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Effects of a Modified Judo Program on Psychosocial Factors in Typically Developing and Children with Autism Spectrum Disorder: a Mixed-Methods Study

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EFFECTS OF A MODIFIED JUDO PROGRAM ON PSYCHOSOCIAL
FACTORS IN TYPICALLY DEVELOPING AND CHILDREN WITH AUTISM
SPECTRUM DISORDER: A MIXED-METHODS STUDY

by

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A Thesis submitted in partial fulfillment of the requirements
for the Honors in the Major Program in Sport & Exercise Science
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Abstract

PURPOSE: The purpose of this study was to examine the effect of a modified judo training program on psychosocial health in both typically developing (TD) and children with Autism Spectrum Disorder (ASD) using a mixed-methods approach. **METHODS:** The sample consisted of 5 children with ASD and 5 TD children (age=8-11yrs) who participated in 10 sessions of a modified judo program during their typical physical education time for school. Psychosocial factors (enjoyment, perceived competence, benefits of PA) were assessed at baseline and post intervention, with completion of all measures dependent upon the level of comfort expressed by the participant. At the end of the program, children took part in focus group discussions centered around their experience with the program, while key school staff participated in semi-structured interviews based on their observations of the program. All focus group discussions and interviews were audio-recorded and transcribed verbatim. **RESULTS:** Quantitative results for pre and post psychosocial measures showed no significant differences existed between PA self-efficacy ($p=.99$), PA enjoyment ($p=.6$), and barriers to PA ($p=.27$). Qualitative results revealed that the majority of the participants found the program to be enjoyable, with partner centered activities being particularly fun. Suggestions for improvement included increasing the duration and frequency of the judo classes. All children reported a desire to continue participating in the judo classes. Findings from staff interviews indicated that school staff observed improvements in psychosocial health and behavior both immediately following a judo class, and throughout the intervention period. Increased self-confidence was mentioned by all participating school staff members. **CONCLUSION:** Despite the lack of significant quantitative findings, psychosocial

benefits were observed in both TD children and children with ASD, with all participants reporting their desire to continue with the program. Future studies should examine the psychosocial benefits in a judo-training program in larger sample of children over longer durations.

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1. Introduction

The purpose of this study was to examine the relationship between martial arts, through the use of a modified judo program, and its effect on psychosocial health factors in typically developing and children with Autism Spectrum Disorder (ASD). ASD is a neuropsychological condition that affects both individual and social functioning (APA, 2000). According to the CDC, approximately 1 in 68 children has been identified with ASD (CDC, 2016). Children with ASD also express varying degrees of associated symptoms and deficits (Wiggins et al., 2015). Individuals diagnosed with ASD demonstrate deficiencies in social interaction, communication skills, and motor performance, which leads to difficulties with balance control and motion planning; these attributes all being ones of focus when the children were analyzed (Pan et al., 2009; Vernazza-Martin et al., 2005).

Strategies prior to this study for the treatment of ASD focused on the reduction of inappropriate stereotypical behaviors, with emphasis on improving cognitive, language, and social deficiencies in children, and few interventions being done on increasing motor skills or incorporating physical activity (PA) into treatment (Colombo-Dougovito, 2015). In recent years, the concept of PA as an alternative form of treatment for children with ASD has been gaining support, especially with evidence showing that 31% of adolescents with ASD are obese compared to 13.1% of typically developing children (Phillips et al., 2014). To add to the physical benefits, PA has been shown to decrease stereotypical social, emotional, and behavioral characteristics typical to ASD (Movahedi et al., 2013, Schmitz Olin et al., 2017).

