Using Positive Reinforcement to Increase Appropriate Social Interactions in a 3-Year-Old Girl Diagnosed with 22q11.2 Duplication within a Day Care Integration Program

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A thesis submitted to the School of Community Services in partial fulfillment of the requirements for the Honours Bachelor of Behavioural Psychology

St. Lawrence College
Kingston, Ontario
Canada
April 2017
Dedication

I would like to dedicate my thesis to my close family and friends that have helped me and supported me through my four years of the Honours Bachelor of Behavioural Psychology Program.

To my parents for their endless support, love, encouragement, and belief in me. To my classmates for helping me get through the 4 years with tons of fun, endless laughs, and creating amazing life-long friendships. To my little brother for giving me a reason to succeed and be a positive role model for him. To my childhood friends, for believing in me when I wasn’t sure in myself and pushing me to do great things.

Finally, to all of those who have helped, loved and supported me not only through these last 4 long years, but through most of my life and have been by my side to get to this great accomplishment. I am grateful to all of you and thank you for all you have done in getting me to this point in my life.
Abstract

Social interactions among children with developmental delays can be difficult and cause social challenges within future endeavors in school, work, and society (Gena, 2006). Social skills are also crucial to building relationships, communicating with others, and contributing socially to various settings and situations. Children diagnosed with 22q11.2 duplication possess characteristics and symptoms that affect the appropriateness of how the individual interacts socially (Unique, 2016). It is hypothesized that utilizing positive reinforcement to teach social skills in children who have developmental delays at a young age, will make transitions, social settings, and interactions much easier as the child develops throughout life. The participant was a 3-year-old girl diagnosed with 22q11.2 duplication participating in a group setting. It was hypothesized that positive reinforcement delivered on a continuous schedule would result in an increase of appropriate social interactions with other children. This hypothesis was explored through an AB design over a 7-week period. The study consisted of prompting and the use of plastic poker chips as a reinforcer to increase the target behaviour. The results of the intervention concluded a significant increase in social interactions, however, the data was deemed unstable and ineffective based on specific criterion. In conclusion, the intervention did increase the desired behaviour of social interaction. To improve stability and effectiveness, it is recommended to address consistency, time constraints, and the confounding variables. This intervention assists in the Behavioural Psychology field and add to the minimal research of 22q11.2 duplication disorder in young children.

Word Count: 243
Acknowledgements

I would like to thank the following people who have helped me throughout my academic journey in making this accomplishment possible.

Thank you to my college supervisor, Sarah Walmsley, for her dedication, support, and guidance throughout my fourth-year placement to help me grow as a student and in my future field.

Thank you to my agency supervisor, Paula Ball, for her endless work, care, support, and input throughout my placement. You challenged me to push my boundaries and look at certain aspects in different ways to add to my thesis through your knowledge and guidance.

Thank you to the staff, children, parents, and guardians of the Sunshine Day Care Integration Program for your welcoming arms, assistance, guidance, and support. You all helped me accomplish this great achievement as well as push me to try new and different things throughout my time at the agency. You all taught me something important that I will carry with me as I start my journey into my field as a professional.

Thank you to my professors and peers throughout the BPSYC program at St. Lawrence College. I wish you all the best of luck in your future endeavors and accomplishments in life. It has been a privilege to go through the BPSYC experience with you all.

Thank you to Christy McCance, for being such a kind friend for the last 12 years and offering me your guidance, support, and help with my thesis to ensure its success.

Thank you to my parents, Kelvin and Sharon Charbonneau, for your endless love and support to encourage me to continue even when I felt that I couldn’t and when our family faced many changes and challenges.

Thank you to my little brother, Lucas Charbonneau, for being the reason for me to be a strong, positive, and ambitious role model.

Thank you to my loving boyfriend, Alex Beattie, for his endless love and support during difficult and stressful times as well as celebrating my successes throughout my education and pushing me to continue when life got the best of me.
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INCREASING APPROPRIATE SOCIAL INTERACTIONS

Chapter 1: Introduction

22q11.2 duplication is a genetic disorder where there is an extra fragment of chromosome 22 in the typical duplication (Unique, 2016). Some people do not have any or minimal signs or symptoms and may not even know they have the duplication. The features of 22q11.2 duplication manifest differently in multiple ways individually (Unique, 2016). Approximately 70% of people diagnosed with 22q11.2 duplication tend to inherit the duplication from their parents (Unique, 2016). Typically, once someone is diagnosed, other family members will complete testing after the confirmation of diagnosis (Unique, 2016).

Individuals diagnosed with 22q11.2 duplication are highly social, however the individuals level of activity (overactive or hyperactive), level of temper control, aggression, concentration, and sleep patterns can contribute to how they interact with others in their environment (Unique, 2016).

Individuals diagnosed with 22q11.2 duplication have differences in heart structure or function, and a problem with the roof of the mouth known as velopharyngeal insufficiency - with or without a cleft in the palate. Other differences that an individual may experience may include hearing loss, growth delay, developmental delay, need for support with learning, speech, and language difficulties, behaviour issues, and some unusual facial features (Unique, 2016).

Rationale

The features of the 22q11.2 duplication can impact the appropriateness of social interactions among individuals in environments such as school. Social skills are essential to successful integration within school, home, work, and community. Increasing social interactions will benefit the participant as it will eventually allow for further improvement in other skills through peer imitation after establishing positive interactions with peers.

Purpose

The purpose of this research study is to determine if positive reinforcement will help increase social interactions in a 3-year-old girl diagnosed with 22q11.2 duplication in a group setting. Increasing social interactions and social skills will help the participant as she ages in various settings and situations throughout life including school, work, home, and out in the community. The skills associated with this research project will help the participant further their social skills, which will transfer to their future goals. The social skills the participant was lacking was being able to engage with children her own age. She relied heavily on adult attention due to being only with her mother for the past 3 years while undergoing treatment for her eye cancer. By increasing her social skills and having her engage with children her own age will allow for social development.

Keywords

Positive Reinforcement - the offering of desirable effects or consequences for a behavior with the intention of increasing the chance of that behavior being repeated in the future
Tangible - capable of being touched; discernible by the touch; material or substantial.
Social Interaction - is an exchange between two or more individuals and is a building block of society.

Hypothesis
The thesis hypothesized that increase and targeted positive reinforcement would result in an increase of appropriate social interactions with other children in a 3-year-old girl diagnosed with 22q11.2 duplication. This hypothesis was explored through an AB design.

Chapter Overviews
The literature review section summarizes and displays evidence from a variety of research literature on the intervention procedures of positive reinforcement, social skills, and tangibles. This section also provides reviews of literature regarding 22q11.2 duplication, Autism Spectrum Disorder, the correlation between 22q11.2 duplication and ASD. The gaps in the literature and relevance to the thesis is also provided.

The method section explains the details regarding the study’s intervention procedures including participant information, informed consent, design, materials, intervention procedures, fading and maintenance.

The results section displays graphs and tables to show the data collected and the results of the intervention through trend lines and visual analysis. This section covers an analysis of the overall outcomes of the study conducted and to investigate effectiveness based on the hypothesis.

The conclusion and discussion section provides understanding into the thesis results and the importance of the results. Also included is the limitations that the thesis presented, contributions to the field of Behavioural Psychology, and an insight into future research.

Word Count: 664
Chapter II: Literature Review

As stated in the introduction, 22q11.2 duplication is a genetic disorder that can be inherited from one or both parents, and occurs when there is an extra fragment of chromosome 22 (Unique, 2016). Research into this genetic disorder has shown that it manifests differently within each individual ranging from no or minimal signs and symptoms to severe signs and symptoms (Unique, 2016). Many people do not become aware that they possess the gene mutation until after having a child diagnosed with 22q11.2 duplication (Unique, 2016).

According to Unique (2016), evidence suggests that children with the genetic disorder tend to be highly sociable, however, other behavioural traits can be problematic. Common characteristics can also include anxiety, poor impulse control, and decreased activity levels (Unique, 2016). 22q11.2 duplication can also have a negative impact on one’s ability to control their temper, may increase the likelihood of aggressive behaviours, and impede adherence to routine changes (Unique, 2016).

Van Campenhout et al., (2012) conducted a study to compare and research the clinical, developmental, and behavioural characteristics of 22q11.2 duplication during childhood. During their investigation of the disorder, it was discussed that the phenotype is mild in children, however displays as an heterogeneous expression (Van Campenhout, S. et. al., 2012). Heterogeneous is diverse in context, meaning that the way the phenotype displays in those with the gene mutation is diverse and variable. It was noted that there is considerable overlap within deletion syndromes within the phenotypes presentation (Van Campenhout, S. et. al., 2012). As previously discussed, there are many symptoms displayed by an individual diagnosed with 22q11.2 duplication, the characteristics classified by the phenotype are the cognitive deficits, behavioural difficulties, and mild dysmorphic features (Van Campenhout, S. et. al., 2012). There are other symptoms that can be displayed by individuals diagnosed with 22q11.2 duplication, including possessing other psychiatric disorder such as Attention Deficit Hyperactivity Disorder (ADHD), and Autism Spectrum Disorder (ASD). Van Campenhout et. al., (2012) suggested that the phenotype is not always correlated with the effect size of the duplication, that the genotype, environment, and genetic interaction contribute to the phenotype presentation severity. The study concluded that all children diagnosed with 22q11.2 duplication showed developmental delays, but differed in severity in the non-medical characteristics, which typically included learning and motor impairments, social and attention deficits, as well as behavioural difficulties (Van Campenhout, S. et. al., 2012).

