Title: The role of technology in facilitating play for children with physical disabilities: development of the Dice Model of Play

Ethics: HS26236 (H2023:343)

Approval Date: February 15, 2024

Approved files:

Protocol (January 22, 2024)

Consent Phase 1 (January 22)

Consent phase 2 (January 22)

Assent phase 1 (November 14)

Assent phase 2 (November 14)

Consent for experts (November 14)

Version date: January 22, 2024

The role of technology in facilitating play for children with physical disabilities: development of the Dice Model of Play

Background and significance

UNICEF [1] considers the right to play a fundamental children's right, serving as a cornerstone of their development [2]. Children with physical disabilities (CWPD) face fewer opportunities to engage in play due to their health conditions and existing environmental barriers [3]. In rehabilitation, play is mainly used as a tool to foster a child's cognitive [4] and physical skills [5]; this might not be seen as "play" from a child's perspective. There has been a recent shift towards recognizing and enhancing the intrinsic value of play, referred to as "play-for-the-sake-of-play," where play is essential for its value and nature rather than its utility in developing other skills [6].

Despite the importance of play, a comprehensive theoretical framework that includes all the facets of play is lacking, and existing research on play mainly emphasizes play benefits. Models and theories developed so far are each focused on a singular facet of play, such as the model of playfulness[7] and the theory of play by Piaget (focus on cognitive dimensions of play)[8], Vygotsky[9] and other theoreticians[10]. **Improving play experiences for CWPD requires a comprehensive understanding of all of its diverse facets.** In this proposed research, we introduce a play model named the "Dice Model of Play" (Figure 1) that draws together the many facets that need to be considered when we want to examine play from a holistic perspective. As depicted by the Dice Model of Play, play is likened to throwing a dice on a board. Anyone can throw a dice, and the play process starts at the point when someone throws the dice. What we view as a final product of play varies based on facets such as the environment where it occurs (indoor or outdoor) [11], the incorporation of technology, age-related stages of play skills (social and cognitive dimensions) [12], and a child's characteristics (physical, mental, psychological) [13]. Play happens at all ages, but developmental age provides a context that can shape play (Figure 1). *Play participation*, or a child's engagement in play, is shaped by the interaction of these facets, powered by a child's eagerness for play, i.e., playfulness [14], resulting in observable play content known as play themes [15]. It is essential to support children's play in ***each*** facet, as deficits in any of these facets can affect play participation and lead to restricted play experience.

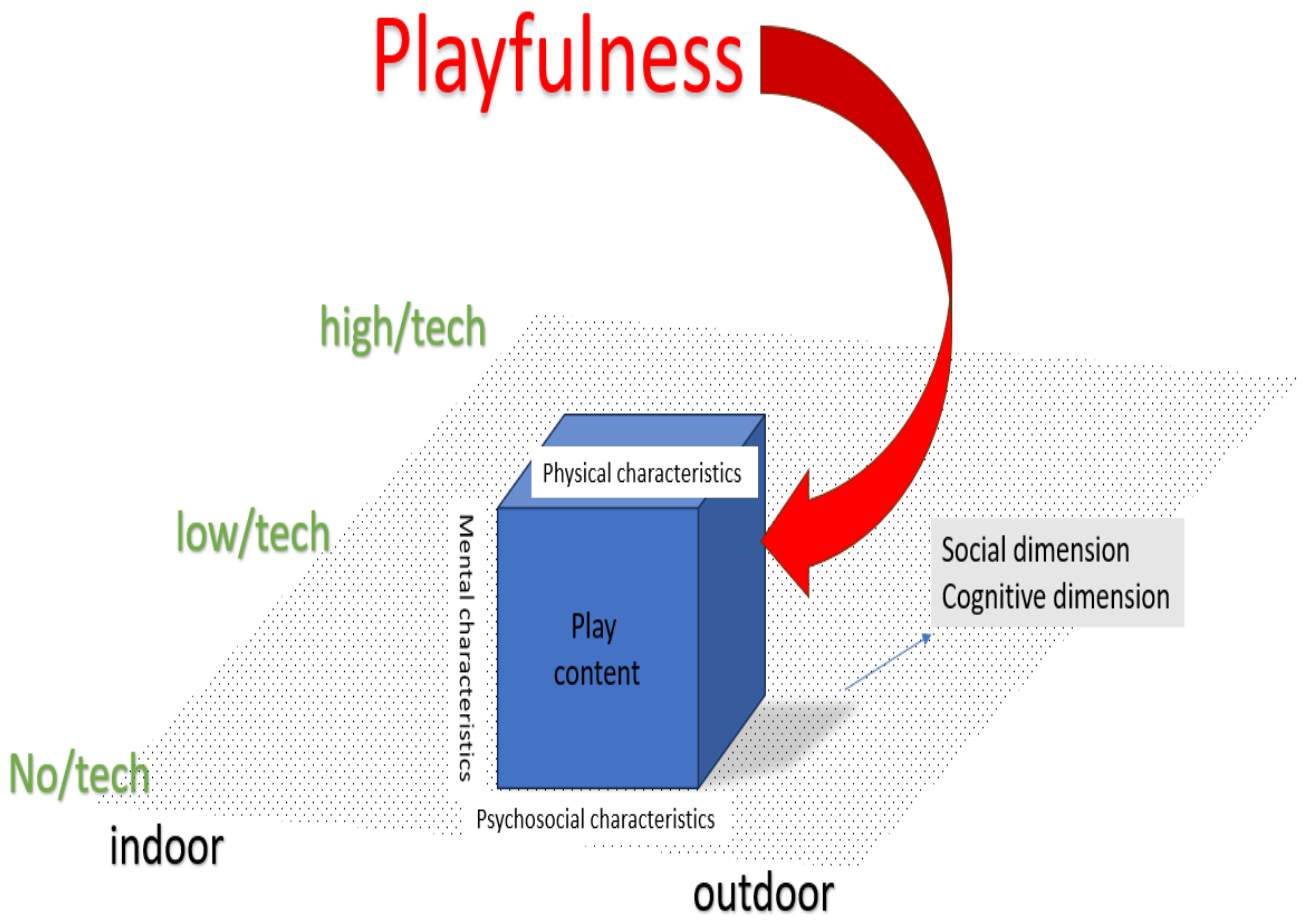

Figure 1: Proposed Dice Model of Play

Technology is a promising avenue for supporting play for the sake of play in CWPD. We recently conducted a scoping review to explore the literature on the role of technology in improving play[16]. Very few studies were located that examined technology's role in play-for-the-sake of play, although some technologies have been shown to improve cognitive and social play skills and playfulness [16]. Even among studies examining cognitive skills, there is a notable gap in coverage across cognitive play types. Most studies predominantly explore practice play and play with rules, with comparatively fewer investigations into the effects of pretend play and constructive play [15]. Robots have shown some potential as a technology to improve play skills and playfulness in CWPD [17]. LEGO™ robots are a commercially available technology that could be used for research and clinical use; however, using them for CWPD may require some adaptation [18]. LEGO™ Robots have been used in studies for fostering cognitive and educational abilities [19,20], social interactions [21], and play[22]. A scoping review on using LEGO™ robots for children with disabilities highlighted that the positive impact of LEGO™ Robots was highly dependent on how it was used [23]. In other words, just providing LEGO™ was not enough to improve play-related outcomes; instead, *how* LEGO™ is incorporated into play serves an essential role in findings. We assert that use of technology, when conscientiously implemented, may be an important intervention to improving the play experiences of CWPD.

