

# VALIDATION OF A CLASSIFICATION SYSTEM: For athletes in adapted judo competitions



The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein

EU Project Identifier: 612954-EPP-I-2019-I-ES-SPO-SCP

Co-funded by the  
Erasmus+ Programme  
of the European Union





## Contents

<b>Introduction .....</b>	<b>2</b>
<b>Method.....</b>	<b>4</b>
<b>Participants.....</b>	<b>4</b>
<b>Classification protocol and assignment to categories .....</b>	<b>5</b>
Table 1. Classification system proposed for Special Needs Judo Union (2018) and adopted for Special Olympics (2020). .....	5
<b>Data collection procedure.....</b>	<b>6</b>
<b>Statistical Analysis .....</b>	<b>6</b>
<b>Results .....</b>	<b>7</b>
<b>Table 2. Classification of the recorded bouts by each rater. ....</b>	<b>7</b>
<b>Table 3. Fleiss kappa (95% CI) for inter-rater agreement, overall Fleiss kappa     and percentage of total agreement.....</b>	<b>8</b>
<b>Table 4. Fleiss kappa (95% CI) for level allocation agreement and overall Fleiss     kappa and percentage of total agreement. ....</b>	<b>8</b>
<b>Discussion.....</b>	<b>8</b>
<b>Conclusions .....</b>	<b>10</b>
<b>References.....</b>	<b>10</b>



## Introduction

The positive effects of physical and athletic activity on the overall health of young people with intellectual disabilities (ID) have been well documented (Kapsal et al., 2019). In broad terms, the positive effects can be grouped into two areas. Firstly, there are benefits for physical health, including improvements in physical aptitudes and bone metabolism, an increase in the performance of cardiovascular and respiratory muscles, and decreases in the likelihood of obesity and a sedentary lifestyle. Secondly, there are psychosocial effects, which can include greater functional independence and fuller inclusion in social life, as well as cognitive benefits and increases in various aspects of psychological wellbeing (especially in terms of self-esteem, self-competence and positive self-perception) (Scifo et al., 2019). Despite this evidence, a number of studies nonetheless show that people with mental disabilities tend to spend much less time than others on physical activity (Jung et al., 2018), and that these individuals tend to be in worse physical condition than the population on average (Oppewal et al., 2013) and are more likely to be obese (McConkey et al., 2019). For these reasons, it is highly desirable to develop and implement athletic programs and other educational strategies to help people with intellectual disabilities to improve their physical condition and to motivate them to take part in regular sports or exercise programs.

In light of this need, a number of adapted sport and exercise programs have been developed with the aim of helping people with ID improve their quality of life. Recent years have seen the publication of studies detailing experiences in this regard involving sports such as soccer (Ryuh et al., 2019), tennis (Favoretto et al., 2020) and baseball (Cunningham & Warner, 2019). Meanwhile, a number of systematic reviews and meta-analyses have also measured the positive effects that physical exercise and participation in sports programs including swimming, track and team sports can have for this population (Bondár et al., 2020; Scifo et al., 2019; Thomson et al., 2020). In terms of the type of ID, these studies predominantly focus on people with Down Syndrome (DS) or Autism Spectrum Disorder (ASD), while a lesser number of researchers have also looked at people with Prader-Willi Syndrome (Kapsal et al., 2019).

In addition to the sports mentioned above, several studies have also provided evidence of the benefits offered by participation in martial arts programs that are adapted to meet the needs of people with ID (Masleša et al., 2012). Research has shown these programs



to be especially effective at improving the motor skills of people with ASD (Kim et al., 2016; Sarabzadeh et al., 2019) or DS (Carter & Horvat, 2016). These activities have also proven to have psychosocial benefits, with karate katas aimed at people with ASD, for example, having been shown to lead to significant improvements in stereotyped behaviors and social interaction (Bahrami et al., 2012; Movahedi et al., 2013). The characteristics of martial arts make them well suited to the population with ID because of their moderate to strenuous intensity and the added mental components of concentration and self-control (Garcia et al., 2019). Martial arts can also be appealing to young people with ASD because of the repetitive nature of the exercises involved (Bell & Allen, 2016). Recent research into the effects of judo participation on children with ASD has yielded promising initial results, pointing to psychosocial benefits such as increases in both social skills and self-esteem (Rivera et al., 2020). Participants have also tended to engage in moderate to strenuous physical activity more often and to reduce the time they spend on sedentary behavior (Garcia et al., 2019).