Yobb, et. al., (2005) researched the screening process for diagnosing 22q11.2 duplication. It is stated that it can be difficult to diagnose due to the overlap with deletion disorders in the 22q11.2 region of the genes, because there are multiple chromosomal arrangements of genetic disorder for 22q11.2 (Yobb, T. M. et. al., 2005). Utilizing a rapid-screening method is preferred when diagnosing genetic disorder like 22q11.2 duplication as it can be difficult to differentiate the different compositions of the gene deformities because of the diversity (Yobb, T. M. et. al., 2005). 22q11.2 duplication syndrome is a common diagnosis that is diverse in multiple aspects that creates importance for further research.
**22q11.2 Duplication and Autism Spectrum Disorder**

During baseline data collection, the participant received a confirmed dual-diagnosis of Autism Spectrum Disorder (ASD) which contributes to the participant’s developmental delays. The characteristics of both disorders have similarities, including difficulty with social skills in relation to the developmental delays.

Ramelli et. al., (2008) conducted a study with two individuals diagnosed with 22q11.2 duplication syndrome and ASD to evaluate the similarities and connection between both disorders. Ramelli et. al., (2008) discussed that both disorders displayed neurological and psychiatric aspects and started that 50% of children with 22q11.2 duplication had a diagnosis of ASD. The complexity of both diagnoses displays clinical diversity as the features that manifest varies upon individuals (Ramelli, G. P. et. al., 2008). Although, observation and research of the parental genetic make-up may allow for future research about a possible recessive mutation - that can be attributed to the ASD phenotype that could potentially link the two disorders concretely (Ramelli, G. P. et. al., 2008).

**Positive Reinforcement**

As stated by Walting and Schwartz (2004), positive reinforcement has been proven to be effective through extensive research, and is appropriate for all individuals regardless of developmental age and level. Children with disabilities widely benefit from positive reinforcement as all behaviours involve a consequence that define the effect on the behaviour and through positive reinforcement is strengthened by the following behaviour (Walting, R., & Schwartz, I. S. 2004). By presenting a reinforcer continuously and immediately after the behaviour occurs it can increase the likelihood the behaviour will continue to occur again in the future (Walting, R., & Schwartz, I. S. 2004). Positive reinforcement can occur naturally through response from others in the environment or can be artificial by receiving a desired tangible (Walting, R., & Schwartz, I. S. 2004).

Positive reinforcement is effective in modifying individual’s behaviour and the literature displays the effectiveness among children with developmental delays in various developmental areas (Walting, R., & Schwartz, I. S. 2004). Allen, Hart, Buell, Harris, and Wolf, (1964) conducted a study with a child in a preschool during free play to increase the frequency of socialization with other children. The study was successful using positive reinforcement (Allen et al., 1964). In the study, the reinforcers used were touch, assistance, attention, and smiles were distributed contingently and immediately following the target behaviour (Allen et al., 1964). This study managed to increase the target behaviours and effectively display and utilize naturally occurring reinforcers in the environment (Allen et. al., 1964). Furthermore, the literature suggests that positive reinforcement will be an effective intervention for the participant, based on previous research.

**Increasing Social Interactions**

Using positive reinforcement to assist in learning social skills in children with disabilities is essential in helping them build relationships, communicate with others, and contribute to various settings and situations. Gena states that social interactions with peers has been identified as a crucial aspect in child development, which increases the importance of the interaction for children diagnosed with autism as they have difficulties with emotional regulation and social
skills (2006). Gena (2006) conducted a study to compare multiple treatment interventions and provide an analysis of the experiment, analyze treatment combinations, investigate the success rate among preschool-aged children, and to promote generalization. The study agrees with previous research regarding limited social interaction from children diagnosed with autism in school inclusion (Gena, A. 2006). However, the study proved that early intervention through systematic treatment may increase the chances of the individuals overcoming social deficits and obtain appropriate social interactions with others specifically if the intervention involves contingent social praise and prompting (Gena, A. 2006).

Hwang and Hughes (2000), conducted a study to compare empirical literature regarding social interactive programs on communication skills in young children diagnosed with autism to identify the factors directly related to the treatment effectiveness. Throughout the comparison of literature, it was found that social interactive strategies prove to increase social skills in children diagnosed with autism across 16 different studies (Hwang, B., & Hughes, C. 2000).

A meta-analysis completed by Höher Camargo et al., (2016) specified that interventions based on behaviour are effective in children with Autism Spectrum Disorder to improve social interaction skills. They discussed that the type of social issue in each participant that should be assessed to implement proper interventions based on the type (Höher Camargo, S. P. et. al., 2016). In the meta-analysis, Quinn, Kavale, Mathur, Rutherford, and Forness, (1999) provided examples of choosing appropriate interventions based on type of social deficit. One example explained that if the participants lack skills to assist in peer initiation then skill acquisition intervention would be suitable and more effective (Quinn, M., et. al., 1999). They found that interventions with the focus on teaching and measuring specifics had a greater effect size compared to comprehensive interventions (Quinn, M. et. al., 1999). The specifics Quinn et. al., (1999) refer to is specific social skills, such as social problem solving, cooperation, and other social skills.

Kogeol, Koegel, Frea, and Fredeen, (2001) contributed to the literature regarding early intervention targets with children diagnosed with autism that provides insight on aspects that differs from other literature. They stated that the contribution of peers is widely accepted as an effective strategy when increasing social and communicative skills in children diagnosed with autism (Kogeol, L. K. et. al., 2001). However, it can be difficult, due to social isolation as interactions with peers involve a different set of skills with peers than adults (Kogeol, L. K. et. al., 2001). Kogeol et. al., (2001) explains that interactions with adults tend to be easier as adults tend to be the initiators, provide responses, and provide a social environment; where peer interactions rely on participation and equal contribution. It has been shown in previous research that the difference between children diagnosed with autism and their typically developing peers is peer interaction (Kogeol, L. K. et. al., 2001).

Strain (1983), stated that social behaviour has been proven to strongly change in integrated settings rather than segregated settings, in which further supports children with developmental disabilities in an unrestrictive atmosphere positively. Many benefits manifests from interventions implemented to increase an individual’s social skills as the research demonstrates.
Early Intervention

By teaching social skills at a young age, it can make transitions, social settings, and interactions much easier as the child develops throughout life. According to Pollard (1998), children that experience negative outcomes are those who are more likely to be unsuccessful in acquiring appropriate social skills.

McGee, Feldman, and Morrier, (1997) discussed the importance of early intervention. The study they conducted concluded findings that early intervention is beneficial with smaller developmental gaps, or due to the neurological plasticity of children, and possibly a combination of both aspects (McGee, G. G. et. al., 1997). The study also suggested that naturally occurring changes socially may assist in identifying environmental and behavioural influences for the participants that interrupt social gains (McGee, G. G. et. al., 1997). A study completed by Moulton, Barton, Robins, Abrams, and Fein, (2016), states that when children under the age of 3 are diagnosed, their likelihood of benefiting from early intervention is heightened. Therefore, according to the above findings, early intervention is key to improving social interactions and behaviour of children.

Using Tangible Reinforcers

Kang et. al., (2013) conducted a study that evaluated an alternative consequence of social interaction opposed to a tangible. They stated that children diagnosed with autism may benefit from a tangible reinforcer suggesting if the children actively engage in stereotypical behaviour with the tangible then the addition of consequences will function as reinforcement without eliciting the stereotypical behaviour (Kang, S. et. al., 2013). The study indicated that the reinforcers positively impacted skill acquisition and task engagement was equally successful. In addition, prior research has suggested that the tangible tends to elicit a higher rate of reinforcement (Kang, S. et. al., 2013).

Kang et. al., (2013) provided insight regarding the accuracy and reliability of preference assessments. Kang et. al., (2013), found that they provide an objective and quantitative method to establish effective reinforcers, however they fail to identify potential negative outcomes. Many preference assessments do not explain that by using highly preferred tangibles, could potentially promote the occurrence of challenging behaviours that could impact the intervention (Kang, S. et. al., 2013). Due to the possibility of the aversive outcomes, it is important to pair reinforcers with naturally occurring consequences, such as social reinforcers like praise as they are effective and have no producing negative effects (Kang, S. et. al., 2013). Another important piece to incorporate is always ensuring that fading is part of the program if using artificial reinforcers to avoid dependency on the reinforcer for the participant.