This study aims to lay the foundation for validating the Dice Model of Play. Fully comprehending and influencing children's play necessitates a strong theoretical framework and a scientific perspective, after which the development of standardized assessment tools and interventional protocols can ensue. Building this Model accurately, providing evidence for its use, ensuring conceptual clarity and comprehensiveness, and clarifying and agreeing upon key variables is crucial for advancing the field of play studies for CWPD.

Research Purpose:

The aim of this study is to **validate and revise the Dice Model of Play to develop a comprehensive model of play**. Specifically, though an iterative process, we will:

- Explore how the variables proposed in the Dice Model of Play match family and children's experiences and insights;
- Examine how the Dice Model of Play works in practice, using the introduction of LEGO technology as an example to test theoretical relationships;
- Understand how experts view the Dice Model of Play in terms of clarity, comprehensiveness, relevance, and applicability.

Research Methods:

The proposed study uses a mixed-method approach in three phases, concurrently integrating qualitative and quantitative in the first two phases followed by a qualitative phase data. (Figure 2).

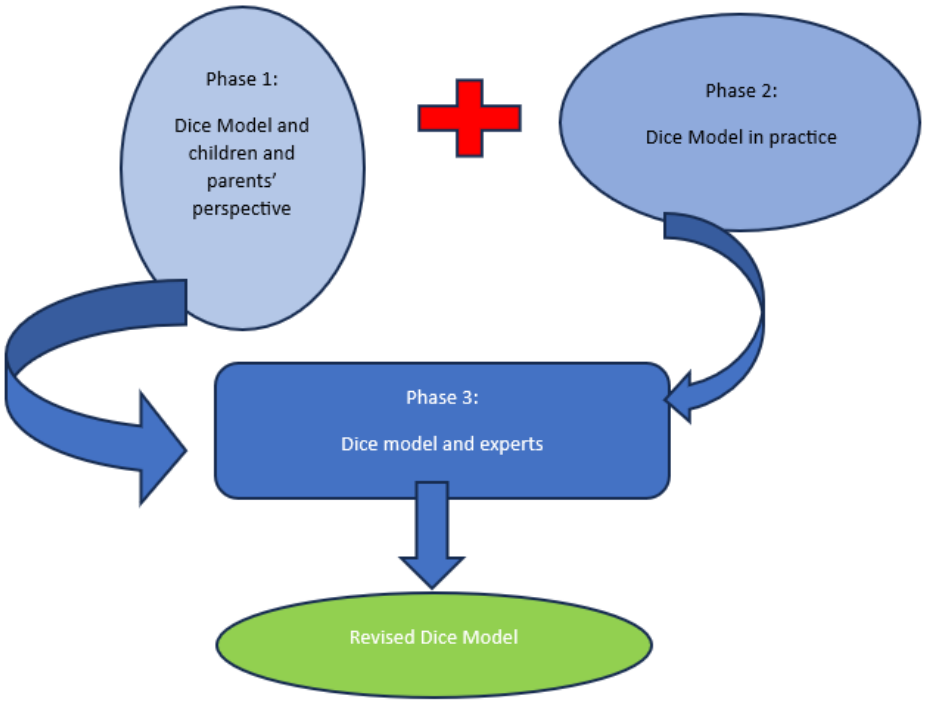

Figure 2- Study process

Phase 1: Explore how the variables proposed in the Dice Model of Play match family and children's experiences and insights. In this phase, 10 children and their guardians will be recruited. Participants will be recruited from the Rehabilitation Centre for Children (RCC) at the Specialized Services for Children and Youth (SSCY) Centre. RCC staff can send our recruitment material through the consent to contact for future research database. The researchers will not have any access to client records. And the research department will send recruitment materials on our behalf. Children with a developmental age of 3-8 years old, diagnosed with a physical disability, living in Winnipeg, and speaking and understanding English (needed to communicate in play with the research assistant) will be included. The exclusion criterion will be primarily neuro-cognitive symptoms such as Autism, and receiving play therapy within the last three months. We will only ask parents about the type of physical disability for the demographic form. Participants will complete consent (parents) and assent (for children) forms. Younger children or those who cannot understand the assent, will receive verbal description and answer to the question that: "Do you like to play today?" and a demographic questionnaire (child's gender, age, developmental history, diagnosis, and history of play therapy). Semi-structured interviews will be conducted with each child-guardian dyad of participants. Interview questions will focus on the different facets of play proposed in the Dice Model of Play, their understanding and meaning of play (including play for the sake of play), children's desires and barriers to play, and opportunities and potential benefits of using technology for helping children to play. The interviews' focus will be on understanding the effects of technology in helping children to play. Interviews will be transcribed, coded and analysed using content analysis [24].

Phase 2: Examine how the Dice Model of Play works in practice, using the introduction of LEGO technology as an example to test theoretical relationships. To examine the Dice Model of Play in practice, 10 children will participate in co-designing a LEGO™ robots with the researcher. For this part sampling would be like phase 1. Phase 1 participants will also be asked to participate in this phase as they wish, however this part is independent from the previous phase and participants can be totally different. The inclusion and exclusion criteria are the same like phase one. To examine the DMP in practice, ten children will participate in co-designing LEGO™ robots a dog's robot, or dog robot's home based on their ability, choice and developmental age with the researcher—some adaptations in instruction or building robots might be made based on the participants' conditions. A crossover trial design will be used (Figure 3). As this study is an initial preliminary pilot study to construct the concept of Dice Model of Play, we believe that 10 children would be a good number which according to several sessions of play, and assessment and co-design it will bring enough and valuable information. The recruitment will be from RCC, including those who participated in step I. At baseline, three play assessments will be administered by the principal investigator (MD) at the Rehabilitation Centre for Children (RCC). The Test of playfulness (TOP) version 4 (Bundy, 1998) is an observational test that covers four main elements of playfulness: intrinsic motivation, internal control, freedom of reality, and framing within 29 Likert scale related to extent, intensity, and skillfulness and is used for children between 15 months and 18 years old[25].. The TOP has been established as a valid and reliable test, and 88% of CWPD showed reliability, according to Rash analysis[26]. The Child Initiated Pretend Play Assessment (ChIPPA-2) provides a play tool pack consisting of two different sets: conventional and symbolic play tools. Percentage of Elaborated Play Actions (PEPA), Number of Object Substitutions (NOS), and Number of Imitations (NIA) are reported for conventional, symbolic, and general pretend play. Construct validity of the ChIPPA is reported as good (Cronbach's alpha coefficient >0.81) [27] and it is a valid and reliable test according to a scoping review published in 2022 [28]. ChIPPA was developed for 3 to 7 years old children however it has been used for children between 8 to 12 years old as well[28]. The Pretend Play Enjoyment-Developmental Checklist (PPE-DC) measures play

enjoyment and covers some aspects of pretend play, such as sequences, storytelling, playing with dolls, object substitution, roleplay, and social interaction, from parents and experts prospectives within two different scoresheets[29].PPEDC is a suitable test for children between the ages of 12 months and 7 years[30]. All these age ranges are defined within developmental age. The bias is reduced by not conducting intervention by the PI, but the PI will do the assessments. As assessments are standardized, bias will be reduced, and PI will not look at any results until data collection is completed for that child.