The proliferation of adapted judo programs for people with ID has meant continuous growth in the number of participants in this activity. Thanks to this growing popularity, a number of adapted judo competitions are now held in various places. Institutions such as the Special Needs Judo Union (SNJU) and the Special Olympics have led the way in organizing a growing number of competitive opportunities for people with ID.

The rules governing these events have evolved and improved over time, with organizers striving to guarantee the safety of all the athletes who take part. These rulebooks, jointly developed by adapted judo referees and coaches, have been put to the test over the past four years of tournaments. The regulations are now applied by adapted judo associations in 28 different countries around the world (Special Needs Judo Union, 2018). With the aim of establishing worldwide standards for adapted judo events, the Special Olympics has adopted the SNJU regulations, helping to ensure that participants from different countries are afforded the same kinds of opportunities. The rules currently in force classify participants into five levels based on their skill level. This is distinct from the previous classification system, which placed participants according to their age and weight class. The technical rules and the scoring system are very similar to those of the International Judo Federation, with some minor adaptations aimed at ensuring the participants' safety.



The rules governing these events have evolved and improved over time, with organizers striving to guarantee the safety of all the athletes who take part. In 2018 the latest rulebook update was released after two years of testing. This update was developed by international experts in adaptive judo in conjunction with experienced adaptive judo referees and coaches from various countries across Europe. In the past two years (2018-2020) these rules were used in all major national and international adaptive judo tournaments, including Special Olympics World Games.

The regulations are now applied by adapted judo associations in 28 different countries (Special Needs Judo Union, 2018) and 46 Special Olympic countries & territories worldwide (Special Olympics, 2020).

With the aim of establishing worldwide standards for adapted judo events, the same rule set of the 2018 SNJU rules have been adopted by Special Olympic International in their 2020 updates. The rules currently in force classify participants into five levels based on their skill level. This is distinct from the mainstream classification system, which places participants according to their age and weight class. The technical rules and the scoring system are very similar to those of the International Judo Federation, with some minor adaptations aimed at ensuring the participants' safety.

## **Method**

This study consisted of two methodological phases. The first took the form of an application of the Delphi Technique (Hsu & Sandford, 2007) in order to assess the validity of the proposed classification system. Six experienced experts offered their opinions as to the classification of athletes with a disability in adapted judo competitions. The resulting proposals were applied at different competitions, and the experts used the feedback obtained from the events to inform a series of changes to their criteria. They repeated this process until they had come to a consensus. The second phase consisted of an inter-rater reliability test aimed at measuring the degree of agreement between observers applying the classification system. To accomplish this, the raters viewed a number of video recordings of judo bouts.

## *Participants*

Six raters (five men and one woman) took part in the classification process. Each of them had at least four years of experience working with adapted judo athletes. Three of the raters were internationally certified referees with experience classifying tournament



participants, and the other three were adapted judo coaches who had taken part in international competitions. The raters watched 20 videos of official adapted judo competitions, with each recorded match corresponding to one of the five proposed classification categories.

All the participants explicitly stated that they were taking part in the study voluntarily. The study was approved by the Research Ethics Committee of the Universitat Ramon Llull in Barcelona (Spain), under reference number CER URL 2019\_2020\_003. All the research protocols used in this study are in compliance with the requirements set out in the 1975 Helsinki Declaration and the subsequent revisions of this document.

