Increasing Functional Communication Skills for Non-verbal Adults with an Intellectual Disability using Picture Exchange Communication System in a Disability Residential Setting

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Abstract

Individuals who are diagnosed with a developmental disorder may find it difficult to communicate functionally, which limits their ability to have their needs met and their thoughts respected. Augmentative and Alternative Communication (AAC) interventions such as, the Picture Exchange Communication System (PECS) aim to provide a way for individuals with functional communication deficits to communicate their needs. A small number of studies have explored whether direct caregivers can be trained to implement PECS for adult clients with a developmental delay, who reside in a disability residential flat. This study aims to investigate the effectiveness of Behavioural Skills Training (BST), delivered remotely, for training support staff to implement PECS in a disability residential setting. The effect of PECS on functional communication for the client is also evaluated. Staff participants took part in training sessions using BST procedures. Once staff participants had achieved 80% accuracy during training, PECS implementation sessions began with the staff and client participants. Training and implementation sessions were delivered remotely, via video conferencing software. The results of this research indicate that direct caregivers can be trained to implement PECS in a disability residential flat, with all staff participants maintaining a high level of accuracy throughout training and implementation. Training and implementation data showed increased functional communication acts for the client participant as he learned to use PECS to mand for items and activities. However, this change was not reflected in the data gained at generalisation and follow-up sessions. In conclusion, this research provides evidence to support BST as an effective practice for training caregivers to implement PECS in a disability residential setting. Further, PECS may also be an effective intervention for increasing functional communication for individuals with a developmental delay and communication deficits.

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Functional communication is necessary for an individual to be able to communicate their needs, preferences, thoughts, and aspirations (Mirenda, 1997). Individuals with developmental disabilities such as Autism Spectrum Disorder (ASD) or Intellectual Disability (ID) often experience challenges related to functional communication. For adults with developmental disabilities, residing in disability residential settings, a lack of functional communication ability may lead to limited engagement in meaningful activities, as expression of needs or wants may be problematic. A lack of functional communication has also been associated with challenging behaviour for this population (Walker, et al., 2018).

Augmentative and Alternative Communication (AAC) interventions have been developed to assist individuals who have complex communication needs. AAC can be aided e.g.: Picture Exchange Communication System (PECS), Picture Exchange (PE), or Speech Generating Devices (SGD's), or unaided. For example, Manual Sign (MS) (Beukelman & Mirenda, 2013). AAC technologies may help to facilitate or replace speech. For instance, SGDs, for individuals with complex communication needs (Beukelman & Mirenda, 2013). However, many individuals with complex communication needs may also have developmental disabilities. Individuals with complex communication needs, associated with a developmental delay, may still require coaching to be able to use their AAC technologies to communicate functionally. Functional communication means that an individual understands that language, or speech, has a communicative purpose, and that their communicative behaviour can influence the social responses of others in their environment. For example, an individual may learn that they can communicate to make a request or social comment, or to offer relevant information (Bondy & Frost, 2001). PECS differs from other aided AAC modes in the way that it is designed to teach functional communication (Bondy & Frost, 2001).

There is an increased emphasis on the role of parents, grandparents, teachers, and support staff in teaching and successfully maintaining functional communication skills for individuals with

developmental disabilities (Ganz, et, al., 2008; Hong, et, al., 2014; 2008; Jurgens, et, al., 2009). However, a specialist trainer is still often required to teach caregivers how to implement formal communication programmes such as, PECS. This can be a barrier due to the time and cost associated with specialised training (Ferguson, Craig, & Dounavi, 2018) . Telepractice or Telehealth has been proposed as an alternative to face to face specialised training, with specialists conducting training sessions remotely. For example, via video conferencing. It is argued that with reduced time and cost associated with a Telepractice approach, there will be increased access to specialised training for caregivers of individuals with developmental disabilities (Chung, et, al., 2020).

Communication difficulties and problem behaviour for individuals with developmental delay

The ability to communicate thoughts, needs, and wants effectively allows for meaningful choice making, successful social engagement, and improvement in quality of life. For many individuals with Autism Spectrum Disorder (ASD) and / or an intellectual disability (ID) "everyday" communication is challenging. Individuals with developmental delays often fail to develop speech at the same rate or in the same way as typically developing peers. There are many factors that contribute to difficulties in language and speech acquisition for individuals with developmental delays (Young, 2017).

Motor impairments and severe speech disorders can impact on language and speech acquisition as such conditions can make it difficult to produce "natural" speech (Beukelman & Mirenda, 2013). Motor impairment does not pertain just to difficulties in producing speech. Gross motor impairments can also mean that communication via gesturing or physically guiding a communication partner is also not possible. Therefore, a functional communication repertoire is less likely to develop. Motor impairments and severe speech disorders can be related to congenital conditions such as, cerebral palsy, ASD, and apraxia. Motor impairment and severe speech disorders can also be associated with acquired conditions. For example, a speech impairment may emerge following a brain injury or a stroke (Beukelman & Mirenda, 2013). For individuals with

developmental differences such as ASD, social communication challenges can also impact on the acquisition of language and speech (Young, 2017). Young children typically learn, in early language development, that they can approach others with a request. For example, a toy or food item, and that this may then result in gaining access to this item. Further, young children also typically learn that they can make a comment to a parent or grandparent, and this may be met with a positive social response (Bondy & Frost, 2001). Some young children with developmental differences such as ASD, have limited social interest in others, which may make them less likely to approach a parent, grandparent or other "communication partner" for the purpose of communication (Bondy & Frost, 2001). This could result in limited opportunities to make the association between gaining the attention of a parent or grandparent, initiating a communicative attempt e.g.: a request, and gaining access to their preferred food item or toy. Further, children who are not socially motivated are also not likely to make communicative attempts. For example, they may not make a comment such as, "It's cold today", for a social response (Bondy & Frost, 1994). This is likely to contribute to a deficit in functional communication skills.