Participants will be randomly allocated to groups A or B. Those in group A will co-design and build their LEGO™ robot, using the researcher's assistance, as led by the child. A go-along interview will be conducted during the co-design with the child [31]. The co-design session will be video recorded to provide context, visual data, and to inform the qualitative analysis. Videos will be deleted right after analysis. A research assistant (RA) will visit the participant's home twice a week for 30 to 45 minutes (after school or on the weekend) to play with the child and their built LEGO™ robots for four weeks (8 sessions total). Group B will engage in the same process of 8 play intervention sessions over four weeks with the research assistant; however, they will receive conventional play tools. The RA will carry a prepared play pack for the play intervention session. After four weeks, the same three play assessments will be administered. In step II of the cross-over design, Group B will engage in the LEGO™ robot co-design session and proceed with the 8-session play intervention. Group A will receive the conventional toys in the play pack for their 8-session play intervention. At the conclusion, the three play assessments will be re-administered. The play tools will be left in toy lending library at RCC, and children and their family will be informed that they can have access to these play materials after the research. Also disinfecting wipes after each use is predicted for sanitary concerns. While it is not anticipated that damage to the robot will occur, we have enough robots to replace if it happens. Descriptive statistics for demographic data and non-parametric statistics (or ANOVA after normality test) for TOP, ChIPPA-2, and PPE-DC will be applied. SPSS-26 will be used for statistical analysis. All the statistics will follow a confidence interval of 95%, and the level of significance will be defined at 0.05. Interviews will be analysed using thematic content analysis[32]. Results of Phase 1 and 2 will be used to modify changes to the Dice Model of Play to be used in phase 3.

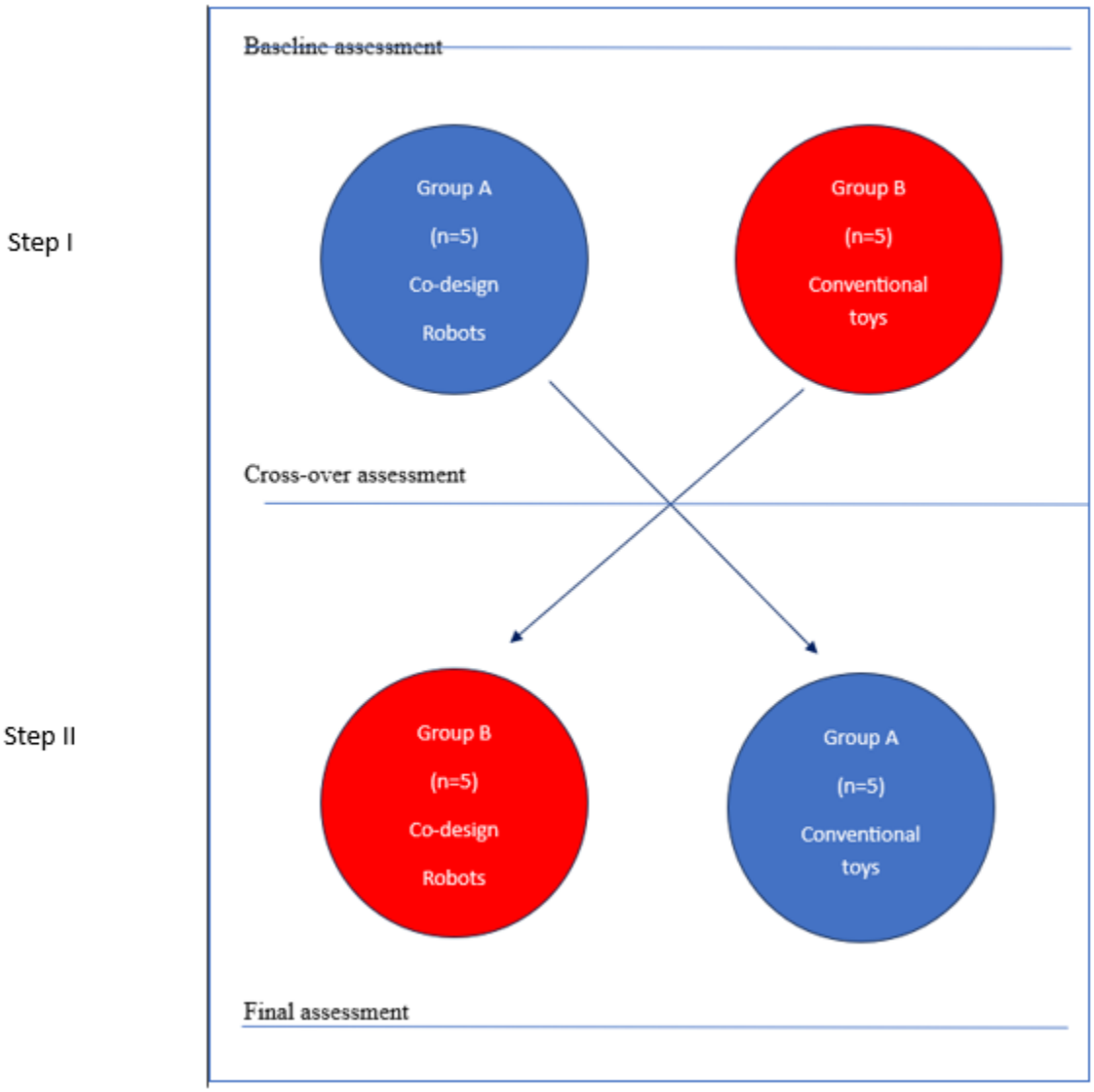

Figure 3- Phase2

Phase 3: Understand how experts view the Dice Model of Play in terms of clarity, comprehensiveness, relevance, and applicability. The Dice Model of Play (2.0) will be shared with experts and professionals in occupational therapy, psychology, and computer science each with at least 5 years of experience of working in the area of play for CWPD, or human-computer-interactions. Although the number of participants is defined as 18, it will not be limited to this number and sampling will continue until the data saturation and as we feel there is no additional modifications to the Dice Model of Play. For recruitment, experts in play and human-computer interaction will be invited via email, based on their publications, and works in this field. Snowball sampling will be conducted to reach more participants. On-line focus groups will consist of 4-6 English or Persian-speaking (PI is native Persian-speaker) international experts who will meet using an online platform. We will provide

some preliminary information about the Dice Model of Play at the beginning of the session. Using case examples, we will ask semi structured questions on the different facets, gaps, and potential application, and technology's potential in each facet. Clarity, coherence, relevance and applicability, comprehensiveness, credibility, and creativity of the model will be discussed. Interviews will be transcribed and subjected to content analysis [24].

The final phase of this research will be to produce a theoretical paper that presents the revised model.

Data management plans

All the gathered data will be stored in a secured file in teams and hard copies will be stored in a locked file in Dr. XXXXX office, which all will be destroyed after 2 years. Video recordings will be done by a laptop which is not connected to cloud and will be immediately deleted after analyzing. Audio recordings will be gathered by devices which are not connected to cloud and will be deleted right after transcription.

Research Knowledge translation:

Results of this research will be published separately through each phase in shape of paper, research conference and poster presentation. We plan some local and international conferences. Our planned conferences and seminars are Canadian occupational therapy association conference 2025, American occupational therapy conference 2025, Iranian occupational therapy association conference 2025, breakfast at SSCY seminar series and other probable opportunities. We will also publish our findings in open-access journals.