O’Leary et. al., (1972) discussed research on tangible reinforcers regarding the use of tangibles as either beneficial or bribery. O’Leary et. al., (1972), concluded that when occurrences where tangibles are said to be bribery that the concrete use of reinforces is different from bribery. Tangibles are used during interventions to influence an individual’s behaviour and are typically paired with secondary reinforcers such as praise and attention (O’Leary et. al., 1972). Interventions that utilize tangibles paired with secondary reinforcers have shown to be more effective with individuals who have had access to secondary reinforcers in their natural environment through their upbringing (O’Leary et. al., 1972). Tangibles have been shown to
have immediate positive effects through demonstration of success for the participant and prompting the participant to engage in behaviour that was avoided previously. Tangibles can be complex to use during interventions; however, the literature suggests that tangibles when used properly can increase the target behaviour successfully. Therefore, for an individual with developmental delays, pairing a tangible reinforcer and a secondary reinforcer such as praise, based on the literature, would be effective to increase the target behaviour as a secondary reinforcer is not strong enough to be used alone for the individual.

**Gaps Identified in the Literature**

Through the reviewing process of the literature there have been some gaps identified in the literature. The first limitation is that there is little information on 22q11.2 duplication as it is a newly found syndrome. Therefore, there is limited direct research and studies conducted including individuals diagnosed with 22q11.2 duplication. This creates a gap in the literature as there is not enough direct research to compare the study work to, and to show the potential effectiveness within this population. However, due to most individuals having dual or multiple diagnoses, it allows for literature that includes other disorders to be incorporated into the research process. The limited resources regarding 22q11.2 duplication can also be attributed to the fact that there are many people who are unaware they possess the gene deformity or are a carrier as some individuals do not show any to minimal signs of the disorder. This gap creates limited research as there are some individuals who are not aware of their diagnosis, which narrows the number of individuals to work with in this population.

Another gap in the literature, is the limited amount of resources regarding different reinforcers. With the four different categorized types of reinforcers, there should be more research done to examine the effects of all types to see if there is a pattern in a certain population. However, reinforcers are personalized, but it may be possible to see if an age group or population displays majority of a certain categorized type of reinforcer. This information could benefit the field because if an individual displays equality in all four categorizes, or multiple types of reinforcers, the research could assist in the decision on the reinforcer for interventions. This process could allow for additional accuracy with reinforcers once preference assessments are completed to provide additional information.

Finally, there is a lack of research examining the use of positive reinforcement paired with praise only. There is an abundant amount of research incorporating positive reinforcement and praise, however there is few studies that look at the two together without other behavioural components incorporated. Having the other behavioural components within a study raises question to if the success was caused by the added technique. Positive reinforcement and praise are commonly used during behaviour modification. It was surprising when there was little research regarding the easily implemented intervention. There should be more research studies conducted that use simplified programs for young children to decrease complexity to increase the effectiveness of the program. When there are too many aspects involved when working with a young child with developmental delays, it may become too overwhelming for the child, the researcher, and makes it difficult to be duplicated or utilized with others. By simplifying the program, it allows for the program to be duplicated and implemented by others or by the adults in the situation if they choose to continue the program. This aspect is highly looked upon in the Behavioural Psychology Field for interventions to possess the ability to be replicated. By
providing more literature that covers this area, it would allow for easier implementation in complex populations and settings.

**Relationship Between the Literature and the Relevance to the Study**

The relationship between the literature and the relevance to the study is based on the diagnosis of 22q11.2 duplication and the positive reinforcement intervention being utilized. The findings within the research literature reviewed display the need for interventions to increase social interactions in children with developmental delays or disabilities. Most of the research literature discussed involves children of preschool age with a diagnosis of 22q11.2 duplication, Autism Spectrum Disorder, or developmental delays. This criterion correlates to the characteristics of the participant in the current study. The articles with participants diagnosed with autism give more insight into the effectiveness and importance of this study.

Another aspect that shows the relationship between the literature and the thesis work, is the age of the participant. The participant is 3-years-old, which classifies her as receiving early intervention. As explained prior, early interventions have been shown to be beneficial when implementing behaviour modification programs due to multiple factors including environment, and neurological plasticity of the developing brain. By using a simplified program, with the young participant, it also increases the likelihood of improvement in her social skill acquisition as explained by Gena (2006).

The current study is also utilizing tangibles as a reinforcer, due to social reinforcers not being strong enough to increase peer social interactions in the participant. The literature reviewed has displayed positive outcomes for the use of tangible reinforcers, which provides confidence in the utilization of a tangible in the thesis work.

Based on the literature reviewed, the aspects incorporated into the thesis show to be effective in other research. With the positive findings and effectiveness of the features for the intervention, it instills a higher confidence level of success for this thesis.

Additionally, the limited literature regarding 22q11.2 duplication permits an opportunity to contribute to the literature. In conclusion, the current study intends to increase social interactions among peers in a preschool setting for children diagnosed with 22q11.2 duplication, as this population requires assistance in development of social skills. To ensure respected literature for applied behaviour analysis fields, program integrity and validity is crucial.

**Word Count: 3010**
Chapter III: Method

Participant(s)

The participant was a 3-year-old female named Izzy diagnosed with 22q11.2 duplication. The participant was chosen through discussion with the daycare classroom teacher and agency supervisor. The participant was selected because she had not been around children her own age prior to starting at the day-care. She had been diagnosed with eye cancer and was at home with her mother while undergoing treatment. Once in remission, her family decided to start day-care to assist with her development. Being primarily with her mother for the first three years of her life created a need for adult attention, which was identified by the family the need to increase social skills among peers her age for attention. The peers involved in the study were recommended by the agency supervisor to assist in interacting with the target individual and appropriate social skills. The inclusion criteria needed for this study was a pre-school aged child that was diagnosed with developmental delays and a genetic disorder.

Informed Consent

Prior to the participant taking part in the study, the participant’s parents/guardians completed the consent form that was created by the placement student and was approved by the St. Lawrence College Research Ethics Board. The consent form (Appendix A) outlines the expectations, limitations, purpose, risks, and other items associated with the study that the participant’s parents/guardians should know. The parents/guardians were provided time to review and ask questions about the study to ensure they had all required information. Once all the information was explained, they were informed that participation in the study was voluntary and they may withdraw from the study at any time without consequences or penalties.

Design

The study was conducted on an AB design. The ‘A’ condition involves baseline data collection, observation, and questionnaires to gain knowledge about the individual and their current behaviour during free play time. The ‘B’ condition was when intervention began, and the teacher and/or placement student began to manipulate the environment through positive reinforcement to increase appropriate social interactions. Social interactions with peers was the dependent variables and the independent variable was the intervention.

Social interactions (accelerate) were defined as observed by the other children as displaying friendly non-verbal body language with their peers for 5 seconds within 1 meter of the peer. The non-verbal body language include eye contact with the peer, sharing of toys, engaging in a shared activity, turning the body towards the peer, smiling at peers, or engaging in words or phrases with peers. Eye contact was any occurrence when the participant held eye contact for at least 2 seconds. Sharing toys was defined as the participant taking a toy or object, holding it in their hand, extending his or her arm, and handing the object to a peer or engaging with the same toy/activity together. Any occurrence when the individual said, “Thank you” or made vocalization to express emotions or to make acknowledgements were included.

The program was being implemented by the placement student, Alysha Charbonneau, under the supervision of the Ethics Board, Sarah Walmsley, and Paula Ball. The staff were all currently trained and had knowledge of the program being utilized. However, aspects of the program such as procedure was explained and demonstrated to the staff to allow for replication or continuation after the placement was completed.
The treatment integrity was assessed by comparison to the REB application and Thesis Proposal submitted to the Ethics Board. These documents were used as guidelines throughout the research to ensure treatment was implemented as intended.

**Setting and Materials**

The study took place in a daycare classroom setting daily during two free play periods – morning and afternoon. Materials required were the toys and activities in the classroom such as puzzles, cars, musical instruments, play food, blocks; a pen, data recording sheets, stopwatch, and plastic poker chips as the reinforcer.

**Measures**

For data collection, direct and indirect measures were utilized. Due to the small class size, a continuous duration recording method was used for a 30-minute free play period. This was conducted twice a day for 3 weeks. The data was recorded by the placement student on the data collection sheets (Appendix C). Utilizing continuous duration recording was beneficial for accurate data collection of social interaction behaviours as she was not displaying many occurrences of social interactions with other children. By utilizing continuous duration, it allows for the skill to become acquired as there was a time constraint to complete the intervention. The total minutes of social interaction that the participant displays were written down on the data collection sheets. Each day a percentage was calculated by dividing the total duration of all social interactions by total length of all sessions that day. The total will be multiplied by 100 to obtain a percentage. The stopwatch began when the participant engaged in a social interaction for at least 5 seconds. The timer was stopped when the participant/peers stopped engaging.