Individuals with developmental disabilities such as ASD or ID, are at risk of being unable to express their desires, establish social relationships, gain education or employment, and engage in community activities (Beukelman & Mirenda, 2013). It is not surprising that individuals who have communication difficulties are more likely to engage in problem behaviour (Walker, Lyon, Loman, & Sennott, 2018). It is postulated that problem behaviour arises from the inability to be able to effectively communicate thoughts, needs, and preferences with family, friends, or caregivers, suggesting that the "function" or purpose of problem behaviour may often be communicative (Mirenda, 1997). That is to say, the individual develops challenging behaviours not only as a result of their needs not being met, but also as a less socially appropriate way to communicate their needs.

Applied Behaviour Analysis (ABA) involves the development of procedures, which aim to better understand behaviour, and provide a context for behaviour change (Cooper, Heron, & Heward, 2007) . Procedures, based on the principles of ABA, have been demonstrated as effective

in shaping socially appropriate behaviours, increasing functional communication skills, and reducing problem behaviours for individuals with developmental disabilities such as, ASD (Duffy & Healy, 2011; Ghaemmaghami, Hanley, Jessel, & Landa, 2018). ABA is a scientific approach, which serves to explain and subsequently make predictions about behaviour. For example, how behaviour may change in relation to the environment, social influences, and how behaviour is shaped by learning (Cooper, et al., 2007). One theory that is associated with how behaviour is changed by learning is Operant Conditioning (Cooper, et al., 2007). Operant conditioning describes three main components for the analysis of behaviour: 1. Antecedent, 2. Behaviour, 3. Consequence. An antecedent is a setting, context, or event which triggers or creates an opportunity for a behaviour to occur. The "behaviour" is defined as the behaviour that occurs in direct relation to the antecedent. The consequence, or "what happens next" can make the behaviour more or less likely to occur again. The process by which the consequence increases the likelihood of the behaviour re-occurring is called "reinforcement" (Cooper, et al., 2007). When a behaviour response is "reinforced" it means that the behaviour is more likely to re-occur.

Skinner's analysis of verbal behaviour applies a behaviour analytic view of language development, suggesting, in brief, antecedents and consequences shape the development of communication behaviours. For instance, communicative behaviours may be evoked by a specific stimulus or environment and reinforced by a specific consequence (McLaughlin, 2010). In other words, Skinner bases his paradigm on an operant model, viewing development of language as contingency based. Importantly, the development of functional language is contingent on a social response. (McLaughlin, 2010). This differs from other paradigms such as, Chomsky's "Language Acquisition Device" (LAD), which views the development of language as an individual inherently acquiring knowledge about a set of language "rules" (McLaughlin, 2010). A further important distinction is the focus of verbal behaviour on "function" as opposed to "form" (Esch, LaLonde, & Esch, 2010). Skinner is also careful to make the distinction between "verbal" behaviour and "vocal" behaviour or speech. A verbal behaviour is an operant behaviour that does not necessarily

require vocalisation. McLaughlin (2010) describes four elementary communicative behaviours or operants as defined by Skinner:

1. Mand: Mands function as a request, either for preferred items, or activities, or sometimes escape e.g.: asking for a break or time-out (Bondy & Frost, The Picture Exchange Communication system, 2001). A mand is reinforced when access to a requested item, object, activity, or "escape" is gained.

2. Tact: Tacts are a type of verbal behaviour that name or provide information about an aspect of an individual's environment. For example, seeing a chair and saying "chair".

3. Echoic: Echoics "echo" or "imitate" the verbal behaviours of another person

4. Intraverbals: Intraverbals are differential responses to the verbal behaviour of others in the social environment. For example, replying "chicken", when someone is asked what they had for dinner, or giving someone the time when asked.

The outcome or consequence of a verbal behaviour is always socially mediated. Therefore, Skinner also emphasises the importance of the role of the listener or "social community" in shaping communicative behaviours (McLaughlin, 2010). Existing research in this field indicates that in building early language skills, a mand repertoire is the first set of communication behaviours that is developed (Esch, LaLonde, & Esch, 2010). Addressing deficits in manding skills has subsequently been a focus in the treatment of problem behaviour in individuals with diagnosed developmental delays (Tiger, Hanley, & Bruzek, 2008).