Research team

This project is a part of post-doctoral fellow project for XXXXX which is done under supervision and guidance of XXXXXXX.

XXXXXX is a professor in the Department of Occupational Therapy at the University of Manitoba. Her research program focuses on using technology to support participation among people with disabilities. In this project, she will provide expert advice to the PI on the research processes and assist with data analysis and knowledge translation.

XXXXXX is a post-doctoral fellow at the University of Manitoba with a background in occupational therapy in all her previous educations. Her research is on play, play assessment tools, interventions, and concepts, especially for children with special needs. She is the project's principal investigator (PI) and will complete drafts, a part of sampling and assessments (with the help of an RA), and data analysis.

A research assistant (Master of Occupational Therapy student) will be hired to assist in this project to transcribe interviews and assist in the play intervention that will occur in phase 2.

Proposed timeline

The project will follow this timeline:

	Nov/Dec 2023	Feb/March 2024	April/June 2024	July 2024	August 2024	September 2024	November 2024	December 2024	January/ February 2025
Ethical approval									

Data collection (Phase 1)									
Data analysis (Phase 1)									
Knowledge translation									
Data collection (Phase 2)									
Data analysis (Phase 2)									
Knowledge translation									
Data collection (Phase 3)									
Data analysis (Phase 3)									
Knowledge translation									

Relevance and Future Research

At the conclusion of this study, we will have established a model that can be used for future research. Several next steps are proposed. We will map existing play assessments and outcome measures to the model and identify gaps that require future assessment and outcome measure development. We will share the model widely in the rehabilitation field, to assist clinicians in properly assessing play and prescribing appropriate interventions, such as assistive technology or other therapies, to facilitate play for CWPD. With increased research in this area, we aim to draw more attention to the significance of play, promoting that children with physical disabilities have equal opportunities to engage in play as their fundamental right, thereby capitalizing on its benefits for their overall development.

References

1. Assembly UG. Convention on the Rights of the Child. United Nations, Treaty Series. 1989;1577(3):1-23.
2. Vygotsky LS. The role of play in development. In: Rod Parker-Rees JW, editor. Early Years Education: Histories and traditions. Vol. 1: Taylor & Francis; 1978. p. 199-207.
3. Diamond KE, Hong S-Y, Tu H. Context influences preschool children's decisions to include a peer with a physical disability in play. Exceptionality. 2008;16(3):141-155.
4. Vygotsky LS. Play and Its Role in the Mental Development of the Child. International Research in Early Childhood Education. 2016;7(2):3-25.
5. Sutapa P, Pratama KW, Rosly MM, et al. Improving motor skills in early childhood through goal-oriented play activity. Children. 2021;8(11):994.
6. Lynch H, Moore A, Edwards C, et al. Advancing play participation for all: The challenge of addressing play diversity and inclusion in community parks and playgrounds. British Journal of Occupational Therapy. 2020;83(2):107-117.
7. Bundy A. Play and playfulness: What to look for. Play in occupational therapy for children. 1997:52-66.
8. Piaget J. Play, dreams and imitation in childhood. Vol. 25. Routledge; 2013.
9. Vygotsky LS. The role of play in development. 1978.
10. Stagnitti K. Understanding play: The implications for play assessment. Australian occupational therapy journal. 2004;51(1):3-12.
11. Kroeker J. Indoor and Outdoor Play in Preschool Programs. Universal Journal of Educational Research. 2017;5(4):641-647.
12. Besio S, Carnesecchi M, Encarnação P. Introducing LUDI: a research network on play for children with disabilities. Assistive technology: building bridges. 2015:689-695.
13. Barnett LA. Developmental benefits of play for children. Journal of leisure Research. 1990;22(2):138-153.
14. Cornelli Sanderson R. Towards a new measure of playfulness: The capacity to fully and freely engage in play. Chicago, IL: Loyola university chicago; 2010.
15. Sarah B, Parson J, Renshaw K, et al. Can children's play themes be assessed to inform play therapy practice? Clinical Child Psychology and Psychiatry. 2021;26(1):257-267.
16. Dabiri Golchin M, Ripat J, Verdonck M. Assistive Technology to facilitate children's play: A scoping review. Disability and Rehabilitation: Assistive Technology. 2023;unpublished.
17. Thiessen R. Understanding family needs: informing the design of social robots for children with disabilities to support play. Canada: University of Manitoba; 2023.
18. Adams K, Encarnação P. A training protocol for controlling Lego robots via speech generating devices. Everyday Technology for Independence and Care: IOS Press; 2011. p. 517-525.
19. Cook AM, Adams K, Volden J, et al. Using Lego robots to estimate cognitive ability in children who have severe physical disabilities. Disability and Rehabilitation: Assistive Technology. 2011;6(4):338-346.
20. Adams K, David B-L. Making hands-on activities for everyone: Math and the lego mindstorms robot. 2013.
21. Narzisi A, Sesso G, Berloffa S, et al. Could you give me the blue brick? LEGO®-based therapy as a social development program for children with autism spectrum disorder: A systematic review. Brain sciences. 2021;11(6):702.
22. Ríos-Rincón AM, Adams K, Magill-Evans J, et al. Playfulness in children with limited motor abilities when using a robot. Physical & occupational therapy in pediatrics. 2016;36(3):232-246.

23. Lindsay S, Hounsell KG, Cassiani C. A scoping review of the role of LEGO® therapy for improving inclusion and social skills among children and youth with autism. Disability and health journal. 2017;10(2):173-182.
24. Elo S, Kyngäs H. The qualitative content analysis process. J Adv Nurs. 2008 Apr;62(1):107-15.
25. Muys V, Rodger S, Bundy AC. Assessment of playfulness in children with autistic disorder: A comparison of the children's playfulness scale and the test of playfulness. OTJR: Occupation, Participation and Health. 2006;26(4):159-170.
26. Harkness L, Bundy AC. The test of playfulness and children with physical disabilities. The Occupational Therapy Journal of Research. 2001;21(2):73-89.
27. Lucisano RV, Pfeifer LI, Santos JLF, et al. Construct validity of the Child-Initiated Pretend Play Assessment—For 3-year-old Brazilian children. Australian Occupational Therapy Journal. 2021;68(1):43-53.
28. Lucisano RV, Pfeifer LI, Stagnitti K. The use of the Child Initiated Pretend Play Assessment-ChIPPA: a scoping review. Cadernos Brasileiros de Terapia Ocupacional. 2022;30.
29. Tigerstedt H, Säteri J. Aito leikki on leikin iloa [Real play is the joy of play]. Varhaiskasvatuksen erityisopettaja. 2018;4.
30. Dadson P, Brown T, Stagnitti K. Relationship between screen-time and hand function, play and sensory processing in children without disabilities aged 4–7 years: A exploratory study. Australian occupational therapy journal. 2020;67(4):297-308.
31. Moran R, Gallant KA, Litwiller F, et al. The go-along interview: a valuable tool for leisure research. Leisure Sciences. 2022;42(1):51-68.
32. Neuendorf KA. 18 Content analysis and thematic analysis. In: Brough P, editor. Advanced research methods for applied psychology: Design, analysis and reporting: Routledge; 2018. p. 213-215.