Indirect measures included an informal interview with the participant’s parent (Appendix D), a Motivation Assessment Scale with Izzy’s classroom teacher (Appendix E), and a reinforcer survey (Appendix F).

**Procedures**

The intervention consisted of utilizing positive reinforcement on a continuous duration schedule. During the two free play periods, the participant either chose an activity or had activities suggested by the placement student verbally and gesturally to engage in or be invited to join her peers in an activity. Once the participant had chosen an activity, the participant was prompted, and a peer(s) was asked to join the activity. The prompting sequence consisted of directly asking the participant if she would like to play with her friends or would be prompted by the following:

- “How about we see if a friend wants to play with us too?”
- “Oh look! Our friend wants to play this game with us.”
- “You really enjoy when your friends join in, let’s see if someone would like to join us.”
- “Yesterday you had a lot of fun playing with Student A.”
- “Student B wants to play with you, would you like to play with them?”

The prompting sequence utilized allows for engagement with her peers through choice to reduce the risk of aversive effects from the program being implemented.

When the participant engaged in appropriate social interactions as defined, the stopwatch began after 5 seconds of interaction. Verbal praise and a desired reinforcer (plastic poker chip)
was delivered after each social interaction with a peer(s). During baseline, the researcher found that the participant engaged in play with her peers without prompting from an adult for at least 30 seconds. The objectives will be 30 seconds, 1 minute, 2 minutes, 3.5 minutes, and 6 minutes. By making this the first objective it allows the goals to be attainable and ensure success for the participant. The objectives increased in small increments to keep the program attainable for the participant. The participant moved on to the next objective once the first objective was mastered and so forth. The objective was considered mastered when the objective had been met during both sessions for 3 consecutive days.

**Fading/Maintenance**

Once the third objective was met the placement student introduced fading procedures. The desired reinforcers were initially provided after every positive and appropriate social interaction and then moved to a FR2 schedule, followed by a FR4 schedule, then eventually the tangible reinforcer was discontinued and verbal praise provided occasionally.

To ensure that the appropriate social interactions are not based on the presence of the adult, when the behavioural goals are met, the adult recording distanced themselves by 0.5 meters from the participant and peer. If the social interaction continued even with the added distance of the adult, it shows that the behaviour is not reliant on the adult attention and was effective in increasing social interactions with the participant’s peer(s).

Fading began during the morning session of November 27th, 2017 with the reinforcer being delivered every second social interaction. FR2 was successfully completed, however, due to time constraints FR4 was not conducted. The tangible reinforcer of the plastic poker chip was faded, however verbal prompts remained and would begin to fade in FR4.

**Word Count: 1340**
Chapter IV: Results

Functional Assessment Results

The participant attended the facility: Mondays, Wednesday, and Thursdays. Each day there was two sessions conducted. One session was completed in the morning and afternoon to explore if the time of day had an impact on the frequency and duration of her social interactions with her peers. Baseline consisted of 7 days of observation. Baseline measures were taken to assess Izzy’s ability to interact with her peers prior to manipulating the environment.

There were three indirect assessments completed prior to baseline observation which included an informal interview with the participant’s parent (Appendix D), a Motivation Assessment Scale with Izzy’s classroom teacher (Appendix E), and a reinforcer survey (Appendix F).

Informal Interview with the Participants Parent. The informal interview with the participant’s parent allowed for additional knowledge of Izzy and her behaviours, interests, background, and medical history to be considered for the program. Some information shared was her medical history. This information was important as there were resources provided about her genetic disorder, as well as information regarding her eye cancer. Unfortunately, due to her eye cancer she had never been exposed to children her own age prior to starting at the day care. This raised concern for how she would interact with the other children due to her limited exposure to other children and her health concerns.

Motivation Assessment Scale with Izzy’s Classroom Teacher. The Motivation Assessment Scale with Izzy’s classroom teacher determined that the function of her social interaction with other children behaviour was tangible with the secondary function being escape. Tangible scored 7 ranking it as the primary function, escape scored 4, then sensory scored 2 and attention scored 1 indicating attention and sensory to have a minimal impact on the behaviour. Once the function of behaviour was determined as tangible, it was decided to conduct a reinforcer survey to research what would be beneficial to utilize during the program to increase her social interactions.

Reinforcer Survey. The reinforcer survey indicated a variety of potential reinforcers through the other assessments and observations of Izzy in the classroom and what she engaged with. The reinforcer survey concluded multiple varieties of reinforcers in the following categories: food, colours, TV shows/movies, favourite things to do, books, activities, toys, and other which included bubbles and hugs.

Data Analysis of Baseline Results

Trend. The trend line in the comparison graphs Appendix G, shows an increase of Izzy’s social interactions from baseline to intervention during free play periods.

Stability. The baseline data stability was calculated (Appendix B) to be 7.14% inferring that the data was unstable and not meeting Twany and Gast (1984) criterion. The stability did not meet the criterion of having less than 80% of the data being within a 15% range due to time constraints, consistency, and other confounding variables.
**PEM (Percentage of Data Points Exceeding the Median).** The baseline PEM was 42.86%. Based on Scruggs and Mastropier (1998) criterion, the PEM for baseline does not meet the criterion and therefore is ineffective (Appendix B).

**Standard Deviation.** Baseline was calculated to have a standard deviation of 2.42 displaying that the data points are near the mean.

Table 1 explains the frequency of behaviour across morning and afternoon sessions during baseline. Frequency was recorded to determine if there was a correlation between the morning and afternoon sessions. It was not recorded to determine the percentage of frequency out of a set amount of opportunities to socially interact with her peers. The frequency graphs in Appendices M and N show a significant difference between number of social interactions, which explains the higher durations during afternoon sessions. Appendix H displays the duration and frequency of morning and afternoon sessions across baseline and intervention for comparison.

**Table 1. Comparison of Morning and Afternoon Sessions on the Frequency of Social Interactions During Baseline**

<table>
<thead>
<tr>
<th>Frequency during Morning Session</th>
<th>Frequency during Afternoon Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>N/A</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

During baseline data collection, frequency and duration was recorded to examine social interactions with her peers. Based on the baseline data, the participant had higher percentages of social interaction with peers during the days when there had been larger numbers in other children present in the room. Table 2 below shows the number of peers in the room and the contribution to her engagement with others.

**Table 2. Comparison of Number of Other Children Present in the Room and the Percentage of Time Spent Interaction with Peers During Baseline Across Morning and Afternoon Sessions**

<table>
<thead>
<tr>
<th>Number of Other Children in the Room During the Morning Session</th>
<th>Percentage of Time Spent Interacting with Peers During Morning Session</th>
<th>Number of Children in the Room During Afternoon Sessions</th>
<th>Percentage of Time Spent Interacting with Peers During Afternoon Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3.01%</td>
<td>3</td>
<td>2.64%</td>
</tr>
<tr>
<td>Number of Other Children in the Room During the Morning Session</td>
<td>Percentage of Time Spent Interacting with Peers During Morning Session</td>
<td>Number of Children in the Room During Afternoon Sessions</td>
<td>Percentage of Time Spent Interacting with Peers During Afternoon Session</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>2</td>
<td>0%</td>
<td>2</td>
<td>0%</td>
</tr>
<tr>
<td>4</td>
<td>2%</td>
<td>3</td>
<td>0%</td>
</tr>
<tr>
<td>3</td>
<td>1.44%</td>
<td>3</td>
<td>1.53%</td>
</tr>
<tr>
<td>2</td>
<td>0.50%</td>
<td>2</td>
<td>N/A</td>
</tr>
<tr>
<td>4-7</td>
<td>0.18%</td>
<td>4</td>
<td>5.03%</td>
</tr>
<tr>
<td>3-5</td>
<td>2.45%</td>
<td>4-6</td>
<td>2.67%</td>
</tr>
</tbody>
</table>

**Interpretation of Functional Assessment and Baseline Analyses Results**

Through the direct observations and indirect measures there were a variety of conclusions regarding the function of behaviour for her social interactions. There were many confounding variables that contributed to the function of behaviour. The confounding variables were potential peer imitation, comfortability and familiarity with her peers and new setting. Based on the functional assessments it was discovered that the function primarily was tangible with a secondary function of escape. However, through the informal interview assessment, it was established that there was also possibility for attention to be a function as Izzy had not been exposed to children her own age before due to medical reasons. Furthermore, it was concluded through direct observations during baseline, that access to tangible items was the primary function for the behaviour.

**Data Analysis of Intervention Results**

The intervention consisted of 13 days of observation.

*Trend.* The trend line in the comparison graphs Appendix G, shows an increase of Izzy’s social interactions from baseline to intervention during free play periods.

*Stability.* The intervention stability calculated at 0% inferring that the data was unstable and not meeting Twany and Gast (1984) criterion. The stability did not meet the criterion of having less than 80% of the data being within a 15% range due to time constraints, consistency, and other confounding variables.