Functional Communication Training (FCT) is an evidence-based communication intervention that aims to teach individuals with communication deficits to communicate their needs in more socially appropriate ways. One way to increase functional communication is to support the development of an effective mand repertoire (Falcomata, Wacker, Ringdahl, Vinquist, & Dutt, 2013). FCT is derived from Skinner's analysis of verbal behaviour and is based on the notion that all behaviour has a function or a purpose. FCT has been used to support behaviour interventions for individuals who engage in challenging behaviour, where the challenging behaviour is associated

with a deficit in communication. (McLaughlin, 2010; Esch, LaLonde, & Esch, 2010). FCT intervention is comprised of the following objectives 1. Establishing the function of the problem behaviour, 2. teaching a functionally equivalent alternative communicative behaviour, 3. providing the relevant function-based reinforcement for the appropriate behaviour response, and 4. ensuring reinforcement is not available following challenging behaviour (Gerow, et al., 2018). Heath et al. (2015) completed a meta-analysis of research focusing on the implementation of FCT for individuals aged from primary school through to adult, and diagnosed with either ASD or ID. Their study indicated that FCT can increase functional communication and decrease challenging behaviour, for individuals with communication difficulties, across different age groups and diagnoses. The effect size did vary across age groups and between groups diagnosed with ASD or ID. The effects of FCT were not as strong for adult participants. However, Heath et al. (2015) also highlights that only 16% of participants included in the meta-analysis were adult, which suggests that effect size may have been "skewed" by the comparatively smaller number of adult participants.

The ability to emit a communicative behaviour is vital for a communication intervention to be effective. For individuals who have limited language skills or who are unable to vocalise, additional communication interventions are required to ensure that target communication behaviours are able to be developed.

Alternative and Augmentative Communication

The objective of increasing communicative competence, for individuals with communication deficits, is overarching in the development of Alternative and Augmentative Communication (AAC) (Lorah, Parnell, Schaefer Whitby, & Hantula, 2015). To achieve communicative competence, Light and McNaughton (2014) suggested that a learner must gain adequate skills in four key areas: 1. Linguistic competence i.e.: understanding the relevant linguistic and AAC codes, 2. Operational competence i.e.: operation of the AAC system, 3. Social competence, and 4. Strategic competence i.e.: the ability to develop strategies to manage barriers to linguistic, operational, and social competence. In verbal behaviour terms, achieving communication

competence may refer to the development of functional communication through the use of AAC. For example, competence is developed via contingent reinforcement of verbal behaviours. Communication partners play an important role in supporting individuals with communication deficits to achieve communicative competence, given that the consequences of verbal behaviour are always socially mediated. The role of the communication partner is also vital in ensuring generalisation, extension, and maintenance of functional communication skills (Binger & Kent-Walsh, 2012).

There is support in existing literature for the effectiveness of unaided AAC modes such as MS, in increasing communicative competence for individuals who find it difficult to produce natural speech (Lorah, et al., 2015). However, there are also identified limitations of this method. For example, there may be a lack of generalisability for users of MS, as any potential communication partner would also have to be proficient in using this method of communication i.e.: they would need to understand what a manual sign represented. Further, motor impairments or difficulties in imitation for some individuals would also be a barrier to the functional use of MS or similar unaided AAC methods (Bondy & Frost, The Picture Exchange Communication system, 2001).

A number of studies have been published investigating the use of aided AAC, such as PECS, PE, or SGDs, for individuals with limited communication skills, including those with developmental disabilities such as ASD. The outcomes from efficacy research suggest that aided AAC can increase functional communication for individuals with communication deficits and a diagnosed developmental delay (Beukelman & Mirenda, 2013). Aided AAC modes have also been compared in terms of preference, and their corresponding effect on frequency of functional communication acts, and rate of "speech" or skill acquisition (van der Meer, et al., 2012; Achmadi, et al., 2014; van der Meer, Sutherland, O'Reilly, Lancioni, & Sigafoos, 2012). The outcomes of the research cited above appear to indicate that preference for AAC may be individual, with AAC users generally gaining skills in their preferred aided AAC mode.

The impact of aided AAC on problem behaviours has also been researched. Walker and Snell (2013) completed a meta-analysis of studies focusing on the effect of aided AAC on challenging behaviour for individuals with diagnosed developmental delays. Their findings showed that aided AAC was effective in reducing challenging behaviour in this population, particularly, under the following conditions: 1. AAC is implemented with individuals under 12 years of age, 2. A Functional Behaviour Assessment (FBA) is carried out prior to intervention, and 3. FCT is paired with AAC to address problem behaviours. Walker et al. (2013) commented on the inclusion of PECS as an AAC intervention for reducing challenging behaviour. The authors noted that the key objective of PECS is to increase functional communication acts, not to reduce challenging behaviour. However, it is argued that research including the implementation of PECS still indicates a positive effect on behaviour, where problem behaviour is included as a dependant variable. This is likely as PECS is a form of AAC with an emphasis on FCT, which may consequently have a positive effect on challenging behaviour (Bondy & Frost, 2001). Despite the positive findings, the authors do highlight that the quality of the existing literature may be comprised by a lack of measurement of generalisation, social validity, and treatment fidelity. Walker et al. (2018) extends on this research with a meta-analysis of studies using a single case experimental design, focusing on FCT, AAC and challenging behaviour in school settings. FCT and AAC were found to have a positive impact on reducing challenging behaviour. This was particularly evident for behaviours that were lower in severity. Lorah et al. (2015) completed a systematic review of studies in the AAC field, which focused on the use of tablets and portable media players as SGDs. Research comparing SGDs to other modes of aided AAC were included in the review. The studies in the review generally met the criteria to be deemed “high quality” as outlined by Horner et al. (2005). The outcomes of the review also demonstrated that, despite an indicated preference for the use of a device, manding repertories can be successfully increased for all aided AAC methods. The authors suggest that future research may be warranted to assess the social and financial validity of device based AAC in natural or community settings, and the extension of verbal behaviour skill development. For instance, beyond the acquisition of manding skills.