### *Classification protocol and assignment to categories*

The adaptive judo classification system was established to ensure that Special Needs judo athletes could be appropriately divided into categories to ensure their safety in the context of competitions. The classification system has five levels 1 – 5, with 1 representing the highest ability level and 5 indicating the lowest ability level.

The levels are determined according to a functional criteria. The raters compare the skill level of the SN-judoka with that of mainstream competitive judoka (for level 1) or that of a mainstream recreational judoka (levels 2-5). The Special Needs Judo Union (2018) classification system for all kinds of adapted judo tournaments follows below (Table 1):

Table 1. Classification system proposed for Special Needs Judo Union (2018) and adopted for Special Olympics (2020).

<p>Level 1 is a judoka who can perform in a contest with a typical developed competitive judoka. This judoka is fast and powerful and has an excellent reactivity. He/she has a strong feeling for Judo and an excellent strategic view. This type of judoka has a minimal disability and therefore usually attends regular education. In general, these are judoka with high functioning autism or light physical disability, as well as hearing impaired judokas and some judoka with ID that have progressed beyond level 2.</p>
---

<p>Level 2 is a judoka who can perform <i>randori</i> with typical developed recreational judoka. This judoka is fast and powerful and has moderate reactivity but is usually slow to respond to judo situations. He/she has good judo feeling, but usually no effective strategy.</p>
--



Level 3 is a judoka who can perform a playful *randori* with typical developed recreational judoka. This judoka is reasonably fast and powerful and has reasonably developed reactivity, but is almost always slow responding to situational judo. Strategy for this type of judoka consists of repeating the same technique over and over.

Level 4 is a judoka who can grapple and play with another judoka of the same or comparable level. Reactivity is suboptimal. Usually the only judo technique consists of takedown and immobilize.

Level 5 is a judoka who can grapple and play with other judoka of the same level. These judokas are very passive, or respond very slowly. Constant coaching to take action is necessary. When they end up in *osae-komi*, the action to escape can take a very long time.

#### *Data collection procedure*

All the matches were video recorded from the same angle in order to ensure that all the participants' moves were visible. The length of each recording was limited to one minute in order to force the raters to issue a judgement under conditions even more demanding than they would likely face in real life.

Prior to the data collection process, the expert raters reviewed the SNJU classification criteria (2018) that have been adopted by the Special Olympics (2020). A multiple choice, video-based Moodle system (with users able to choose from five options) was developed to allow the participants to watch the recorded adapted judo matches and select what they believed to be the corresponding level. Twenty videos in total were presented, showing matches at varying levels (from 1 to 5) (Level 1=3, level 2=2, level 3=7, level 4=5, level 5=3).

#### *Statistical Analysis*

Two methods were used to quantify the degree of inter-rater agreement as to the analysis and classification of the recorded matches. These inter-rater agreement calculations were the Intraclass Correlation Coefficients (ICC) method and the Fleiss-Kappa measure. The ICC was calculated using a two-way mixed and absolute agreement. An ICC value above 0.8 was considered excellent, 0.7-0.8 good, 0.5-0.7 fair and below 0.5 poor (Blacker & Endicott, 2000). Along with the ICC, we also calculated the Standard Error of Measurement (SEM) to calculate the variability of the scores, for which we used



the formula ( $SEM=SD \times \sqrt{(1-ICC)}$ ) (Weir, 2005). Following Landis and Koch, (1977) Fleiss Kappa was interpreted such that a Kappa value  $<0.0$  corresponds to poor agreement, 0.0-0.2 to slight agreement, 0.2-0.4 to fair agreement, 0.4-0.6 to moderate agreement, 0.6-0.8 to substantial agreement and 0.8-1 to near perfect agreement. Confidence intervals (CI) of 95% are reported with the ICC and Fleiss Kappa values. Statistical analyses were performed using SPSS software v.24 (SPSS Inc., Chicago, IL, USA).