*PEM (Percentage of Data Points Exceeding the Median).* The PEM score overall was 50% and the intervention PEM was 46.15% meaning that this intervention was considered ineffective based on interpretation of Scruggs and Mastropier (1998) (Appendix F).

*Standard Deviation.* Standard deviation was additionally calculated to assess most of data in close range to the mean. Intervention standard deviation was calculated at 20.84 displaying that the data points were widely separated. This is conclusive based on the 7.37% to 63.85% range in social interaction results during intervention.
**Percentage of Behaviour Change.** The improvement percentages per session and overall were high. The improvement percentage for morning sessions based on duration in seconds was 869.05%. Afternoon session improvement percentage was calculated at 1,158.96% and the overall improvement from baseline to intervention percentage of social interaction duration was 1,014.01%.

**Social Validity.** The results of this study concluded that the program did increase social interactions and assisted the participant in becoming social among peers in her age group instead of relying on adult attention. The classroom ECE, placement supervisor, and participants’ parents stated an increase and positive behaviour change in the participant. They noted various changes and improvements in other aspects of participant’s life. Her parents indicated that she has improved in her other school therapies, at home, with her language and verbal communication, and interaction with her older brother. The program increased her social interactions, however, additionally improved multiple life skills in various settings of her life through generalization.

Table 3 shows the frequency of behaviour across morning and afternoon sessions during intervention for the same intentions as mentioned previously for baseline. Appendix H displays the duration and frequency of morning and afternoon sessions across baseline and intervention for comparison.

<table>
<thead>
<tr>
<th>Frequency during Morning Session</th>
<th>Frequency during Afternoon Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>N/A</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>N/A</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Number of Other Children in the Room During the Morning Session</td>
<td>Percentage of Time Spent Interacting with Peers During Morning Session</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>-------------------------------------------------------------------</td>
</tr>
<tr>
<td>5</td>
<td>14.06%</td>
</tr>
<tr>
<td>5</td>
<td>7.37%</td>
</tr>
<tr>
<td>3</td>
<td>15.85%</td>
</tr>
<tr>
<td>8</td>
<td>17.81%</td>
</tr>
<tr>
<td>6</td>
<td>25.14%</td>
</tr>
<tr>
<td>5</td>
<td>10.15%</td>
</tr>
<tr>
<td>4</td>
<td>1.57%</td>
</tr>
<tr>
<td>6</td>
<td>6.23%</td>
</tr>
<tr>
<td>4-6</td>
<td>13.89%</td>
</tr>
<tr>
<td>4</td>
<td>26.92%</td>
</tr>
<tr>
<td>6-7</td>
<td>8.12%</td>
</tr>
<tr>
<td>4</td>
<td>29.16%</td>
</tr>
<tr>
<td>5</td>
<td>17.06%</td>
</tr>
</tbody>
</table>

Izzy successfully completed 3 out of 5 behavioural objectives, however due to time constraints, once the third behavioural objective was met after 3 consecutive days fading was implemented. Izzy quickly surpassed each objective once intervention started and her social interactions increased once intervention was implemented. Izzy’s social interaction with peers averaged at 2.93% during baseline. The positive reinforcement paired with praise intervention increased 31.27% with Izzy’s social interactions averaging at a 34.20% increase. Once intervention began there was no days where the behaviour was at the same as baseline or below. The intervention immediately increased the participant’s interactions with her peers. Figure 1 displays the progress made from baseline to intervention overall. Figure 2 shows the comparison on frequency and Figure 3 shows the comparison of duration across baseline and intervention.
Figure 1. Percentages of Social Interactions Between Baseline and Intervention graph displays the percentage of social interactions engaged in between baseline and intervention. This graph shows a significant increase in social interactions from the participant.
Figure 2. Duration Comparison Across Baseline and Intervention graph shows the difference between baseline and intervention of the duration of the social interactions the participant is engaging in. This graph shows a significant increase in social interactions from the participant.
Figure 3. Frequency Comparison Across Baseline and Intervention graph presents the comparison of the frequency that the social interactions are engaged in between baseline and intervention. This graph shows a significant increase in social interactions from the participant.
Chapter V: Discussion

Summary

The study was designed to increase appropriate social interactions in a 3-year-old female diagnosed with 22q11.2 duplication through positive reinforcement during free play periods. Prompting was utilized to encourage the participant to engage in social interactions with her peer(s). Verbal prompting was included to assist the participant in beginning engagement with the other children through phases like, “Why don’t we invite Child A to do the puzzle too,” or “Would you like to play Play-Doh with Child B?” Positive reinforcement was used when the child displayed the target behaviour without being prompted. The positive reinforcement was the tangible poker chip paired with verbal praise. Throughout the study, the reinforcer was faded to decrease the likelihood of the individual becoming dependent on the reinforcer. Fading similarly assisted in generalizing the target behaviour to other situations, peers, and environments. To evaluate the effectiveness of the intervention, continuous duration recording was recorded to demonstrate the effectiveness of the program through accuracy.

The program resulted in increasing social interactions of the participant even without meeting specific criterion to state the intervention successful. Although the intervention was effective in increasing the desired behaviour, the intervention was deemed unstable and ineffective.

Connection of Different Aspects of the Results

Indirect Assessments. The three indirect assessments utilized provided vital information to ensure an appropriate program for the participant. The informal interview with the participant’s parent gave insight into her personality, medical history, treatment history, diagnoses, and background. The functional assessment with the classroom teacher demonstrated the functions of the participant’s behaviour to design the intervention around the proper functions of behaviour. Finally, the reinforcer survey exhibited the objects that would be potential reinforcers for Izzy to ensure that the reinforcer being utilized during the program would be reinforcing for her.

Generalization. The skill set that Izzy was acquiring throughout the program generalized to other environments and people. She could utilize her social skills with her family, specifically her older brother, with the other children during other times and environments, at her other therapy sessions in other centers, and increased and improved her communication. The generalization that Izzy displayed showed that the social skills are becoming a learned behaviour. Through the acquisition of the skill set, she should continue to display improvement of her social skills as time progresses without regression back to baseline.

Context of the Current Literature

There is limited research involving 22q11.2 duplication and interventions. Most studies used for the literature review was related to other disorders such as ASD and in other populations. There was no research study conducted with similar aspects as displayed in this study.
Importance and Implication for the Behavioural Psychology Field

This study would assist the Behavioural Psychology field to evaluate the use of positive reinforcement to increase social interactions in a 3-year-old diagnosed with 22q11.2 duplication as there is currently little research on the genetic disorder itself. This study could be duplicated within other populations, disorders, environments, and situations.

Strengths

There were many positive strengths related to the study. The study was easily generalized to other settings and people as stated by the staff of the facility and the participant’s family. There were very minimal costs – if any – depending on the reinforcer, that allows for it to be implemented easily as resources that are already present can be utilized in the program. The intervention increased social interactions even through the intervention did not meet the criterion for effectiveness, it still increased the participants’ interactions with her peers. Finally, the use of continuous duration recording allowed for an accurate display of the occurrence and length of the target behaviour.

Limitations

There were several limitations regarding the intervention. Conducting the intervention in daycare classroom setting caused disruptions when other children wanted to participate in other activities with the researcher, incidents occurred while recording, or being taken away from the intervention during the sessions.

Additionally, there was a possibility of her interactions with others occurring due to peer imitation based on her own observations - as she had not had any prior contact with children her own age before beginning at the day care.

Sessions were often conducted at varying times throughout the day based on the participants’ arrival time to the center, other activities, lack of time and small class size.

Finally, there are many unknown confounding variables that could attribute to her increase in socialization that differ from the intervention. These confounding variables include peer imitation or contentment and familiarity within her new setting.

Multilevel Challenges Perspective

Client Level. Challenges that this researcher faced at the client level was the undesired verbal and physical behaviours exhibited by the participant during observation periods prior to intervention. The participant in this study had delayed verbal and speech, creating a barrier between participant and researcher. Izzy could use her pictures or used her limited verbal repertoire to ask for certain items, however, she had difficulty expressing her emotions due to her verbal communication deficit. The lack of communication caused undesired verbal and physical behaviours including: screaming, tantrumming, throwing one’s body around, and crying. When the participant engaged in these behaviours it was important to focus on the child’s wellbeing by comforting them and trying to understand their emotions to ensure there are no aversive feelings paired with certain objects such as the teacher or researcher.

Program Level. At the program level, there were several challenges that were encountered including other children requesting the researcher’s attention during conduction of the intervention with the participant. Additionally, depending on the activities scheduled for the day there would be sessions that were not implemented due to limited time. The final challenge
was getting other children to engage with the participant during the beginning of intervention as they would rather continue their activity, play by themselves, or with another peer. The challenges during the program allowed for lessons to be learned during clinical applications and the confounding variables that are faced during real-life application.