This study investigates martial arts (MA), a form of PA that has been showing an increased popularity in the reduction of stereotypical behaviors (Bahrami et al., 2012; Bell et al., 2016). MAs being once viewed in the western world as being barbaric, has been gaining increased popularity in the last few centuries for its promotions to physical and mental health, showing increases in self-confidence and esteem (Weiser & Kuts, 1995). Such as in traditional Taekwondo, for example, a focus is put on teaching an individual to become more self-aware and to actively pursue personal growth through increasing evaluation of one's thoughts and actions in search of improvement (Lake, 2013). One study specifically, by Bahrami et al., 2012, found that after a 14-week MAs training remine, children with ASD showed significant reduction in stereotypical behavior from pre- to post. In addition, data from a supporting study found lower scores of hostility and aggression and/or higher scores of self-esteem and positivity with traditional MA students when compared to children of other sports (Zivin et al., 2001). And another study found that a participant following a MA program acted in less aggressive behavior and learned to better interact with others (McKeehan, 2012).

Further, many treatments of ASD focus on the improvement of social, communication, and task skills, but little focus has been put into PA and increasing motor development skills (Colombo-Dougovito et al., 2015). Low levels of PA have been shown to be directly linked to increased risk of cardiovascular disease, type 2 diabetes, and obesity. Regular participation in PA has been linked to losing and keeping weight off and shows increases in both mental and physical health (CDC, 2015). Since children with ASD generally participate in PA less than their TD counterparts, they are at a 40% higher risk of becoming obese (Lawson & Foster, 2016). This study expands the use of various methods of PA, specifically MA, as a form of both increasing PA and

increasing psychosocial health factors in children with varying exceptionalities (VEs).

Like this study exams, Judo training can provide ancillary benefits beyond traditional PA for TD children and children with VEs, as it has also been linked to numerous psychosocial benefits such as greater life satisfaction, decreased anxiety, improved self-esteem and confidence, and greater communication skills (Bahrami et al., 2016; Glesser & Lison, 1986). Children practitioners of judo often demonstrate positive outlooks on other forms of PA, increased attitudes towards PA, and excitement toward training days (Strekowicz- Przybycień et al., 2014). Most judo techniques require the ability to work with a partner, and its unique emphasis on physical education (PE), intellectual training, and social interaction, provides a novel platform for children with VEs. Additionally, judo can be easily transitioned into PE and school sport programs (Sterkowicz- Przybycień et al., 2014). This pilot study examined the psychosocial effects of a modified judo program as well as the feasibility and burden of the program within the school setting over a 5-week period.

2. Methods

Recruitment

The sample consisted of 10 participants, 4th and 5th graders approximately 10-12 years of age, from an elementary school in Orlando, Fl. This sample was recruited through the UCF Center for Autism and Related Disabilities. All procedures were approved by the University of Central Florida Institutional Review Board and consent/child assent was obtained by parents and children.

Judo Program

The judo program was led by a USA Judo certified coach and occurred at a frequency of two times a week over a five-week period during the child's typical PE time. The HIM researcher, committee chair, and/or additional committee member were present at every session, ensuring proper execution of the program and assisted in additional supervision of the child participants. Each session occurred in 50-minute bouts and consisted of a warm-up and stretching session, followed by a series of solo and partner-oriented judo exercises of moderate to vigorous intensity. The study participants began their introduction to judo by learning formal opening/closing procedures (i.e.: bowing procedures), how to put on and care for their judo gi (uniform), and a variety of basic body weight exercises. As the participants advanced through the program they learned how to fall safely, move effectively with a partner, balancing/unbalancing strategies, and standing-based (foot sweeps) judo techniques. Each session closed with a cool-down and mind-body exercises to encourage self-regulation and reflection.

Quantitative Measures

Physical Activity Self-Efficacy

Self-efficacy for PA was measured using a previously validated modified version of the original scale (Motl et al., 2002). This scale consisted of questions that measure children's confidence in their ability to overcome barriers and engage in PA. The questionnaire starts, "I can be physically active during my free time on most days..." Followed by the statements, "no matter how busy my day is," "even if it is very hot and cold outside," and "even if I have to stay at home." Response options for this 5-point scale range from 1 ("Disagree a lot") to 5 ("Agree a lot"). Internal consistency for this scale in a school-based sample of 100 children was $\alpha=0.76$ (Motl et al., 2002). A higher score on this scale is indicative of greater self-efficacy associated with PA. A protocol of the questionnaire is provided in the Appendix.