## Results

The six raters displayed an excellent degree of agreement in their classification of the recorded matches into the range of levels. The ICC value calculated was 0.91, and the SEM was 0.36 (CI of 95%, 0.84 to 0.95,  $p < 0.001$ ). Table 2 shows the raters' classifications for each of the bouts.

(Table 2 approx here)

Table 2. Classification of the recorded bouts by each rater.

Bout	Rater 1	Rater 2	Rater 3	Rater 4	Rater 5	Rater 6	Level allocation
1	4	4	5	4	4	4	4
2	4	5	4	5	4	5	5
3	4	4	4	4	4	4	4
4	2	3	3	3	3	3	3
5	1	2	1	1	1	1	1
6	1	2	2	2	2	2	2
7	5	5	4	5	5	5	5
8	1	1	1	1	1	1	1
9	3	3	3	3	3	3	3
10	3	3	3	3	3	3	3
11	5	5	5	5	5	5	5
12	4	3	4	3	4	4	4
13	4	4	4	4	4	4	4
14	3	2	3	3	3	3	3
15	2	2	2	1	1	1	1
16	4	3	3	4	4	4	4
17	2	2	2	2	2	2	2
18	3	3	2	2	3	3	3
19	3	3	3	3	3	3	3
20	2	3	3	3	3	3	3

The Fleiss Kappa values calculated among the six raters reflected agreement between substantial and nearly perfect, with a mean percentage of agreement of 85% (Table 3).





Table 3. Fleiss kappa (95% CI) for inter-rater agreement, overall Fleiss kappa and percentage of total agreement.

	<b>AVAL_1</b>	<b>AVAL_2</b>	<b>AVAL_3</b>	<b>AVAL_4</b>	<b>AVAL_5</b>	<b>AVAL_6</b>	<b>Overall</b>
<b>Level</b>	0.67	0.67	0.60	0.87	0.93	1	0.79
<b>Allocation</b>	(0.41-1.03)	(0.43-1.05)	(0.39-0.97)	(0.54-1.20)	(0.52-1.08)	(0.76-1.24)	(0.52-1.22)
<b>% agreement</b>	80%	75%	70%	90%	95%	100%	85%

The Fleiss Kappa calculations all indicated at least substantial degrees of agreement (with the proportions of agreement reaching at least 77.77%) (Table 4), with the exception of the bouts assigned to level 2.

Table 4. Fleiss kappa (95% CI) for level allocation agreement and overall Fleiss kappa and percentage of total agreement.

	<b>LEVEL_1</b>	<b>LEVEL_2</b>	<b>LEVEL_3</b>	<b>LEVEL_4</b>	<b>LEVEL_5</b>	<b>Overall</b>
<b>Inter-Rater Allocation</b>	0.71 (0.59-0.82)	0.49 (0.38-0.60)	0.71 (0.59-0.82)	0.68 (0.56-0.79)	0.71 (0.59-0.82)	0.66 (0.60-0.72)
<b>% agreement</b>	77.77%	91.66%	90.47%	83.33%	83.33%	85%

## Discussion

The objective of this study was to assess the reliability of the new evidence-based functional classification system for participants in adapted judo competitions. The goal of these standards is to classify athletes with intellectual disabilities according to their functional skills in adapted judo, and to do so in a way that is both objective and repeatable.

The high level of agreement between the raters is reflected in the ICC calculation, which yielded a figure of 0.91. This indicates an excellent degree of inter-rater reliability, showing that the system produces consistent results with different raters. The fact that the levels of inter-rater reliability found in this study were so high is especially significant given that the video recordings used were only one minute long. This limited opportunity for observation might have been an obstacle to the classification, and such a limitation would not be an issue under normal circumstances. However, the fact that the raters were able to observe bouts meant that they could analyze two participants at once. This provided them with additional information to inform their classification.