University of Manitoba | Rady Faculty of Health Sciences

Department of Occupational Therapy
R106 - 771 McDermot Ave
Winnipeg, MB R3E 0T6
T: 204-789-3897
F: 204-789-3927

RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM

HREB #: HS26236 (H2023:343)
Title of Study: The role of technology in facilitating play for children with physical disabilities: development of the Dice Model of Play (Phase 1)

Principal Investigator: Dr. Minoo Dabiri Golchin
RR-367 - 820 Sherbrook Avenue
Health Sciences Centre
Winnipeg, MB R3A 1R9 Canada
Email: Minoo.DabiriGolchin@umanitoba.ca
minoo.dabirigolchin@umanitoba.ca

Supervisor: Dr. Jacquie Ripat
Department of Occupational Therapy
University of Manitoba
S204 - 771 McDermot Avenue
Winnipeg, Manitoba
(204)3182558
Jacquie.Ripat@umanitoba.ca

You and your child are invited to be in this research study. You can think about being in this study or not and discuss your decision with others. Please ask any questions if this consent form is not clear to you in any part. You can email us or call us to help you decide.

Purpose of Study

This study explores children's play experience from the perspective of the child and of their parent/guardian.

Participant Selection

We are inviting children with different physical abilities to participate in this study. As your child is diagnosed with a physical disability and is a client of the Rehabilitation Centre for Children, you are eligible to participate in this study. Ten children and their parent/guardians will be invited to participate in this study.

Study Procedures

If you participate in this study, you and your child will have the following procedures:

We will schedule an hour-long session to interview you and your child together. The sessions will be held at the Rehabilitation Centre for Children (RCC). We will ask you questions such as: *How*

often does your child play? What is their favourite way to play? What makes playing more difficult for them? What makes it easier to play?

Your child will also be interviewed; you can be present at the interview session. Sample questions include: *Tell me about how you like to play? What are some of your favourite ways to play? What are some of the difficulties you have when playing? How can technology help you to play easier or make it more fun*?

The interview session will be digitally audio recorded and then typed out afterwards so we can review the ideas that people share with us.

Risks and Discomforts

There are no significant risks anticipated in this study. However, we anticipate that talking about challenges can be emotional for some people. If this occurs, we will refer you to a consultant, and you can talk about it with us or the consultant.

Please note that during the study the investigator may hear or see risks to the children that are legally reportable.

Benefits

There is no direct benefit to participating in this study. However, you will help us learn more about children's play and how we can provide better service to children. We will provide you a $50 e-gift card as a way to thank you for your participation in the study.

Costs

There will be no cost to you to participate in the study.

Confidentiality

We are committed to maintaining the utmost confidentiality of your personal information. We will create a master list containing a code assigned to your name. The only record which has your personal information is the master list, which will be stored in a secured folder in Dr. Jacquie Ripat's office. This secure file will be used to store a list of participant names and email addresses solely to send you a summary of the study results. The audio recording will be stored in a secure drive at the University of Manitoba and deleted after transcription. All other data will be deleted after two years.

If the study findings are presented at a meeting or published, it will not be possible for anyone to identify your participation.

Some people or groups may need to check the study records to ensure all the information is correct. All of these people have a professional responsibility to protect your privacy. These people or groups are the Health Research Ethics Board of the University of Manitoba, which is responsible for protecting people in research and has reviewed this study for ethical acceptability, and quality assurance staff of the University of Manitoba, who ensure the study is being conducted properly. If your research records need to be copied to any of the above, your name and all identifying information will be removed to maintain your anonymity. No information revealing any personal information such as your name, address or telephone number will leave the University of Manitoba. Despite efforts to keep your personal information confidential, absolute confidentiality cannot be guaranteed. Your personal information may be disclosed if required by law. All records will be securely stored in a locked area, with access limited to authorized personnel.

Permission to Quote:

We may wish to quote your words directly in reports and publications resulting from this. It's important to note that while you won't be attributed as the speaker, your words may be used to illustrate specific points. We will ensure that quotes do not contain any identifying information and that all quotes will use made-up names (pseudonyms).

Voluntary Participation/Withdrawal from the Study

Your involvement in this study is entirely optional. You can decide whether to participate or withdraw from the study at any time. If you choose not to continue participating, you can withdraw from the study without obligation. Before withdrawing, we recommend discussing any concerns you may have with the study staff, and we will do our best to address them and ensure a comfortable process, if feasible. Upon the study's conclusion, all participants will receive a summary of the research findings. It's important to note that by signing this consent form, you are not forfeiting any of your legal rights, nor are you releasing the investigators from their legal and professional obligations.

Questions

You are free to ask any questions that you may have about this study and your rights as a research participant. If any questions arise during or after the study, contact the supervisor, Dr. Jacquie Ripat, at (204) 318 2558. For questions about your research participant rights, contact the University of Manitoba Bannatyne Campus Research Ethics Board Office at (204) 789-3389.

Statement of Consent

I have read this consent form. I have had the opportunity to discuss this research study with one of the study investigators. I have had my questions answered by them in a language I understand. The risks and benefits have been explained to me. I believe any study team member has not unduly influenced me to participate in the research study with any statements or implied statements. I understand that I will be given a copy of this consent form after signing it. I understand that my participation in this study is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this research study.

I understand that my records, which might contain identifying information, could be examined by the research staff collaborating with the Principal Investigator and the entities and organizations mentioned in the Confidentiality section of this document. I know that I can withdraw from the study at any point, and my data may be removed before publication. By signing this consent form, I have not waived any of my legal rights as a participant in a research study.

Parent/legal guardian's signature: _____ Date _____
(day/month/year)

Parent/legal guardian's printed name: _____

Participation in future studies

If you consent to be informed of future research, please complete the following part:

I agree to be contacted for related research (Signature) _____

If you agree to be contacted for further research, please provide contact information below:

Contact information: _____

Investigator

I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has knowingly given their consent.

Signature: _____ **Date** _____
(day/month/year)

Printed name: _____

Role in the study: _____

Notice Regarding Collection, Use, and Disclosure of Personal Information and Personal Health Information by the University

This personal and health information is being collected under the authority of *The University of Manitoba Act*. Where you have provided personal information and health information about a third party, your signature shall be deemed to include a representation that you have the consent of the third party to provide their personal information and health information to the University of Manitoba. The University will use the information you provide for the purposes of this research study. This personal information and health information will not be used or disclosed for other purposes unless permitted by *The Personal Health Information Act* (PHIA) or *The Freedom of Information and Protection of Privacy Act* (FIPPA). If you have any questions about the collection of this personal information or personal health information, contact the Access & Privacy Office (tel. 204-474-9462), 233 Elizabeth Dafoe Library, University of Manitoba, Winnipeg, MB, R3T 2N2.

University of Manitoba | Rady Faculty of Health Sciences

Department of Occupational Therapy
R106 - 771 McDermot Ave
Winnipeg, MB R3E 0T6
T: 204-789-3897
F: 204-789-3927

RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM

HREB #: HS26236 (H2023:343)
Title of Study: The role of technology in facilitating play for children with physical disabilities: development of the Dice Model of Play (Phase 2)

Principal Investigator: Dr. Minoo Dabiri Golchin
RR-367 - 820 Sherbrook Avenue
Health Sciences Centre
Winnipeg, MB R3A 1R9 Canada
Email: Minoo.DabiriGolchin@umanitoba.ca

Supervisor: Jacquie Ripat
Department of Occupational Therapy
University of Manitoba
S 204 - 771 McDermot Avenue
Winnipeg, Manitoba MB R3E 0T6
(204)3182558
Jacquie.Ripat@umanitoba.ca

Sponsor: Dr. Jacquie Ripat

Funder: Not applicable

You and your child are invited to be in this research study. You can think about being in this study and discuss your decision with others. Please ask any questions if this consent form is not clear to you in any part. You can email us or call us to help you decide.