Organizational Level. A challenge at the organizational level was that conducting observations and interventions using continuous duration recording for 30 minutes each session was too lengthy and time consuming for individuals who would want to replicate the study or continue the program with the participant. Although accurate, the recording method used is not favorable in terms of time. It would possibly be more beneficial for the researcher and replicators of the study to utilize partial interval recording or momentary time sampling to obtain the data. This would allow for easier implementation while still having accurate data. This challenge would assist in improving the study to increase the success of the intervention.

Societal Level. At the societal level, a challenge of concern for the participant is the inconsistency of the program. When the program is inconsistent it can decrease the success rate and difficulty in developing the desired skills. If the desired skills are not taught, it causes integration issues for the child in the future. The participants can become reluctant to the program due to inconsistent delivery of reinforcement that can result in aversive behaviours such as screaming, crying, throwing one’s body on the floor, etc. A program should not elicit aversive responds from the participants as the participants’ wellbeing needs to be priority. However, inconsistency heightens the odds of aversive behaviours occurring if the reinforcement is not delivered on an appropriate schedule of reinforcement for the participant. that could occur is that the participant could result in isolation from others.

Recommendation for Future Research

Currently, there is minimal research on interventions with children diagnosed with 22q11.2 duplication. Although the intervention was deemed unstable and ineffective based on criterion, it was successful for the participant, therefore this research could expand the current information and raise new research questions to be tested.

To replicate this intervention, the limitations involving time constraints and consistency of implementation would need to be improved to progress the effectiveness and stability of the intervention. It is recommended to consider altering the recording method from continuous duration recording – although high in accuracy – because of the time associated with observing an individual for long periods of time. Momentary time sampling would be the most appropriate alternative.

For future research, researchers should explore how speech therapy to increase verbal communications in children diagnosed with 22q11.2 duplication disorder would increase their social skills. Evaluating if the verbal communication would assist in sociality with others could contribution to the development of additional interventions for children who display verbal communication deficits.

Word Count: 1405
References


Appendix A:  
Informed Consent

St. Lawrence College

Informed Consent

Project Title: Using Positive Reinforcement to Increase Appropriate Social Interactions in a 3-year-old Girl Diagnosed with 22q11.2 Duplication within a Day Care Integration Program

Principle Investigator: Alysha Charbonneau
Name of Supervisor: Sarah Walmsley
Name of Institution: St. Lawrence College
Name of Institution/Agency: Sunshine Day Care Integration Program

Invitation
Hello, I am a student enrolled in the 4th year of the Honours Bachelor of Behavioural Psychology program at St. Lawrence College. During this final year of the program, as part of placement, I am to complete a research project – as known as an applied thesis – and I would like to invite you and your daughter to be apart of this research project to help in the completion of the study. This form contains information about the project for full understanding. Please read all sections carefully and ask questions before the decision to be included in the study.

Why is this research study being done?
This research study is being done to increase your daughter’s appropriate social interactions in a preschool child diagnosed with 22q11.2 duplication. The reason for the research is to assess whether positive reinforcement will increase social interactions in a child with the diagnosis among their peers in a day care setting to improve their social skills.

What will you need to do if you take part?
If you choose to participate in the study, you will be expected to be in communication with the placement student in regard to the intervention, as well as openly discuss progress, desired items or activities, etc. Your daughter will be recorded twice a day for one morning and afternoon free play period, with each lasting 30-minutes in length totaling one hour a day of recording and intervention. The start will be September 20th, 2017 and the end date being December 8th, 2017.

What are the potential direct benefits of taking part?
The potential benefits that can directly occur from participating in the study is improved social skills to assist the participant in multiple environments and situations throughout life that require social skills including school, work, or in the community. By improving their social skills, it can also benefit them by interacting with their peers to
learn other acceptable behaviours through peer-imitation, such as patience, temper control, and speech.

**What are the potential benefits of this research study to others?**
To others, the benefits of this research will allow for added research in the field with a diagnosis that is not very commonly worked with, research, or known about. The benefits could add to the research and allow for more awareness about the diagnosis.

**What are the potential disadvantages or risks of taking part?**
If you wish to have your daughter participate, I must disclose the potential risks of the research study. Due to the use of reinforcers, the possibility of dependency on the desired reinforcers may occur if fading does not happen as planned. If your daughter displays discomfort you will be contacted and the program will stop immediately. She will be given a break and redirected to a new activity.

**What happens if something goes wrong?**
If your daughter has an aversive reaction to the research study and intervention, please speak to myself or the program facilitator because each person reacts to programs differently.

**What will the information you collect from me in this project be kept private?**
All information collected for and during this research study will be held in a locked filing cabinet at St. Lawrence College for all paper copies. They will be held for 10 years – 10 years after your daughter’s 18th birthday if she is a minor now - then destroyed. For all information on a laptop, will not contain real names, the laptop will be encrypted and password protected. These documents will also be held for 10 years – 10 years after your daughter’s 18th birthday if she is a minor now - before being destroyed.

**Do you have to take part?**
Participation in this specific research study is completely voluntary, you and your daughter are not required to take part in it if you and your daughter wish not to. If you and your daughter want to participate, you will need to sign this consent form. You and your daughter are free to leave the study at any time with no consequences. If you and your daughter decide to stop participating please see myself or the facilitator.

**Contact for further information**
The Research Ethics Committee for Behavioural Psychology (REC-P) under the authority of the St. Lawrence Research Ethics Board (SLC-REB) has approved the research study to be conducted and deem it as ethical. The project was created under Sarah Walmsley’s supervision from St. Lawrence College. I appreciate your cooperation. If any questions arise, please contact me, Alysha Charbonneau at ACharbonneau17@student.sl.on.ca. However, my supervisor, Sarah Walmsley, can also be contacted at SWalmsley@sl.on.ca. If you have any concerns about your rights
or information about the research study as a participant you may contact the SLC-REB Chair at reb@sl.on.ca.

**Consent**

If you wish to be included and agree with the information in the form for the research project, please complete the following form. Once completed, return to me as soon as possible. You will be given a signed copy of the agreement for your own person records and the original will be held at the agency.

By signing this form, I agree that:

- ✓ The study has been explained to me.
- ✓ All my questions were answered.
- ✓ Possible harm and discomforts and possible benefits (if any) of this study have been explained to me.
- ✓ I understand that I have the right not to participate and the right to stop at any time.
- ✓ I am free now, and in the future, to ask questions I have about the study.
- ✓ I have been told that my personal information will be kept confidential.
- ✓ I understand that no information that would identify me will be released or printed without asking me first.
- ✓ I understand that I will receive a signed copy for this consent form.
- ✓ I understand that the data from this study will be presented at the St. Lawrence College Behavioural Psychology Poster Gala, and may be reported at other conferences or published in a scientific journal. No identifying information will be included in these reports.

I hereby consent to be included in the research study explained prior.

<table>
<thead>
<tr>
<th>Participant Name</th>
<th>Participant Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Facilitator’s Name</th>
<th>Facilitator’s Signature</th>
<th>Date</th>
</tr>
</thead>
</table>
Appendix B:
Baseline Data Collection Sheet

To indicate whether the behaviour has occurred or not a ‘yes’ or ‘no’ will be written in under the box ‘Did the target behaviour occur?’ and if the behaviour did the following box ‘How long did the target behaviour occur?’ the length of time in seconds and minutes will be written. The frequency of the target behaviour will be recorded using continuous duration recording. There will be two sessions each day lasting 30 minutes, one session will take place in the morning during the free play period and the second session will be in the afternoon during the free play period. This template will be used to record during both baseline and intervention once the program is implemented.