The Fleiss Kappa values indicated that the degree of agreement among all the raters ranged from substantial to nearly perfect agreement, with an average value of 0.79. One possible explanation for the high level of inter-rater reliability found here is the fact that this classification system has already been in use for a few years in unofficial competitions and exhibition matches. In other words, the referees and coaches who are responsible



for applying these standards are already familiar with them. Earlier studies (Escolar et al., 2001) have found that the inter-rater reliability of tests measuring athletes' functional skills tends to increase when the raters have more training and experience. Our study further confirms this, as the raters who displayed the greatest degree of agreement were those with the most experience and those who were certified referees. The latter are responsible for classifying athletes prior to competitions. In light of this, it is clear that future raters should be given practical training in order to ensure they have the experience they need.

The level of agreement reflected by the Fleiss Kappa values for the assignment to categories was not as high as it was for the raters, but it was nonetheless considerable. All the classification levels showed a substantial degree of agreement (0.6-0.8) with the exception of level 2, where the figure was 0.49, indicating only moderate agreement. However, this was the category that showed the highest percentage of overall agreement (91.66%). This discrepancy between the low Fleiss Kappa value and the high overall agreement is likely due to the fact that this category was the least represented in the sample (only two bouts). A study by Rosén et al. (2020) on the reliability of a classification system for Paralympic athletes in a sport called *Para Va'a* reached a similar conclusion. This study found that tests with a lesser prevalence of cases yielded lower values, evidence that Fleiss Kappa statistics are affected by the number of cases in each category (Delgado & Tibau, 2019).

The results of this study can be approached as nominal variables in that each level corresponds with an independent category, but they can also be taken as ordinal variable, in that each level represents a progression with respect to the level below it. Adapted judo athletes are placed into five categories based on the assessment of raters. The method used here to assess inter-rater reliability is a way to quantify the degree of agreement among a group of raters who independently analyze and score a group of participants (Hallgren, 2012). More specifically, this study has used to agreement analysis methods, the ICC and the Fleiss-Kappa, in order to establish the level of agreement between the raters and to analyze the data collected. The fact that the ICC calculations yielded higher values than the Fleiss-Kappa can be explained by the kind of data used in this study. The Fleiss-Kappa test is better suited to use with nominal variables such as data collected using a Likert scale, while the ICC is more effective with ordinal data (Hallgren, 2012). Therefore, it is possible to conclude that the ICC test is the best fit



when it comes to making inferences about the agreement between raters, while the Fleiss Kappa also allows us to analyze the degree of agreement attained within each category.

A number of prior studies have examined the validity and reliability of a range of different classification methods for athletes in adapted sports (Altmann et al., 2013; Connick et al., 2016; Pernot et al., 2011; Rosén et al., 2020; Tweedy & Vanlandewijck, 2011).

## Conclusions

This study represents an important step forward in the classification of participants in adapted judo competitions for people with ID. The study found high levels of inter-rater reliability using different methods of analysis of scores assigned to video recorded matches. Future international adapted judo competitions for people would benefit from further field studies to confirm the reliability of this classification system.

## References

- Altmann, V. C., Groen, B. E., Van Limbeek, J., Vanlandewijck, Y. C., & Keijsers, N. L. W. (2013). Reliability of the revised wheelchair rugby trunk impairment classification system. *Spinal Cord*, *51*(12), 913–918.
- Bahrami, F., Movahedi, A., Marandi, S. M., & Abedi, A. (2012). Kata techniques training consistently decreases stereotypy in children with autism spectrum disorder. *Research in Developmental Disabilities*, *33*(4), 1183–1193.  
<https://doi.org/10.1016/j.ridd.2012.01.018>
- Bell, A., & Allen, M. (2016). Using Martial Arts to Address Social and Behavioral Functioning in Children and Adolescents With Autism Spectrum Disorder. *Therapeutic Recreation Journal*, *50*(2), 176–181. <https://doi.org/10.18666/TRJ-2016-V50-I2-7287>
- Blacker, D., & Endicott, J. (2000). Psychometric properties: concepts of reliability and validity. In A. Ruush, M. First, & D. Blacker (Eds.), *Handbook of psychiatric measures*. American Psychiatric Publishing.
- Bondár, R. Z., di Fronso, S., Bortoli, L., Robazza, C., Metsios, G. S., & Bertollo, M. (2020). The effects of physical activity or sport-based interventions on psychological factors in adults with intellectual disabilities: a systematic review. *Journal of Intellectual Disability Research*, *64*(2), 69–92.