Physical Activity Enjoyment

PA enjoyment was measured using a validated modified version of the original scale (Motl et al., 2002) with questions that start "When I am active..." followed by the items "I feel bored," "I dislike it," and "It frustrates me." The 5-point scale contains responses that range from 1 ("Disagree a lot") to 5 ("Agree a lot"), with a higher score indicative of more enjoyment related to PA. A protocol of the questionnaire is provided in the Appendix.

Perceived Barriers to Physical Activity

Perceived barriers to PA were measured with a 4-item adapted scale from a validated modified version of the original scale (Elder et al., 2009) which asked, "How often do these things keep you from being physically active?" Items included "The weather is bad," "I don't have time

to do physical activity,” “It would take time away from my school work,” and “I’m embarrassed about how I look when I’m active.” The 5-point scale ranges from 1 (“very often”) to 5 (“never”), with a higher score indicative of fewer barriers. A protocol of the questionnaire is provided in the Appendix.

Quantitative Analysis

Paired samples t-tests were used to compare all the relevant variables prior to and following the program.

Qualitative Measures

Participant Focus Groups

After the cessation of the program, participants were invited to take part in a focus groups to discuss their reactions to the judo intervention. The 3 main areas of focus being: 1) Overall thoughts of the program; 2) Positive and negative reactions to the intervention; 3) Improvements and adjustments to the program; 4) Interest in continuing the judo program; and 5) Feelings towards physical activity, in general. The focus groups lasting approximately 10-15 minutes.

School Principal and Physical Education Instructor Interviews

Informal interviews were conducted with both the PE teacher and the school principal. Questions focused on the feasibility of implementation of the program, the perception of the participants’ experiences with the program, faculty and staff burden, changes in participants’ behaviors, and strategies to improve the program for future use. Both participant focus groups and school staff interviews were audio-recorded and transcribed verbatim.

Qualitative Analysis

Focus group discussions were transcribed verbatim and coded independently by two research assistants, who met to then discuss and resolve any inconsistencies. Responses provided by participants were tallied for each question category. Content from individual interviews were examined for specific themes.

3. Results

Quantitative Results:

Table 1 displays the psychosocial measures at baseline and post-intervention. For pre and post psychosocial measures, no significant differences existed between PA self-efficacy ($p=.99$), PA enjoyment ($p=.6$), and barriers to PA ($p=.27$).

Table 1. Participant psychosocial measures (n=10)

Factors	Baseline	Post-intervention
PA self-efficacy	14.9 (2.56)	14.9 (2.99)
PA enjoyment	56.9 (7.44)	55.7 (10.4)
PA barriers	15.2 (5.49)	13.8 (6.79)

*indicates significant differences between baseline and post measures

Qualitative Results:

Judo Program

All 10 of the children participated in the program and the in the focus groups. Table 2 presents their positive and negative responses provided to the questions asked. In all, the majority of the children found enjoyment in the judo program, and specifically found the partnered-center nature of the training notably fun. One male participant in particular stating: “I loved everything about the program! Especially getting to wear the uniforms.” And one of the female participants addressed the social aspect of the program with stating: “I like that I could do the activities with my friend.” Acknowledging, the negative aspects of the program, about four of the participants did not appreciate the program being only five weeks long and wanted it to be longer. Additionally, some participants want more frequency of classes a week, suggesting three times a week as

opposed to only twice a week. Two of the children stated that they missed their normal PE class and had the suggestion of the program being offered as an after-school program or as an additive to the normal PE class.

Suggestions for improvement of the program included the lengthening of the program duration, and increasing the frequency of the judo training from two to three sessions per week. Additionally, two participants suggested receiving tokens instead of medals for the conclusion of the program. This could be in reference to tokens the students receive for good behavior which allows them special privileges. One of the children felt that the length of the classes (50 minutes) could have been longer.

All of the participants stated they would choose to participate in the judo program if it was ever offered again and asked about other opportunities to participate in similar activities.