Target Behaviour: Social Interactions with Peer(s)
Recording Method: Frequency, Continuous Duration Recording
Sessions per day: 2
Observation and Data Collection Duration: 30 minutes per sessions, equaling 60 minutes of recording a day
Baseline Duration: Approximately 3 weeks, starting on September 18th, 2017
<table>
<thead>
<tr>
<th>Date</th>
<th>Frequency of Target Behaviour during Morning Free Play Period (30 minutes)</th>
<th>Frequency of Target Behaviour during Afternoon Free Play Period (30 minutes)</th>
<th>Number of Other Children in the room (AM/PM)</th>
<th>Duration: Total Time (X)</th>
<th>Percentage (X/3600 x 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 20(^{th})</td>
<td>4</td>
<td>5</td>
<td>5/3</td>
<td>AM: 108.38 sec. PM: 95.17 sec. Total: 203.55 sec.</td>
<td>203.55/3600 x100 = 5.65%</td>
</tr>
<tr>
<td>September 21(^{st})</td>
<td>0</td>
<td>0</td>
<td>2/2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>September 25(^{th})</td>
<td>4</td>
<td>0</td>
<td>4/3</td>
<td>AM: 71.97 sec. PM: 0 sec. Total: 71.97 sec.</td>
<td>71.97/3600 x100 = 1.10%</td>
</tr>
<tr>
<td>September 27(^{th})</td>
<td>3</td>
<td>2</td>
<td>3/3</td>
<td>AM: 52.04 sec. PM: 55.08 sec. Total: 107.12 sec.</td>
<td>107.12/3600 x100 = 2.97%</td>
</tr>
<tr>
<td>September 28(^{th})</td>
<td>2</td>
<td>N/A</td>
<td>2</td>
<td>AM: 18.19 sec. PM: N/A sec. Total: 18.19 sec.</td>
<td>18.19/3600 x100 = 0.50%</td>
</tr>
<tr>
<td>October 2(^{nd})</td>
<td>1</td>
<td>4</td>
<td>4-7/4</td>
<td>AM: 6.44 sec. PM: 181.27 sec. Total: 187.35 sec.</td>
<td>187.27/3600 x100 = 5.20%</td>
</tr>
<tr>
<td>October 4(^{th})</td>
<td>3</td>
<td>5</td>
<td>3-5/4-6</td>
<td>AM: 88.11 sec. PM: 96.27 sec.</td>
<td>184.38/3600 x100 = 5.12%</td>
</tr>
</tbody>
</table>
Duration:
Morning Session: \(345.13/12,600 \times 100 = 2.74\%\)
Afternoon Session: \(427.79/12,600 \times 100 = 3.39\%\)

Total Duration Observed in Seconds During Baseline:
\[
= \text{Total seconds observed per day} \times 2 \text{ sessions a day}
\]
\[
= 1800 \times 2
\]
\[
= 3,600 \times \text{number of days recorded}
\]
\[
= 3,600 \times 7
\]
\[
= 25,200
\]
Total Duration of Target Behaviour During Baseline: 772.92
Total Percentage of Duration During Baseline: \(772.92/25,200 \times 100 = 3.07\%\)

Stability of Morning Session Duration:
\[
= (2.74 \times 0.075)
\]
\[
= 0.21
\]
\[
= (2.74 - 0.21) \text{ to } (2.74 + 0.21)
\]
\[
= 2.53 \text{ to } 2.95
\]
Overall, 0%, or 0 out of 7 data points fall within a 15% of the average. This means the data was not stable for morning sessions.

Stability of Afternoon Session Duration:
\[
= (3.39 \times 0.075)
\]
\[
= 0.25
\]
\[
= (3.39 - 0.25) \text{ to } (3.39 + 0.25)
\]
\[
= 3.14 \text{ to } 3.64
\]
Overall, 0%, or 0 out of 7 data points fall within a 15% of the average. This means the data was not stable for afternoon sessions.

Total Stability of Baseline Duration:
\[
= (3.07 \times 0.075)
\]
\[
= 0.23
\]
\[
= (3.07 - 0.23) \text{ to } (3.07 + 0.23)
\]
\[
= 2.84 \text{ to } 3.30
\]
Overall, 7.14%, or 1 out of 14 data points fall within a 15% of the average. This means the data was not stable for baseline.
PEM (Points Exceeding the Median) for Baseline:
Median is 2.97
= Number of data points above the median/ Total number of days recorded
= 3/7 x 100
= 0.4286 x 100
= 42.86%
Appendix C:
Indirect Measures

Informal Interview with Participant’s Mother
During Izzy’s first visit to the day care, we could discuss and ask questions about Izzy, her conditions, treatments/therapies, testing, likes/dislikes, personality traits, difficulties/strengths, etc. During this informal interview, Izzy’s mother disclosed her diagnosis of 22q11.2 duplication. It was also mentioned that they were waiting for the ADOS testing to determine if Izzy has a diagnosis of Autism Spectrum Disorder, which will arrive in October. Another important disclosure, is that Izzy was diagnosed with cancer in her right eye at the age of 2-years-old. Due to the cancer, her right eye was removed and replaced with a prosthetic eye. The ADOS was completed as they are unsure if Izzy’s developmental delays are due to her current diagnosis of 22q11.2 duplication and/or if was caused by the chemotherapy she endured while she had cancer.

Viewing of Intake Forms and Provided Written Information
There was a variety of information including medical past about her eye cancer and diagnosis of 22q11.2 duplication, with information packages included for learning. There was also an “All About Me” document that the mother had made for Izzy stating all about her including likes, dislikes, certain behaviours, and any important and relevant information required in knowing about her. All these things were helpful and useful in gaining information about Izzy as a participant. Below is an example of Izzy’s “All About Me” document.
Hello, my name is Izzy and I want to tell you all about me!
I love my family and enjoy being around them.
I have a prosthetic right eye, which I love to pretend to scare my family with by poking it or taking it out, but my mom doesn’t like when I do that because then she must clean it.
When I was 2 years old, I was diagnosed with eye cancer, which is why I have the prosthetic eye. I had the cancer removed and went through four rounds of chemotherapy. Right now, there is no sign of the cancer, but I go for follows ups.
After having cancer, I had genetic testing done when mommy realized I was having some trouble growing and developing and turns out I have something called 22q11.2 duplication. My mommy has a package for you about it.
I recently did ADOS testing and get the results back in October. I go to speech therapy, behavioural and occupational therapy too.
I like crackers, bananas, the colour red and blue, Toy Story, puzzles, Minnie Mouse, Frozen, and singing.
I’m stubborn, but only because I like routines and do not like change. I am very impatient because I really like to go.
Those are some things about me that are important to know while getting to know me.

From Izzy

Hi there, Izzy’s mom here and I just want to take the time to thank you for reading about my little girl. She is full of life and we want to make sure people understand her as best as possible. We are excited to see how she likes being in day care and I know she is excited. I’ve attached information booklets about her diagnosis and if you have any questions, please ask.

Thank you, Izzy’s mom
### Appendix D:

**Motivation Assessment Scale with Izzy’s Classroom Teacher**

Name: Miss Davis  
Rater: Alysha Charbonneau  
Date: September 29th, 2017

Behavior Description  
Social interactions with other children.

Setting Description  
Day Care Preschool Setting

Instructions: The Motivation Assessment Scale is a questionnaire designed to identify those situations in which an individual is likely to behave in certain ways. From this information, more informed decisions can be made concerning the selection of appropriate reinforcers and treatments. To complete the Motivation Assessment Scale, select one behavior that is of particular interest. It is important that you identify the behavior very specifically. For example, aggressive, is not as good a description as hits his sister. Once you have specified the behavior to be rated, read each question carefully and circle the one number that best describes your observations of this behavior.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Never (0)</th>
<th>Almost Never (1)</th>
<th>Seldom (2)</th>
<th>Half the Time (3)</th>
<th>Usually (4)</th>
<th>Almost Always (5)</th>
<th>Always (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Would the behaviour occur continuously, over and over, if this person was felt alone for long periods of time? (For example, several hours.)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Does the behaviour occur following a request to perform a difficult task?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Does the behaviour seem to occur in response to your talking to other persons in the room?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Does the behaviour ever occur to get a toy, food, or activity that this person has been told that he or she can’t have?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Would the behaviour occur repeatedly, in the same way, for very long periods of time, if no one was around? (For example, rocking back and forth for over an hour)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. Does the behaviour occur when any request is made of this person? | X |

7. Does the behaviour occur whenever you stop attending to this person? | X |

8. Does the behaviour occur when you take away a favourite toy, food, or activity? | X |

9. Does it appear to you that this person enjoys performing the behaviour? (feels, tastes, looks, smells, and/or sound pleasing) | X |

10. Does this person seem to do the behaviour to upset or annoy you when you are trying to get him or her to do what you ask? | X |

11. Does this person seem to do the behaviour to upset or annoy you when you are not paying attention to him or her? (For example, if you are sitting in a separate room, interacting with another person) | X |

12. Does the behaviour stop occurring shortly after you give this person the toy, food, or activity he or she has requested? | X |

13. When the behaviour is occurring, does this person seem calm and unaware of anything else going on around him or her? | X |

14. Does the behaviour stop occurring shortly after (one to five minutes) you stop working or making demands of this person? | X |

15. Does this person seem to do the behaviour to get you to spend some time with him or her | X |

16. Does the behaviour seem to occur when this person has been told that he | X |
or she can’t do something he or she wanted to do?