- Carter, K., & Horvat, M. (2016). Effect of Taekwondo Training on Lower Body Strength and Balance in Young Adults with Down Syndrome. *Journal of Policy and Practice in Intellectual Disabilities, 13*(2), 165–172.
- Connick, M. J., Beckman, E., Deuble, R., & Tweedy, S. M. (2016). Developing tests of impaired coordination for Paralympic classification: normative values and test–retest reliability. *Sports Engineering, 19*(3), 147–154.
- Cunningham, G. B., & Warner, S. (2019). Baseball 4 All: Providing Inclusive Spaces for Persons with Disabilities. *Journal of Global Sport Management, 4*(4), 313–330.
- Delgado, R., & Tibau, X.-A. (2019). Why Cohen’s Kappa should be avoided as performance measure in classification. *PLoS One, 14*(9), e0222916.
- Escolar, D. M., Henricson, E. K., Mayhew, J., Florence, J., Leshner, R., Patel, K. M., & Clemens, P. R. (2001). Clinical evaluator reliability for quantitative and manual muscle testing measures of strength in children. *Muscle & Nerve: Official Journal of the American Association of Electrodiagnostic Medicine, 24*(6), 787–793.
- Favoretto, L., Hutchison, Z., Mowling, C. M., & Pangelinan, M. M. (2020). Improvements in tennis skills in adults with developmental and intellectual disabilities following an 8-week adapted tennis program. *Journal of Motor Learning and Development, 1*(aop), 1–17.
- Garcia, J. M., Leahy, N., Rivera, P., Renziehausen, J., Samuels, J., Fukuda, D. H., & Stout, J. R. (2019). Brief Report: Preliminary Efficacy of a Judo Program to Promote Participation in Physical Activity in Youth with Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders, 50*(4), 1418–1424. <https://doi.org/doi:10.1007/s10803-019-04338-w>
- Hallgren, K. A. (2012). Computing inter-rater reliability for observational data: an overview and tutorial. *Tutorials in Quantitative Methods for Psychology, 8*(1), 23.
- Hsu, C.-C., & Sandford, B. A. (2007). The Delphi technique: making sense of consensus. *Practical Assessment, Research, and Evaluation, 12*(1), 10.
- Jung, J., Leung, W., Schram, B. M., & Yun, J. (2018). Meta-analysis of physical activity levels in youth with and without disabilities. *Adapted Physical Activity Quarterly, 35*(4), 381–402.
- Kapsal, N. J., Dicke, T., Morin, A. J. S., Vasconcellos, D., Maiàno, C., Lee, J., & Lonsdale, C. (2019). Effects of physical activity on the physical and psychosocial health of youth with Intellectual disabilities: A systematic review and meta-Analysis. *Journal of Physical Activity and Health, 16*(12), 1187–1195.