PECS is a low tech, low-cost mode of aided AAC (Young, 2017), which systematically teaches functional communication skills, focusing on all verbal operants, including the mand. (Bondy & Frost, The Picture Exchange Communication system, 2001). Further, key components incorporated in the PECS training protocol (Bondy & Frost, The Picture Exchange Communication system, 2001) aim to satisfy communication competencies as outlined by Light and McNaughton (2014). The consideration of PECS as a financially viable AAC intervention is warranted, with further consideration of quality-of-life measures for participants, social validity, treatment fidelity, and concomitant effects on challenging behaviour.

The Picture Exchange Communication System

PECS was originally developed by Andy Bondy and Lori Frost with the aim of increasing functional communication skills for children with a diagnosis of ASD (Bondy & Frost, 1994). However, existing literature has indicated that PECS may also be effective for increasing functional communication skills for individuals with a diagnosed ID, with or without an accompanying ASD diagnosis (Conklin & Mayer, 2011). PECS is based on verbal behaviour and applied behaviour analysis principles i.e.: communication objectives are informed by verbal behaviour principles and taught via the use of behaviour analytic strategies. PECS differs from other PE interventions as key functional communication objectives are systematically taught, in a stepwise fashion, across 6 training stages. The six stages of PECS are outlined below, as specified in the PECS training protocol (Bondy & Frost, 2001).

Stage 1: In this stage, the learner (AAC user) is taught how to exchange a single picture for a highly preferred item, object, or activity. Communication partners are trained to immediately respond to the learner's request when it is initiated by the learner. It is important that the communication partner waits for the learner's initiation. This ensures that the communication act is evoked by a need/item/environment, not that it occurs because the learner is responding to a prompt, hence making the communication functional.

Stage 2: This stage teaches the learner how to generalise their new skill. They will be taught to use the same picture to exchange for the preferred item, object, or activity, across different communication partners. They will also learn to use their new skill across varying distances, and to be more persistent with their communication.

Stage 3: For this stage, the learner is taught how to discriminate between two or more pictures, before they initiate their request. A PECS folder will be made available for storage and categorisation of relevant pictures/symbols.

Stage 4: In stage 4, a sentence strip is introduced, with an "I want" PECS symbol attached. The learner is taught to retrieve a picture/symbol of their preferred item, object, or activity from the PECS folder, and add it to the sentence strip. This will then form the sentence "I want e.g.: chips". In stage 4 learners may also be taught how to incorporate attributes. For example, "I want red car".

Stage 5: In this stage the learner is taught to respond to the question "what do you want?"

Stage 6: In stage 6, the learner is taught to make comments. This is achieved by teaching the learner to respond to questions such as, "what do you see?", "what do you hear?". "I see", "I hear", "I smell", "I feel" are examples of symbols that will replace the "I want" symbol on the sentence strip to help the learner make the appropriate response.

Learner and communication partner proficiency at any stage of PECS training must be at least 80% before training for the next PECS stage can commence (Frost & Bondy, 2002). The PECS training protocol further emphasises the significant role the communication partner plays in the development and maintenance of functional communication skills.

Research supporting the effectiveness of PECS for increasing functional communication acts for individuals with ASD and or ID is expansive. Existing literature has demonstrated an increase in independent speech, manding behaviours, and initiation of interactions following PECS intervention (Jurgens, Anderson, & Moore, The effects of teaching PECS to a child with Autism on verbal behaviour, play and social functioning, 2009; Charlop Christy, Carpenter, Le, LeBlanc, & Kellet, 2002; Conklin & Mayer, 2011; Anderson, Moore, & Bourne, 2007). Functional communication increases have also extended to social communication skills such as joint attention

and functional play skills (Anderson, Moore, & Bourne, 2007; Jurgens, Anderson, & Moore, The effects of teaching PECS to a child with Autism on verbal behaviour, play and social functioning, 2009; Lerna, Esposito, Conson, & Massagli, 2014). Walker et al. (2013) highlights that the primary objective of PECS, as an aided AAC mode, is not to reduce challenging behaviour. However, some researchers have also demonstrated a decrease in problem behaviours following PECS implementation (Conklin & Mayer, 2011; Frea, Arnold, & Vittimberga, 2001). Ganz et al. (2009) obtained variable results related to the reduction of challenging behaviours for three participants with developmental delays. The authors discuss the possibility that the variability may be due to differences in behaviour function. It is suggested that further research may investigate whether problem behaviour may reduce or stabilise over time in the absence of a functional behaviour assessment. For instance, where challenging behaviour is monitored but not directly targeted by the intervention.

The majority of studies evaluating the effectiveness and validity of PECS utilise single subject research designs. Flippin et al. (2010) completed a meta-analysis focusing on PECS studies utilising both single subject and group design, where dependant variables were communication and speech outcomes for children with a diagnosis of ASD. Flippin et al. (2010) only included studies that followed unmodified PECS training protocols (Frost & Bondy, 2002). The review showed that PECS increased functional communication skills for children and young people on the autism spectrum. The overall outcomes regarding development of speech, as a result of PECS training, were not as significant. However, Flippin et al. (2010) observed a significant effect size for speech gains during PECS Stages 4-6 and theorised that the development of speech may be associated with the introduction of verbal modelling and time delays, associated with PECS Stage 4. Research quality was evaluated by reviewing key quality indicators as outlined by Horner et al. (2005). The results of the meta-analysis showed that the studies utilising single subject designs reached the criteria for “adequate” quality. However, concerns were raised around treatment fidelity, generalisation, and maintenance. The meta-analysis by Flippin et al. (2010) did not include comparative studies, participants with additional diagnoses, multiple dependent variables, or