Reaction to Assessment Measures

The participants reported that they enjoyed wearing the wrist accelerometer equipment because it allowed them to follow how many steps they were taking and were able to compete with each other to see who could take more steps. Several participants remarked: "I liked seeing my activity. It reminded me to move a lot," and "I wish we could keep the watches." Many of the children did not enjoy certain assessments measures, mainly, the heart rate variability assessment which required them to lay down for 10 minutes without moving or talking. One of the female participants stated: "I didn't like laying on the mat for so long. I started to sleep," and another saying, "It was boring to lay there. I kept moving even though I was supposed to be quiet. That's too hard."

Table 2. Participant responses from focus groups

Question	Most Frequent response(s)	# of Positive responses	# of Negative responses
Overall Reaction	Enjoyed program	10	0
Positive reaction	Exercises were fun	9*	0
Negative reaction	Didn't enjoy some of the assessment measures	3 (reported no negative parts of program)	5*
Suggestions for improvement	Longer duration and frequency (semester long)	6 (suggestions to improve future program) *	0
Continuation of program	Yes	10	0

*All 10 participants did not respond

Staff Interviews

The interviews from the staff reported an overall positive feedback for the judo program. Table 3 shows a synopsis of the responses received from the staff and principal during the interviews. The principal and PE instructor also stated that they did not recall hearing any negative responses from the participants regarding the judo program. In addition, both professionals reported varying improvements amongst the participants in physical and psychosocial aspects. They also welcomed the fact of the continuing the program in the future. Suggested improvements from staff included closer collaboration and open communication with the teaching staff regarding program curriculum and logistics.

Table 3. Staff responses from informal interviews

Question	Notable Quotes from PE teacher and principal
Overall student perception	<p><i>I strongly believe that the students in the judo program really enjoyed participating. I never heard one negative comment from any students.</i></p> <p><i>Only negative comments I heard were from students who were not in the program and wished they were.</i></p>
Perceived Benefits	<p><i>Students can gain confidence, become more self-aware of their body, and how their body moves, students can learn a way to defend themselves can be important while moving through different ages and situations in life.</i></p> <p><i>The program helped out our teachers a lot and allowed them much needed planning time at the end of the year when they really needed it.</i></p>
Limitations & suggestions for improvement	<p><i>I think a few things could be done to make the program more convenient for teachers such as writing out a schedule for them to follow throughout the study. Giving times, dates, and what the students will be doing.</i></p>
Perceived student behavior change	<p><i>I did notice some changes in the students. They seemed more confident in themselves and more aware of their body movements. The confidence was very noticeable.</i></p> <p><i>Students in the program also decreased in the area of incident reports as measured by the school's documentation process.</i></p>
Generalizability	<p><i>I truly believe that a program like this can benefit students in every school if the proper discipline is instilled.</i></p>
Continued implementation	<p><i>Yes, we would be happy to continue the judo program at our school. It would be great if we could include more students in this program.</i></p>

4. Discussion

The purpose of this study was to examine the effects of a modified judo program on the psychosocial health of both TD children and children with ASD. Although there were no significant quantitative findings, results from the qualitative analysis indicated that participants found the intervention to be an overall positive experience and interviews with the school staff revealed observed benefits as a result of the program.

The use of an inclusive environment is highly encouraged to increase feelings of overall well-being in children with ASD and other disabilities, however, no studies have examined a PA program in an inclusive environment (Individuals with Disabilities Education Act). The utilization of an inclusive environment may be even more beneficial for a PA program such as judo which emphasizes partner-centered exercises (National Development Center for Autism Spectrum Disorder; Houston-Wilson & Lieberman, 2003). Inclusive environment factors also show benefits for typically developing children as well, and allows TD children to serve as role models for children with ASD (Rachna Khare & Abir Mullick, 2009). Additionally, mind-body exercises show promise in increasing mental health in individuals with ASD, which should remain a focus for other studies (Chan et al., 2015).

Despite positive feedback from staff, teachers, and participants from the program, there was no significant quantifiable psychosocial improvements at the cessation of the program. This can be due to factors such as the small sample size, short duration of the program, and inability to monitor outside lifestyle factors (e.g. diet). ASD severity level was not clearly established either

for uniformity across the sample. Future studies should examine whether ASD severity may moderate the association between an exercise program and psychosocial benefits.