<table>
<thead>
<tr>
<th>Sensory</th>
<th>Escape</th>
<th>Attention</th>
<th>Tangible</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <em><strong>0</strong></em>_</td>
<td>2. <em><strong>0</strong></em>_</td>
<td>3. <em><strong>0</strong></em>_</td>
<td>4. <em><strong>1</strong></em>_</td>
</tr>
<tr>
<td>5. <em><strong>0</strong></em>_</td>
<td>6. <em><strong>0</strong></em>_</td>
<td>7. <em><strong>1</strong></em>_</td>
<td>8. <em><strong>0</strong></em>_</td>
</tr>
<tr>
<td>9. <em><strong>1</strong></em>_</td>
<td>10. <em><strong>0</strong></em>_</td>
<td>11. <em><strong>0</strong></em>_</td>
<td>12. <em><strong>6</strong></em>_</td>
</tr>
<tr>
<td>13. <em><strong>1</strong></em>_</td>
<td>14. <em><strong>4</strong></em>_</td>
<td>15. <em><strong>0</strong></em>_</td>
<td>16. <em><strong>0</strong></em>_</td>
</tr>
</tbody>
</table>

Total Score = ____2____  ____4____  ____1____  ____7____

Mean Score = ____1____  ____0____  ____0____  ____0____

Relative Ranking = ____3____  ____2____  ____4____  ____1____

Appendix E:

Reinforcer Survey

Child’s Name: Izzy Bowman

This reinforcer survey was completed by the placement student after other indirect measures and observations of participant.

| Favourite food:       | • Cheese  
                        | • Apples  
                        | • Bananas  
                        | • Red grapes  
                        | • Apple juice  
                        | • Milk  
                        | • Crackers  |
|-----------------------|------------------|
| Favourite colour:     | • Red  
                        | • Blue  |
| Favourite TV Show/Movies: | • Paw Patrol  
                                                       | • Mickey Mouse  
                                                       | • Despicable Me  
                                                       | • Frozen  |
| Favourite thing to do: | • Jump  
                        | • Be with my family  
                        | • Dance  
                        | • Sing  
                        | • Play games  |
| Favourite book:       | • Anything Paw Patrol  |
| Favourite activities: | • Jumping  
                        | • Playing with Play-Doh  
                        | • Playing with Paw Patrol toys  
                        | • Playing on the play structure and sliding down the slide  |
| Toys she enjoys:      | • Cause and effect toys  
                        | • Legos  
                        | • Blocks  
                        | • Puzzles  
                        | • Minions  |
| Other:                | • Loves bubbles  
                        | • Hug  |
Appendix F:
Intervention Data Collection Sheet

Target Behaviour: Social Interactions with Peer(s)

Recording Method: Frequency, Continuous Duration Recording

Sessions per day: 2

Observation and Data Collection Duration: 30 minutes per sessions, equalling 60 minutes of recording a day

Baseline Duration: 6 weeks, starting October 30th, 2017
<table>
<thead>
<tr>
<th>Date</th>
<th>Frequency of Target Behaviour during Morning Free Play Period (30 minutes)</th>
<th>Frequency of Target Behaviour during Afternoon Free Play Period (30 minutes)</th>
<th>Number of Other Children in the room (AM/PM)</th>
<th>Duration: Total Time (X)</th>
<th>Percentage (X/3600 x 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 30th</td>
<td>3</td>
<td>4</td>
<td>5/5</td>
<td>AM: 506.37 sec.</td>
<td>785.56/3600 x 100 = 21.82%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PM: 279.19 sec.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total: 785.56 sec.</td>
<td></td>
</tr>
<tr>
<td>November 6th</td>
<td>2</td>
<td>N/A</td>
<td>5/N/A</td>
<td>AM: 265.28 sec.</td>
<td>265.28/3600 x 100 = 7.37%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total: 265.28 sec.</td>
<td></td>
</tr>
<tr>
<td>November 8th</td>
<td>1</td>
<td>4</td>
<td>¾</td>
<td>AM: 570.75 sec.</td>
<td>664.24/3600 x 100 = 18.45%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PM: 93.49</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total: 664.24 sec.</td>
<td></td>
</tr>
<tr>
<td>November 9th</td>
<td>3</td>
<td>6</td>
<td>8/5</td>
<td>AM: 641.39 sec.</td>
<td>1690.80/3600 x 100 = 46.97%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PM: 1049.41 sec.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total: 1690.80 sec.</td>
<td></td>
</tr>
<tr>
<td>November 13th</td>
<td>3</td>
<td>5</td>
<td>6/7</td>
<td>AM: 905.18 sec.</td>
<td>1523.65/3600 x 100 = 42.32%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PM: 618.47 sec.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total: 1523.65 sec.</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Style</td>
<td>Step</td>
<td>Time</td>
<td>Total Time</td>
<td>Percentage</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------</td>
<td>------</td>
<td>------------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>November 15th</td>
<td>8</td>
<td>N/A</td>
<td>5/N/A</td>
<td>365.46 sec.</td>
<td>365.46/3600 x 100 = 10.15%</td>
</tr>
<tr>
<td>November 16th</td>
<td>1</td>
<td>2</td>
<td>4/4</td>
<td>56.52 sec.</td>
<td>955.97/3600 x 100 = 26.55%</td>
</tr>
<tr>
<td>November 20th</td>
<td>4</td>
<td>6</td>
<td>6/6</td>
<td>224.38 sec.</td>
<td>889.59/3600 x 100 = 24.71%</td>
</tr>
<tr>
<td>November 22nd</td>
<td>3</td>
<td>5</td>
<td>4-6/4</td>
<td>500.10 sec.</td>
<td>2022.25/3600 x 100 = 56.17%</td>
</tr>
<tr>
<td>November 23rd</td>
<td>6</td>
<td>2</td>
<td>4/4</td>
<td>969.13 sec.</td>
<td>2487.04/3600 x 100 = 69.08%</td>
</tr>
<tr>
<td>November 27th</td>
<td>6</td>
<td>5</td>
<td>6-7/7</td>
<td>292.46 sec.</td>
<td>463.40/3600 x 100 = 12.87%</td>
</tr>
</tbody>
</table>
November 30th | 8 | 2 | 4/4 | AM: 1049.68 sec.  
PM: 542.78 sec.  
Total: 1592.46 sec.  
1592.46/3600 x 100 = 44.23%

December 6th | 5 | 1 | 5/6 | AM: 614.30 sec.  
PM: 1684.35 sec.  
Total: 2298.65 sec.  
2298.65/3600 x 100 = 63.85%

**Duration:**
Morning Session: 6,961/23,4000 x 100 = 29.75%
Afternoon Session: 9,043.35/23,400 x 100 = 38.65%

**Total Duration Observed in Seconds During Intervention:**
= Total seconds observed per day x 2 sessions a day
= 1800 x 2
= 3,600 x number of days recorded
= 3,600 x 13
= 46,800

**Total Duration of Target Behaviour During Intervention in Seconds:** 16,004.35
**Total Percentage of Duration During Baseline:** 16,004.35/46,800 x 100 = 34.20%

**Stability of Morning Session Duration:**
= (29.75 x 0.075)
= 2.23
= (29.75 – 2.23) to (29.75 + 2.23)
= 27.52 to 31.98
Overall, 0%, or 0 out of 13 data points fall within a 15% of the average. This means the data was not stable for morning sessions.

**Stability of Afternoon Session Duration:**
= (38.65 x 0.075)
= 2.90
= (38.65 – 2.90) to (38.65 + 2.90)
= 35.75 to 41.55
Overall, 0%, or 0 out of 13 data points fall within a 15% of the average. This means the data was not stable for afternoon sessions.
Total Stability of Intervention Duration:
= (34.20 x 0.075) 
= 2.56 
= (34.20 – 2.56) to (34.20 + 2.56) 
= 31.64 to 36.76
Overall, 0%, or 0 out of 26 data points fall within a 15% of the average. This means the data was not stable for baseline.

PEM (Points Exceeding the Median) for Intervention:
Median is 26.55
= Number of data points above the median/ Total number of days recorded 
= 6/13 x 100 
= 0.4615 x 100 
= 46.15%

Overall PEM (Points Exceeding the Median):
Median is 15.66
= Number of data points above the median/ Total number of days recorded 
= 10/20 x 100 
= 0.5 x 100 
= 50%

Percentage of Improvement in Duration for Morning Sessions:
= Intervention – Baseline/Baseline x 100 
= 29.75 – 3.07/3.07 x 100 
= 26.68/3.07 x 100 
= 8.69 x 100 
= 869.05%

Percentage of Improvement in Duration for Afternoon Sessions:
= Intervention – Baseline/Baseline x 100 
= 38.65 – 3.07/3.07 x 100 
= 35.58/3.07 x 100 
= 11.59 x 100 
= 1,158.96%
Total Percentage of Improvement in Duration:
= Intervention – Baseline/Baseline x 100
= 34.20 – 3.07/3.07 x 100
= 31.13/3.07 x 100
= 10.14 x 100
= 1,014.01%
Appendix G:
Comparison Graphs Between Baseline and Intervention

Figure 1. Percentages of Social Interactions Between Baseline and Intervention Graph
Figure 2. Duration Comparison Across Baseline and Intervention Graph.
Figure 3. Frequency Comparison Across Baseline and Intervention Graph
Appendix H:
Comparison of Morning and Afternoon Sessions Between Baseline and Intervention

Figure 4. Duration in Seconds Across Morning and Afternoon Sessions Between Baseline and Intervention.
Figure 5. Frequency Across Morning and Afternoon Sessions Between Baseline and Intervention.