participants over the age of 18 years. Studies excluded from the meta-analysis, do provide some evaluation of generalisation and treatment fidelity (Ganz, Sigafoos, Simpson, & Cook, 2008; Jurgens, Anderson, & Moore, The effects of teaching PECS to a child with Autism on verbal behaviour, play and social functioning, 2009). Steps have also been taken by researchers to include teachers and parents in PECS implementation, and to ensure training, implementation, and generalisation sessions are conducted in more natural environments (Ganz, Sigafoos, Simpson, & Cook, 2008; Ziomek & Rehfeldt, 2008; Jurgens, Anderson, & Moore, The effects of teaching PECS to a child with Autism on verbal behaviour, play and social functioning, 2009). Alsayedhassan et al. (2016) completed a more recent review of the literature focusing on the efficacy of PECS, implemented by parents and practitioners. The outcomes of the review provided further support for the generalisation of PECS both in implementation and in training. However, a meta-analysis by Lamb et al. (2018) indicated that treatment fidelity and parent, and practitioner training methods still require more detailed reporting. Based on the existing reviews and meta-analyses in the literature PECS is gaining support as a "promising" evidence-based practice (Flippin, et, al., 2010). However, further research with increased focus on generalisation, maintenance, parent and practitioner training, and treatment fidelity would increase support for the establishment of PECS as an evidence-based practice (Lamb, et, al., 2018, Alsayedhassan, et, al., 2016 & Flippin, et, al., 2010).

PECS for adults with ASD and or ID in a disability residential setting

Caregivers and direct staff are likely to be the primary communication partners for adults residing within disability residential settings. It has been suggested that adults with developmental disabilities, residing in disability residential settings, are at risk of reduced quality of life, as communication deficits are often barriers to functional e.g.: choice making, and social communication (Beukelman & Mirenda, 2013). Further, when direct staff are not skilled in communicating with adult clients in their care, challenging behaviour is more likely to develop (Smidt, Balandin, Reed, & Sigafoos, 2007). Communication interventions for adults with diagnosed

developmental delays have been evaluated in AAC research. There has also been increased focus on caregiver or direct staff implemented interventions. For example, van der Meer et al. (2017) evaluated the effectiveness of an iPad™-based communication intervention for increasing functional communication for adults with ID, where direct care staff were trained to implement the intervention. Direct- care staff were trained using a combination of PowerPoint and video presentations, role play, practice, and feedback. Van der Meer et al. (2017) found that training staff to implement an iPad™-based communication intervention led to increases in functional communication for the clients, and increased fidelity of implementation by direct-care staff. Hong et al. (2014) completed a similar study, where direct care staff were trained to implement an iPad™ based communication programme called "Tap to Talk ™", for an adult participant with ASD. The outcome of this study also showed that direct-care staff could be trained to implement a communication intervention with a high level of accuracy. However, the authors identified that the client's independent use of AAC, and rate of communication initiations decreased as input from the direct-care staff increased. Hong et al. (2014) proposed that this may be due to the client's increased dependency on prompts to communicate by the direct-care staff. Research evaluating the use of PECS to increase functional communication in adults with ASD or ID is limited. However, similar to AAC, published studies do partially address generalisation issues, with a focus on direct-staff or caregiver led implementation. Wood et al. (2007) investigated training procedures to teach 4 direct care staff to implement PECS for an adult participant, with a diagnosed developmental delay. The authors used a combination of written information, modelling, rehearsal, and feedback to train the direct-care staff. The outcome of their study showed that direct care staff can be trained to accurately implement PECS and that a high level of accuracy can be maintained. The authors commented that the increase in accuracy of PECS implementation was also achieved in a natural setting, the disability residential home, within the regular shifts and daily routines, and without the requirement for extra resources. A limitation of the research was that it did not allow for assessment of the client participant's potential functional communication change across baseline, training, and follow-up sessions, as the client participant was not able to master Stage 1 in the allocated

timeframe. Barnes et al. (2011), in a similar study, did not gain the same positive effect. However, the authors concluded that the implications may be that written instruction and instructional videos alone are not sufficient for direct care staff to be able to learn and accurately implement PECS. Barnes et al. (2011) also did not report data on the client participant's functional communication change across pre-test and training conditions. An unpublished dissertation by Collins (2014) evaluated training via video-modelling for direct care staff in the implementation of Stages 1 and 2 of PECS, for four adult clients with developmental delays. The outcomes implied that following training, accuracy of PECS implementation increased for staff. Further, data collected for the client participants indicated that functional communication responses increased from baseline as PECS training progressed. Collins (2014) also completed a qualitative social validity questionnaire. Staff feedback appeared to be generally positive with regard to training, and feasibility of PECS implementation in the disability residential environment.