Purpose of Study

This study explores children's play experience with technology/robots and traditional play tools. We are interested in the role of technology in helping children play. In this study, we are observing how your child builds a LEGO robot, how they play with it and how they play with traditional toys. In this study, we will compare children's play with and without technology and use the findings to better understand how we can use technology to support children's play

Participant Selection

We are inviting children with different physical abilities to participate in this study. As your child is diagnosed with a physical disability and is a client of the Rehabilitation Centre for Children, you are eligible to participate in this study. Ten children will participate in this study.

Study Procedures

If you participate in this study, you and your child will have the following procedures:

1. We will schedule the first session at the Rehabilitation Centre for Children that will last approximately 1 hour long. Three assessment tools will be used in this session:

- Test of playfulness: this test is about 15 minutes of free play where the researcher will observe your child playing alone or with siblings/peers. You can either bring your kid for this assessment or take a video of their play and provide it to the researcher. The videos will be deleted after scoring.
- Child Initiated Pretend Play Assessment (ChIPPA-2): This is a 30-minute test using a set play pack of various toys. Your child will play with the researcher while the researcher scores your child's pretend play skills.
- Pretend Play Enjoyment- Developmental Checklist (PPE_DC): We will ask you to complete this questionnaire. In this questionnaire, you will check the phrases that describe your kid's play. This questionnaire identifies your child's developmental play age and their enjoyment score.

2. We will then assign your child to group A or B with a lottery. Regardless of whether you are in group A or B, you will receive the same interventions, just in a different order.
3. If your child is in group A, you will be invited to come to RCC for a second hour long session, and your child will build a LEGO robot with the help of the researcher. The researcher will ask them some questions during the building. You can observe the session.
4. After this session, a Research Assistant (RA) who is a Master of Occupational Therapy Student will come to your home with the robot that your child built in the session. The RA will come to your home for four weeks, twice a week, bring a robot daily, play with your kid, and leave with the robot. Your child cannot keep the robot, as it will be detached and rebuilt for other kids
5. After eight play sessions with robots, you and your child will come to RCC again for the same assessments.
6. After these assessments, another round of play will be started but with a pack of traditional toys, this time. Again, the RA will come to your home eight times for four weeks, 45 minutes each time and after finishing these sessions, you and your child will be invited to RCC for a final round of the same assessments.
7. If your child falls in group B, the same things happen, but you will start with traditional toys, then co-design and then play with robots. Assessments will be at baseline, middle time, and final point three times.

Risks and Discomforts

There are no significant risks anticipated in this study. A researcher or research assistant will always be beside your child for support.

Please note that during the study, the investigator may hear or see risks to the children that are legally reportable.

Benefits

Hoping to learn more about how children play and whether robots (the difference in technology between robotics and conventional toys) change playfulness, play skills and enjoyment in children

that may have physical limitations. You will receive 16 sessions of play directed by a Master of Occupational Therapy student in this project, and we can share the assessments that show your child's play status with you. Also, we will provide you with a $50 e-gift card for your participation in this study.

Costs

There will be no cost to you to participate in the study.

Confidentiality

We are committed to maintaining the utmost confidentiality of your personal information. We will create a master list containing a code assigned to your name. The only record which has your personal information is the master list, which will be stored in a secured folder in Dr. Jacquie Ripat's office. This secure file will be used to store a list of participant names and email addresses solely to send you a summary of the study results. The audio recording will be stored in a secure drive at the University of Manitoba and deleted after transcription. The video recording is stored in a secured folder at the university of Manitoba as well, and will be deleted right after the analysis. All other data will be deleted after two years. If the study findings are presented at a meeting or published, it will not be possible for anyone to identify your participation. It's important to note that while you won't be attributed as the speaker, your words may be used to illustrate specific points.

Some people or groups may need to check the study records to ensure all the information is correct. All of these people have a professional responsibility to protect your privacy. These people or groups are the Health Research Ethics Board of the University of Manitoba, which is responsible for protecting people in research and has reviewed this study for ethical acceptability, and quality assurance staff of the University of Manitoba, who ensure the study is being conducted properly. If your research records need to be copied to any of the above, your name and all identifying information will be removed to maintain your anonymity. No information revealing any personal information such as your name, address or telephone number will leave the University of Manitoba. Despite efforts to keep your personal information confidential, absolute confidentiality cannot be guaranteed. Your personal information may be disclosed if required by law. All records will be securely stored in a locked area, with access limited to authorized personnel.

Permission to Quote:

We may wish to quote your words directly in reports and publications resulting from this. It's important to note that while you won't be attributed as the speaker, your words may be used to illustrate specific points. We will ensure that quotes do not contain any identifying information and that all quotes will use made-up names (pseudonyms).

Voluntary Participation/Withdrawal from the Study

Your involvement in this study is entirely optional. You can decide whether to participate or withdraw from the study at any time. If you choose not to continue participating, you can withdraw from the study without obligation. Before withdrawing, we recommend discussing any concerns you may have with the study staff, and we will do our best to address them and ensure a comfortable process, if feasible. Upon the study's conclusion, all participants will receive a summary of the research findings. It's important to note that by signing this consent form, you are not forfeiting any of your legal rights, nor are you releasing the investigators from their legal and professional obligations.

Questions

You are free to ask any questions that you may have about this study and your rights as a research participant. If any questions arise during or after the study, contact the

For questions about your research participant rights, contact the University of Manitoba Bannatyne Campus Research Ethics Board Office at (204) 789-3389.

Statement of Consent

I have read this consent form. I have had the opportunity to discuss this research study with one of the study investigators. I have had my questions answered by them in a language I understand. The risks and benefits have been explained to me. I believe any study team member has not unduly influenced me to participate in the research study with any statements or implied statements. I understand that I will be given a copy of this consent form after signing it. I understand that my participation in this study is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this research study.

I understand that my records, which might contain identifying information, could be examined by the research staff collaborating with the Principal Investigator and the entities and organizations mentioned in the Confidentiality section of this document. I know that I can withdraw from the study at any point, and my data may be removed before publication. By signing this consent form, I have not waived any of my legal rights as a participant in a research study.

Parent/legal guardian's signature: _____ Date _____
(day/month/year)

Parent/legal guardian's printed name: _____

Investigator

I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has knowingly given their consent.

Signature: _____ Date _____
(day/month/year)

Printed name: _____

Role in the study: _____

Notice Regarding Collection, Use, and Disclosure of Personal Information and Personal Health Information by the University

This personal and health information is being collected under the authority of *The University of Manitoba Act*. Where you have provided personal information and health information about a third party, your signature shall be deemed to include a representation that you have the consent of the third party to provide their personal information and health information to the University of Manitoba. The University will use the information you provide for the purposes of this research study. This personal information and health information will not be used or disclosed for other purposes unless permitted by *The Personal Health Information Act* (PHIA) or *The Freedom of Information and Protection of Privacy Act* (FIPPA). If you have any questions about the collection

of this personal information or personal health information, contact the Access & Privacy Office (tel. 204-474-9462), 233 Elizabeth Dafoe Library, University of Manitoba, Winnipeg, MB, R3T 2N2.

