with ASD in the SEN Sports Coach Certificate Course. Dr. Kwok shared the characteristics of children with ASD in learning sports skills, the rationale and significance of this study, and the preliminary findings in the pilot study to over 30 participants in the course.

2. In November 2022, Dr. Kwok (PI) was invited by the Community Team Sports Office from the Hong Kong Federation of Youth Groups to share the development of the interventions of this study with over 40 participants in the workshop “Teaching sports skills to children with special education needs”.
3. In April 2023, Dr. Kwok (PI) was invited by the Hong Kong China Taekwondo Association to serve as the guest speaker in sharing the benefits of taekwondo to children with ASD and special taekwondo coaching skills for this population to over 200 taekwondo coaches in Hong Kong.
4. In December 2023, Dr. Kwok (PI) and Ms. Ip (Co-I) organized a sharing seminar on this study with over 100 participants via zoom. Most of the participants were sports coaches, physical education teachers and parents. The significant findings of this research were shared in the seminar. Please refer to Appendix 4 for the poster.

13. Statistics on Research Outputs

	Peer-reviewed Journal Publications	Conference Papers	Scholarly Books, Monographs and Chapters	Patents Awarded	Other Research Outputs (please specify)	
No. of outputs arising directly from this research project	0	1	0	0	Type	No.
					N/A	

14. Public Access Of Completion Report

(Please specify the information, if any, that cannot be provided for public access and give the reasons.)

Information that Cannot Be Provided for Public Access	Reasons
Part 6 (6.2): Potential for further development of the research and the proposed course of action	Intellectual property protection: the new research idea developed by the research team should be kept confidential. This helps to maintain the competitive advantages of the team in applying other research fundings.

Appendix 1:

Photos of acknowledgement of RGC-funded facilities /equipment