A study by Conklin and Mayer (2011) evaluated the effectiveness of PECS for increasing functional communication for three adults with developmental delays. One participant was able to progress through all six stages of PECS, and two participants gained proficiency in stages 1-3. The authors also monitored the collateral effect on challenging behaviour for the client participants. An overall decrease in problem behaviour for all three participants was observed. It is noted that a limitation of the study is that training did not occur in a natural environment. Further, PECS was implemented by undergraduate students who had training in ABA. This may also limit the generalisability of these results, as it is possible that the communication partners in this study may have had existing skills which would improve their performance in implementing PECS

The effectiveness of caregiver or direct care staff led PECS implementation, for adults with developmental delay, appears to be gaining support in the PECS literature. However, further replication studies are required to strengthen external validity (Cooper, Heron, & Heward, 2007). Reviews and meta-analyses have not yet been completed for this specific application of PECS, which may be due to the limited number of studies available. The consideration of reliability,

treatment fidelity, social validity, generalisation, and maintenance can be observed in research included in this literature review. However, none of the published studies incorporate measures of all of the quality indicators as outlined by Horner et al (2005) This indicates that further research, focusing on all quality indicators, is required in order to increase evidence for the effectiveness of PECS for adults with developmental disabilities, residing in disability residential environments.

Implementation barriers and treatment fidelity in AAC and PECS

There is a growing body of literature demonstrating the effectiveness of aided AAC interventions for individuals with a diagnosed developmental delay. However, aided AAC is not as widely or as successfully used as research would suggest, which may indicate research to practice gaps (Fixen et al., 2010, as cited in, Erath, et al., 2020). It can be difficult for families and paraprofessionals to access specialist communication equipment, advice, and training e.g.: due to long waitlists, or cost of training (DiGennaro, et al., 2013, as cited in, Erath, et al., 2020). This may partially explain why some individuals with communication deficits do not have or have never had access to AAC to support their communication. Specialist services, once accessed, are often time limited. It is possible that there is not enough time for communication partners and learners to master communicative competence before specialist support is withdrawn. Consequently, specialist services are often required to engage multiple times when communication interventions are either abandoned or seen as unsuccessful, which can increase strain on time and cost (Shapiro & Kazemi, 2017). These challenges are potentially exacerbated by limitations in replication and generalisability of AAC interventions in “natural” or front-line settings. Several researchers have sought to address such issues by creating a focus on caregiver or paraprofessional led AAC implementation and training, with implementation and training being conducted in the learner or AAC user’s natural environments (Ganz, et al., 2008; Ziomek & Rehfeldt, 2008; Jurgens et al., 2009). However, generalisability and maintenance of communication partner and learner skills is still of concern (Flippin et al., 2010). There are a number of factors that contribute to how successfully the effects of an intervention can be generalised, and how successfully outcomes can be maintained. Social

validity, parent and caregiver training, and treatment fidelity are commonly identified factors impacting on the validity, generalisation, and maintenance of PECS and other aided AAC interventions.

Social validity is concerned with how acceptable treatment goals and intervention procedures are for consumers (Cooper, et al., 2007). Wolf (1978) suggests that social validity should be measured in three ways: 1. The social significance of the target behaviour, 2. The appropriateness of the procedures, and 3. The social importance of the results. Measuring the social significance of target behaviour goals can be achieved either by measuring against the performance of an individual already competent in the target behaviour, or by adapting performance levels of an individual to ascertain what level of performance will gain the best outcomes (Van Houten, 1979, as cited in, Cooper, et al., 2007). The appropriateness or acceptability of treatment procedures is often measured by gaining subjective ratings by consumers or participants, either by use of scales or questionnaires (Cooper, et al., 2007). The social importance of the outcomes of the intervention refers to how meaningful the change in behaviour has been, as rated by observers or consumers. For example, parents, teachers, direct care staff, external stakeholders, or other professionals (Wolf, 1978). This can be measured by using scales, questionnaires, or standardised tests (Cooper, et al., 2007). It is important that interventions are perceived as socially valid or accepted, as this may increase the likelihood that the intervention would continue to be used i.e.: skills and procedures are maintained long-term. Further, implementors of the intervention are more likely to be motivated to work towards accepted, appropriate, or "valued" goals, which is also indicative of more long-term use of the intervention (Fuqua & Schwade, 1986).

A number of reviews and meta-analyses have been completed assessing the efficacy and validity of PECS and other modes of aided AAC as communication interventions for individuals with a diagnosed developmental delay (Flippin, et al., 2010; Logan, et al., 2017; Lorah, et al., 2015; Tincani & Devis, 2011; Walker & Snell, 2015; Hart & Banda, 2010). The majority of researchers reported that, in many of the included studies, social significance of target behaviour and

acceptance of treatment procedures was not directly evaluated (Hart & Banda, 2010). A number of researchers also reported on a lack of long term follow up, where generalisation and maintenance of skills was not assessed. A long-term follow- up also provides information about the social validity of an intervention, measured by long term gains (Jurgens, Anderson & Moore, 2019). The short-term effectiveness of aided AAC such as, PECS, in increasing functional communication for individuals with ASD and or ID has been well documented. Evaluation of social validity, in terms of significance of goals and treatment acceptability, has been increasingly incorporated in to aided AAC. However, it would appear that the long-term effectiveness of aided AAC interventions i.e.: the rate of success in generalisation and maintenance of skills over time, may need further evaluation.