University of Manitoba | Rady Faculty of Health Sciences

Department of Occupational Therapy
R106 - 771 McDermot Ave
Winnipeg, MB R3E 0T6
T: 204-789-3897
F: 204-789-3927

RESEARCH PARTICIPANT INFORMATION AND ASSENT FORM

HREB: HS26236 (H2023:343)
Title of Study: The role of technology in facilitating play for children with physical disabilities: development of the Dice Model of Play (Phase 1)

Investigators: Dr. Minoo Dabiri Golchin
Dr. Jacquie Ripat

Why are you here?

The researchers want to tell you about a study about children and play. They want to see if you would like to be in this study. This form tells you about the study. If there is anything you do not understand, please ask your parents, your guardian, or the study staff.

Why are we doing this study?

We want to see what you think about play and how you describe play. We want to learn more about whether children like using technology to play and how we can help children to use it better.

What will happen to you?

If you want to be in the study, these things will happen:

1. You will be asked to come to the Rehabilitation Centre for Children (RCC) for one visit.
2. During this visit to RCC, we will ask you and your parents several questions about play and your play habits, things that you like and wish to play and things that do not let you play as you like to. We will talk to you and ask you some questions for about 1 hour.

Will the study hurt?

Talking about play and your wishes does not hurt, but you may feel uncomfortable or tired of discussing your play routines and wishes. If you feel so, you can stop the interview at any time or take a rest or end our meeting. You can also skip questions you do not want to discuss.

Will you get better if you are in this study?

This study will not make you feel better or get well, but it will help us to know how you like to play so that we can find some ways to help more children play.

What if you have any questions?

You can ask your questions any time, now or later. You can talk to the therapist, your family, the research team, or anyone else.

Who will know what I did in the study?

Any information you give to us will be kept private. Your name will not be on any study paper, and no one but the study staff and your parent will know that you were in the study.

Do you have to be in the study?

You do not have to be in this study; nobody will get sad or angry if you do not want to do this. If you don't want to be in this study, just say so. We will also ask your parents if they would like you to be in the study. Even if your parents want you to be in the study, you can still say no. The therapist will still take care of you. Even if you say yes now, you can change your mind later. It's up to you.

Do you have any questions?

What questions do you have?

Assent

I want to take part in this study. I know I can change my mind at any time.

Verbal assent given Yes □

_____

Print the name of the child

Written assent if the child chooses to sign the assent.

_____	_____	_____
Signature of Child	**Age**	**Date**

I confirm that I have explained the study to the participant to the extent compatible with the participant's understanding and that the participant has agreed to be in the study.

_____	_____	_____
Printed name of Person obtaining assent	**Signature of Person obtaining assent**	**Date**

University of Manitoba | Rady Faculty of Health Sciences

Department of Occupational Therapy
R106 - 771 McDermot Ave
Winnipeg, MB R3E 0T6
T: 204-789-3897
F: 204-789-3927

RESEARCH PARTICIPANT INFORMATION AND ASSENT FORM

HREB: HS26236 (H2023:343)
Title of Study: The role of technology in facilitating play for children with physical disabilities: development of the Dice Model of Play (Phase 2)

Investigators: Jacquie Ripat
Minoo Dabiri Golchin

Why are you here?

The researchers want to tell you about a study about children and play. They want to see if you would like to be in this study. This form tells you about the study. If there is anything you do not understand, please ask your parents, your guardian, or the study staff.

Why are we doing this study?

We want to see how you will build your LEGO robot and how you will play with your built robot. We also want to see how you play with traditional toys. We want to learn more about whether children like using technology for playing and how they can use it better.

What will happen to you?

If you want to be in the study, these things will happen:

1. You will be invited to the Rehabilitation Centre for Children (RCC) to play with one of the researchers (Minoo). Minoo will bring some toys and will play with you. Some questionnaires will be completed by your parents.
2. We have a lottery that, based on that, we will come to your home to play with you, or you will come to us to play. But no worries, the lottery just shows the turn of plays and you will have a turn to play both ways with us.
3. A build-a-robot session will last about 2 hours. You will be asked to come to the Rehabilitation Centre for Children (RCC) for one visit. Then, you will build your LEGO robot with one of the researchers (Minoo). She will help you to build your robot if you need help, and she will ask you some questions during the play, like what robot you want to build and how you feel about that.
2. After building your robot, another researcher will visit your home twice a week. They will bring your built robot whenever they comes to your home. They will play with you for 45 minutes each time. After four weeks, your turn of playing with the LEGO robot finishes.
3. Then, two times each week for another four weeks, the researcher will come to play with you at home with a pack of play tools. They will bring and take the pack whenever they comes to your home. These sessions will last 45 minutes each time.
4. You will be invited to RCC to play with Minoo three times at beginning, middle and the end of the study.

5. You might play with robots or traditional pack first. We do not know the order yet, but we will tell you as we put your name on the lottery.

Will the study hurt?

Playing with traditional packs or robots does not hurt you. However, the robot might be too heavy to carry, or playing can tire you. A researcher is always with you during the study, so they can help you with building, carrying or anything that you need help with during play. You can also postpone sessions if you are sick and cannot play with the researcher at home.

Will you get better if you are in this study?

This study will not make you feel better or get well, but we hope it will help you play better and enjoy more. It also helps us find ways to help children play better.

What if you have any questions?

You can ask your questions any time, now or later. You can talk to the therapist, your family, the research team, or anyone else.

Who will know what I did in the study?

Any information you give to the researchers will be kept private. Your name will not be on any study paper, and no one but the study staff and your parent will know that you were in the study.

Do you have to be in the study?

You do not have to be in this study; nobody will get sad or angry if you do not want to do this. If you don't want to be in this study, just say so. We will also ask your parents if they would like you to be in the study. Even if your parents want you to be in the study, you can still say no. Your therapist will still take care of you. Even if you say yes now, you can change your mind later. It's up to you.

Do you have any questions?

What questions do you have?

Assent

I want to take part in this study. I know I can change my mind at any time.

_____ **Verbal assent given Yes □**

Print the name of the child

Written assent if the child chooses to sign the assent.

_____ _____ _____

Signature of Child **Age** **Date**

I confirm that I have explained the study to the participant to the extent compatible with the participant's understanding and that the participant has agreed to be in the study.

Printed name of Person obtaining assent	**Signature of Person obtaining assent**	**Date**

University of Manitoba | Rady Faculty of Health Sciences

Department of Occupational Therapy
R106 - 771 McDermot Ave
Winnipeg, MB R3E 0T6
T: 204-789-3897
F: 204-789-3927

RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM

HREB #: HS26236 (H2023:343)
Title of Study: The role of technology in facilitating play for children with physical disabilities: development of the Dice Model of Play (Phase 3)
Title of Study: The role of technology in facilitating play for children with physical disabilities: development of the Dice Model of Play (Phase 2)

Principal Investigator: Dr. Minoo Dabiri Golchin
RR-367 - 820 Sherbrook Avenue
Health Sciences Centre
Winnipeg, MB R3A 1R9 Canada
Email: Minoo.DabiriGolchin@umanitoba.ca

Supervisor: Jacquie Ripat
Department of Occupational Therapy
University of Manitoba
S 204 - 771 McDermot Avenue
Winnipeg, Manitoba MB R3E 0T6
(204)3182558
Jacquie.Ripat@umanitoba.ca

Sponsor: Dr. Jacquie Ripat

Funder: Not applicable

You are invited to participate in this research study. You can think about being in this study and discuss your decision with others. Please ask any questions if any part of this consent form is not clear to you. You can email us or call us to help you decide if you have any concerns or questions.