- Kim, Y., Todd, T., Fujii, T., Lim, J.-C., Vrongistinos, K., & Jung, T. (2016). Effects of Taekwondo intervention on balance in children with autism spectrum disorder. *Journal of Exercise Rehabilitation, 12*(4), 314–319. <https://doi.org/doi:10.12965/jer.1632634.317>
- Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics, 159*–174.
- Masleša, S., Videmšek, M., & Karpljuk, D. (2012). Motor abilities, movement skills and their relationship before and after eight weeks of martial arts training in people with intellectual disability. *Acta Gymnica, 42*(2), 15–26.
- McConkey, R., Sadowsky, M., & Shellard, A. (2019). An international survey of obesity and underweight in youth and adults with intellectual disabilities. *Journal of Intellectual & Developmental Disability, 44*(3), 374–382.
- Movahedi, A., Bahrami, F., Marandi, S. M., & Abedi, A. (2013). Improvement in social dysfunction of children with autism spectrum disorder following long term Kata techniques training. *Research in Autism Spectrum Disorders, 7*(9), 1054–1061.
- Oppewal, A., Hilgenkamp, T. I. M., van Wijck, R., & Evenhuis, H. M. (2013). Cardiorespiratory fitness in individuals with intellectual disabilities—a review. *Research in Developmental Disabilities, 34*(10), 3301–3316.
- Pernot, H. F. M., Lannem, A. M., Geers, R. P. J., Ruijters, E. F. G., Bloemendal, M., & Seelen, H. A. M. (2011). Validity of the test–table–test for Nordic skiing for classification of Paralympic sit-ski sports participants. *Spinal Cord, 49*(8), 935–941.
- Rivera, P., Renziehausen, J., & Garcia, J. M. (2020). Effects of an 8-Week Judo Program on Behaviors in Children with Autism Spectrum Disorder: A Mixed-Methods Approach. *Child Psychiatry & Human Development*. <https://doi.org/doi:10.1007/s10578-020-00994-7>
- Rosén, J. S., Goosey-Tolfrey, V. L., Tolfrey, K., Arndt, A., & Bjerkefors, A. (2020). Interrater Reliability of the New Sport-Specific Evidence-Based Classification System for Para Va'a. *Adapted Physical Activity Quarterly, 1*(aop), 1–12.
- Ryuh, Y., Choi, P., Oh, J., Chen, C.-C., & Lee, Y. (2019). Impact of Inclusive Soccer Program on Psychosocial Development of Children with and without Intellectual Disabilities. *Journal of Developmental and Physical Disabilities, 31*(5), 691–705.
- Sarabzadeh, M., Azari, B. B., & Helalizadeh, M. (2019). The effect of six weeks of Tai Chi Chuan training on the motor skills of children with Autism Spectrum Disorder. *Journal of Bodywork and Movement Therapies, 23*(2), 284–290.



- Scifo, L., Chicau Borrego, C., Monteiro, D., Matosic, D., Feka, K., Bianco, A., & Alesi, M. (2019). Sport intervention programs (SIPs) to improve health and social inclusion in people with intellectual disabilities: A systematic review. *Journal of Functional Morphology and Kinesiology*, 4(3), 57.
- Special Needs Judo Union. (2018). *Rules for Special Needs Judo*. <https://snju.org/rules-and-regulations-for-special-needs-judo-2017-english/>
- Special Olympics. (2020). *Sport Rules 1*. [https://resources.specialolympics.org/sports-essentials/sports-and-coaching/judo?\\_ga=2.253857800.1893156716.1601627461-134918636.1596443713](https://resources.specialolympics.org/sports-essentials/sports-and-coaching/judo?_ga=2.253857800.1893156716.1601627461-134918636.1596443713)
- Thomson, A., Bridges, S., Corrins, B., Pham, J., White, C., & Buchanan, A. (2020). The impact of physical activity and sport programs on community participation for people with intellectual disability: A systematic review. *Journal of Intellectual & Developmental Disability*, 1–11.
- Tweedy, S. M., & Vanlandewijck, Y. C. (2011). International Paralympic Committee position stand—background and scientific principles of classification in Paralympic sport. *British Journal of Sports Medicine*, 45(4), 259–269.
- Weir, J. P. (2005). Quantifying test-retest reliability using the intraclass correlation coefficient and the SEM. *The Journal of Strength & Conditioning Research*, 19(1), 231–240.