The role of the communication partner is integral to the success of a communication intervention. Development of functional communication skills relies on a competent communication partner, who is able to create opportunities for communication, shape appropriate communication behaviours, and respond appropriately to communication initiations by the learner. A competent communication partner may create communication opportunities by environmental arrangement. For example, by enticing the learner with an item that they can view, but not reach, and or using strategies such as, “Stop Drop and Talk”, which recommends that the communication partner learns to recognise and act on communication opportunities as they arise in the natural environment (Jurgens, et al., 2019, p. 1). Communication partners also need to be competent in modelling and prompting in order to be able to shape appropriate communication behaviours and respond appropriately to communication initiations by the learner. Without adequate training, communication partners of AAC users have been observed to engage in behaviours that are detrimental to the development of functional communication or communication initiations (Light, et al., 1985), or frequently display AAC implementation errors (Jurgens, Anderson & Moore, 2012). Kent-Walsh and McNaughton (2005) report a number of errors commonly made by non-specialist communication partners. Communication partners, when observed in natural settings displayed the following behaviours 1. Domination of interactions, 2. Predominant use of yes or no questions, 3.

Domination of conversational turn-taking, 4. Providing limited opportunities for learner communication initiation, 5. Interrupting AAC learner, and 6. Focusing predominantly on technology or materials rather than the learner. As a result, Kent-Walsh and McNaughton (2005) outline a reduction in learner initiations, a reduction in the use of functional language, and a reduction of linguistic complexity of communicative behaviours. Effectiveness and integrity of communication partner behaviours are particularly important where a set protocol is prescribed, for example, The PECS Training Protocol (Frost & Bondy, 2002). Jurgens et al. (2012) completed a review of 21 YouTube videos, with a focus on parent implemented PECS. The authors observed a high rate of implementation errors, suggesting a lack of procedural integrity among communication partners who are not adequately trained. Implementation errors were defined as, 1. Vocal prompt, 2. Gestural prompt, 3. Open hand prompt errors, 4. Learner initiation errors, 5. Timely reinforcement errors, 6. Insistence on speech, and 7. Incorrect error correction. Researchers have increasingly incorporated training of parents, caregivers, teachers, and direct- care staff to implement aided AAC interventions, including PECS, for individuals with developmental delays. A number of studies and reviews suggest that parents and paraprofessionals can be trained to implement aided AAC with a high degree of procedural integrity (Lorah, et al., 2015; Jurgens, et al., 2009; Kent-Walsh & McNaughton, 2005). However, there is still an overall lack of reporting on procedural integrity and treatment fidelity within the existing aided AAC literature (Flippin, et al., 2010; Hart & Banda, 2010; Lamb, et al., 2018).

Procedural integrity and treatment fidelity measures are vital if outcomes are to be attributed to an intervention (Simpson, 2005). Training of parents, caregivers, teachers, and direct-care staff to implement aided AAC interventions such as PECS, with a high level of integrity and fidelity may help to bridge the gap between research and practice. The quality of training is a significant factor in ensuring high levels of integrity. There is a paucity of research evaluating training of direct-care staff in the implementation of PECS for adults with ASD, with or without a diagnosed ID. Barnes, Dunning and Rehfeldt (2011) completed a review, which evaluated different strategies for training direct-care staff to implement PECS. The outcome of their review suggested that training methods

incorporating written instructions, video modelling, rehearsal, and corrective feedback such as, Behavioural Skills Training, were most effective for increasing integrity and fidelity of PECS implementation.

Behavioural Skills Training and PECS

Individuals with unmet communication needs rely on the skills of those who support them, either to be able to anticipate what they might want or need, or to be able to effectively implement and support an AAC intervention. This is particularly true for individuals with ASD and or ID, who reside in disability residential homes. Direct-care staff are often untrained in AAC interventions, despite the complex communication needs of the individuals that they support (van der Meer, et al., 2017). Sutherland et al. (2014) completed a survey of AAC requirements for adults with ID. Their research indicated that a high number of adults with ID have a need and would meet criteria for aided AAC. However, the direct-care staff who support these individuals often step into the role with limited to no training in aided AAC interventions. The authors concluded that to meet the communication needs of adults with ID, further training of direct-care staff to effectively implement aided AAC interventions is required. Dalton and Sweeny (2011) completed a similar study, which also indicated that, despite direct-care staff recognising the importance of facilitating communication for adults with ID, direct-care staff also felt that they did not have adequate knowledge or training provided to them, which would enable them to facilitate communication effectively.

Behavioural Skills Training (BST) is a competency-based training package (Sarokoff & Sturmey, 2004). It is comprised of four key components, 1. Instruction, 2. Model, 3. Rehearsal, 4. Feedback (Rosales, Stone, & Rehfeldt, 2009). A number of single subject studies have utilised BST to teach skills to direct-care staff, parents, teachers, and students. For example, Sarokoff and Sturmey (2004) investigated the effectiveness of using BST to teach three special education teachers to implement discrete-trial teaching (DTT) with a young student with autism. The authors found that BST increased the accuracy of implementation of DTT, and that skills were rapidly

acquired during the course of training. Lavie and Sturmey (2002) utilised BST to teach 3 staff to implement a paired stimulus preference assessment for 8 children with ASD.

Gormley et al. (2019) completed a clustered randomised control trial with the aim of evaluating the effectiveness of BST in training direct-care staff, for adults with ID, on principles related to reinforcement, systematic prompting, FCT and task analysis. This research has increased evidence for the efficacy of BST as a quality training method for teaching direct-care staff, "disseminating evidence-based practice to front line" (Gormley et al., 2019, p. 1302).