Purpose of Study

The purpose of this study explores experts' opinions on a newly developed model developed by the Principal Investigator named the “Dice Model of Play” for children with disabilities. We want to know what you think about the model we have developed, what gaps we have to consider, how accurate our assumptions are, and your comments on the model in terms of clarity, comprehensiveness, relevance, and applicability.

Inclusion criteria:

- Having expertise in occupational therapy, psychology, computer science, or other related professions to children with disabilities, play and human-computer-interactions.
- At least five years of experience
- Being able to read and communicate in English or Persian (PI is native Persian)
- Having access to the Internet and Online meeting platforms

Participant Selection

We invite you to participate in this study because you are an expert in supporting play among children with physical disabilities, using technology in play interventions, designing technology, or in the area of human-computer interactions. X people will participate in this study.

Study Procedures

This study will use online focus groups to gather experts thoughts on the Dice Model of Play. If you participate in this study, you will have the following procedures:

1. We will provide you with a copy of the Dice Model of Play at least two weeks before the focus group so you will have time to review it.
2. We will schedule a focus group session that will last approximately 90 minutes, and which will be held with other experts in this area. Each group will consist of 4-6 people, and the session will be held online using Microsoft Teams platform.
3. We will provide a 10-minute summary of the Dice Model at the beginning of the session, and after that, a discussion will be held about different facets of the Dice Model and your thoughts. Focus group questions will include: *How does the "dice" analogy represent play in this model? What are your thoughts about playfulness? How necessary is that playfulness is considered in the play model? What are some characteristics that can affect children's playing that are not considered in this model? Are technology solutions accurate in this model?*
4. Interviews will be digitally audio recorded on the Teams platform. We will transcribe them afterwards for analysis.

Risks and Discomforts

There are no significant risks anticipated in this study.

Benefits

There is no direct benefit of this study. However, we hope to expand the Dice Model of play, which will expand how we can use technology to enhance play for children with physical disabilities. We hope that this project will generate more research and technology development in this field, resulting in more evidence-based practice for children with disabilities and improving the quality of service. Also, we will offer you a $50 e-gift card in a way that you prefer after the last assessment (Amazon, Walmart, and so on)

Costs

There will be no cost to you to participate in the study.

Confidentiality

We are committed to maintaining the utmost confidentiality of your personal information. The study records will not include your names. Instead, you will be assigned a participant code to de-identify all data related to your interview responses. A secure file, maintained on the secure University of Manitoba server, will be used to store a list of participant names and email addresses solely to send you a summary of the study results. All data will be stored on the secure University of Manitoba server and will be deleted two years after study completion. If the study findings are presented at a meeting or published, it will not be possible for anyone to identify your participation. It's important to note that while you won't be attributed as the speaker, your words may be used to illustrate specific points.

Some people or groups may need to check the study records to ensure all the information is correct. All of these people have a professional responsibility to protect your privacy. These people or groups are the Health Research Ethics Board of the University of Manitoba, which is responsible for protecting people in research and has reviewed this study for ethical acceptability, and quality assurance staff of the University of Manitoba, who ensure the study is being conducted properly. If your research records need to be copied to any of the above, your name and all identifying information will be removed to maintain your anonymity. No information revealing any personal information such as your name, address or telephone number will leave the University of Manitoba. Despite efforts to keep your personal information confidential, absolute confidentiality cannot be guaranteed. Your personal information may be disclosed if required by law. All records will be securely stored in a locked area, with access limited to authorized personnel.

We might contact you to include you in any acknowledgements in submitted peer-reviewed papers. However, this will not be done without your permission.

Permission to Quote:

We may wish to quote your words directly in reports and publications resulting from this. With regards to being quoted, please check yes or no for each of the following statements:

Researchers may publish documents that contain quotations by me under the following conditions:	
Yes No	I agree to be quoted directly if my name is not published (I remain anonymous).
Yes No	I agree to be quoted directly if a made-up name (pseudonym) is used.
Yes No	I agree to be quoted directly with my name (I will be known).
Yes No	I agree to be named in the acknowledgment part of publications (I will be known)

Voluntary Participation/Withdrawal from the Study

Your involvement in this study is entirely optional. You can decide whether to participate or withdraw from the study at any time. If you choose not to continue participating, you can withdraw from the study without obligation. Before withdrawing, we recommend discussing any concerns you may have with the study staff, and we will do our best to address them and ensure a comfortable process, if feasible. Upon the study's conclusion, all participants will receive a

summary of the research findings. It's important to note that by signing this consent form, you are not forfeiting any of your legal rights, nor are you releasing the investigators from their legal and professional obligations.

Questions

You are free to ask any questions that you may have about this study and your rights as a research participant. If any questions arise during or after the study, contact the principal investigator, Dr. Jacquie Ripat, at (204) 3182558. For questions about your research participant rights, contact the University of Manitoba Bannatyne Campus Research Ethics Board Office at (204) 789-3389.

Statement of Consent

I have read this consent form. I have had the opportunity to discuss this research study with one of the study investigators. I have had my questions answered by them in a language I understand. The risks and benefits have been explained to me. I believe any study team member has not unduly influenced me to participate in the research study with any statements or implied statements. I understand that I will be given a copy of this consent form after signing it. I understand that my participation in this study is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this research study.

I understand that my records, which might contain identifying information, could be examined by the research staff collaborating with the Principal Investigator and the entities and organizations mentioned in the Confidentiality section of this document. I know I can withdraw from the study at any point, and my data may be removed before publication. By signing this consent form, I have not waived any of my legal rights as a participant in a research study.

Expert's signature: _____ **Date _____**
(day/month/year)

Expert's printed name: _____

Participation in future studies

If you consent to be informed of future research, please complete the following part:

I agree to be contacted for related research (Signature) _____

If you agree to be contacted for further research, please provide contact information below:

Contact information: _____

Investigator

I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has knowingly given their consent.

Signature: _____ **Date _____**
(day/month/year)

Printed name: _____

Role in the study: _____

Notice Regarding Collection, Use, and Disclosure of Personal Information and Personal Health Information by the University

This personal and health information is being collected under the authority of *The University of Manitoba Act*. Where you have provided personal information and health information about a third party, your signature shall be deemed to include a representation that you have the consent of the third party to provide their personal information and health information to the University of Manitoba. The University will use the information you provide for the purposes of this research study. This personal and health information will not be used or disclosed for other purposes unless permitted by *The Personal Health Information Act* (PHIA) or *The Freedom of Information and Protection of Privacy Act* (FIPPA). If you have any questions about the collection of this personal information or personal health information, contact the Access & Privacy Office (tel. 204-474-9462), 233 Elizabeth Dafoe Library, University of Manitoba, Winnipeg, MB, R3T 2N2.