Several limitations should be noted. As previously mentioned, the lack of quantitative results may be due to the small sample and short duration of the current study. Additionally, due to the small sample size, we were unable to stratify the sample to compare TD children and children with ASD. However, several strengths can be observed in this study. This is the first study to utilize an inclusion classroom setting (both TD children and children with ASD) to participate in a modified judo program. This study utilized a mixed-methods approach, utilizing questionnaires and focus groups/interviews to gather data on psychosocial health factors. To further examine the benefits of this program, a larger sample size is needed and examining adolescents may be recommended since adolescents with VEs may be at a higher risk for sedentary behavior (Srinivasan et al., 2014).

5. Conclusion

This study shows promise in the feasibility of implementing a modified judo program into an inclusive school. Although, not quantitatively expressed, qualitative analysis reveals that participants of the program express positive experiences. To obtain significant quantifiable data, the use of a larger sample size over a longer duration is required. Increases in confidence of students was noticed by PE teacher and other staff. Additionally, the program helped the teachers by offering them extra time in the day while the children participated in the program, which was appreciated by the teachers.

This pilot study demonstrates feasibility of the development and implementation of a modified judo program in a classroom of both TD children and children with VEs. This study gained feedback from teachers and staff, as well as identified strategies that can be used in future interventions. Specifically, improvements on feasibility and efficacy of future judo programs included: closer collaboration with school staff to develop a more structured schedule and outlining the curriculum of the program, using the program as an addition to regular PE rather than an alternative, and holding the program over a full school semester rather than 5 weeks.

6. Appendix

PHYSICAL ACTIVITY SELF-EFFICACY

1. I can be physically active during my free time on most days...
 - a. No matter how busy my day is
 - i. Strongly disagree
 - ii. Somewhat disagree
 - iii. Neither agree nor disagree
 - iv. Somewhat agree
 - v. Strongly agree
 - b. Even if it is very hot or cold outside
 - i. Strongly disagree
 - ii. Somewhat disagree
 - iii. Neither agree nor disagree
 - iv. Somewhat agree
 - v. Strongly agree
 - c. Even if I have to stay at home
 - i. Strongly disagree
 - ii. Somewhat disagree
 - iii. Neither agree nor disagree
 - iv. Somewhat agree
 - v. Strongly agree

PHYSICAL ACTIVITY ENJOYMENT

1. When I am physically active...
 - a. I feel bored
 - i. Strongly disagree
 - ii. Somewhat disagree
 - iii. Neither agree nor disagree
 - iv. Somewhat agree
 - v. Strongly agree
 - b. I dislike it
 - i. Strongly disagree
 - ii. Somewhat disagree
 - iii. Neither agree nor disagree
 - iv. Somewhat agree
 - v. Strongly agree
 - c. It frustrates me
 - i. Strongly disagree
 - ii. Somewhat disagree
 - iii. Neither agree nor disagree
 - iv. Somewhat agree
 - v. Strongly agree

BARRIERS TO PHYSICAL ACTIVITY

1. How often do these things keep you from being physically active?
 - a. The weather is bad
 - i. Never
 - ii. Rarely
 - iii. Sometimes
 - iv. Often
 - v. Very often
 - b. I don't have time to do physical activity
 - i. Never
 - ii. Rarely
 - iii. Sometimes
 - iv. Often
 - v. Very often
 - c. It would take time away from my school work
 - i. Never
 - ii. Rarely
 - iii. Sometimes
 - iv. Often
 - v. Very often
 - d. I'm embarrassed about how I look when I'm active
 - i. Never
 - ii. Rarely
 - iii. Sometimes
 - iv. Often
 - v. Very often

Principal/Instructor Sample Style Questions

1. What is the overall perception of the students following the program?
2. What perceived benefits were recognized in the students?
3. What (if any) are the limitations to the program?
4. What are suggestions for improvement?
5. Were there any perceived behavior changes following the program?

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