Studies assessing the effectiveness of BST in teaching the implementation of PECS have also been completed. Rosales et al. (2009) completed a study, which aimed to use BST to teach three students to implement the first three stages of PECS with a confederate learner. Their study was strengthened by generalisation and maintenance probes. The participants required further training at the first generalisation probe. However, performance remained high for further generalisation sessions and was maintained at 1 month follow up. Homlitas and Rosales (2014) added to this research by utilising BST to teach education staff to implement the first three stages of PECS. Baseline and training sessions were conducted with confederate learners. However, generalisation and follow up sessions were conducted with children with ASD. The authors found that BST was effective in training teachers to implement the first three stages of PECS. Further, accuracy of performance during generalisation and follow up remained at least 90%. Wood et al. (2007) also used BST style coaching to teach direct care staff to implement the first stage of PECS with an adult with ASD and ID. Their study showed that BST was effective for teaching direct-care staff to implement PECS with an adult learner. Further, high levels of performance were maintained across generalisation and follow up sessions.

Research focusing on the use of BST for teaching PECS has not yet been systematically reviewed. The quality of the studies would appear to be reasonable (Horner et al., 2005), with generalisation, follow up and fidelity measures included in most. However, despite continued high performance at generalisation and maintenance sessions, which may be indicative of a socially

acceptable treatment combination, social validity does not appear to have been measured in the majority of the studies.

A study completed by Barnes et al. (2011) discusses that BST prescribes a minimum level of training to ensure procedural integrity and maintenance of skills related to PECS training and implementation. Intensive levels of specialist training and support have been demonstrated in the existing PECS and BST literature. Specialist engagement at this level can be costly, and the requirement for face-to-face training for direct-care staff can impact on resources and support capacities. For example, caregivers supporting individuals who reside in remote locations, are likely to experience difficulty accessing specialist services due to the extra time and financial costs associated with travel. Telehealth or Telepractice has grown over the past decade and has been purported to be a viable alternative to face-to-face specialist training.

Telepractice

Training parents, caregivers, direct-staff, and education professionals to implement behavioural, communication, or health interventions in natural environments helps to address generalisation and social validity issues in evidence-based practice (Chung, et al., 2020). However, it can often be difficult for those supporting individuals with complex needs to access specialised training or supervision. A number of barriers may be associated with accessing specialist advice. For example, waitlists, geographical constraint, financial constraints, and time constraints (Ferguson, Craig, & Dounavi, 2018). The practice of Telehealth or Telepractice has been developed to try and mediate some of these barriers in order to extend service delivery. Telepractice involves the use of tele-communication technology to deliver specialist training remotely (Chung, et al., 2020). Training can either be delivered in “real-time” via video conferencing, or training sessions can be pre-recorded and viewed at convenience. Telepractice also enables multi-disciplinary teams supporting individuals with complex needs to consult remotely, saving travel time and venue costs (Baharav & Reiser, 2010). Telepractice has a growing evidence base, and it has been demonstrated

as effective in training parent, caregivers, direct-care staff, and other professionals to implement interventions (Sutherland, Trembath, & Roberts, 2018).

Telepractice has been utilised in research across a variety of fields, such as nursing, occupational therapy, and a variety of different health and disability conditions (Chung, et al., 2020). However, a growing number of studies have been completed in the field of Telepractice, evaluating delivery of training to parents and caregivers of children and adolescents with developmental disabilities such as ASD or ID. Baharav and Reiser (2010) completed a study incorporating a Telepractice approach to a speech and language intervention for young children with autism. Their research compared a treatment as usual clinical model, with a model incorporating home sessions. The home sessions were remotely supervised by a specialist with real-time feedback and coaching provided. The outcomes suggested that treatment gains exceeded expectations for the experimental treatment model. Further, parents reported that the intervention was relatively easy to implement in the home environment. Vismara et al. (2012) also completed a study focusing on early autism. Parents were successfully trained to implement aspects of the Early Start Denver Model (ESDM) in the home environment, with remote coaching. Participants gained skills rapidly and reported that the technology was easy to use. Increase in target social communication skills for the learner participants was comparable to training delivered by an on-site professional.

Akemoglu et al. (2019) completed a systematic review, which examined caregiver led language and communication interventions delivered via Telepractice. Following video coaching on language and communication interventions parents increased their skills in facilitating their child's social communication. Parent participants showed improvement in implementation strategies such as modelling, prompting, environmental arrangement and providing increased opportunities for communication initiation. Child participant outcomes demonstrated an increase in social communication skills. However, the outcomes were not as clinically significant as with parent participants.

Telepractice has also been utilised to teach parents and caregivers to complete functional assessments, and to implement FCT. Wacker et al. (2013) trained parents of twenty young children with ASD to implement a functional behaviour assessment (FBA) for problem behaviours, supported by a parent assistant, via remote coaching from an experienced behaviour analyst. Training sessions were conducted in a clinic setting, which was within fifteen miles of the participants' homes. The results of this study indicated that parents were able to follow FBA procedures, when FBA training was delivered remotely. Further, FCT was also able to be successfully implemented via remote coaching, which resulted in a decrease in challenging behaviours. Wacker et al. (2013) discuss that further research is required to evaluate the effectiveness of treatments such as FCT via Telepractice in a broader range of settings. For example, schools, homes, and disability residential settings. Machalicek et al. (2016) extended this research and found that parents of children with ASD were able to complete FBA and engage in FCT strategies to decrease challenging behaviour in the home environment, with remote support from an experienced behaviour analyst. Benson et al. (2018) completed a recent study which incorporated a Telepractice approach to treating Self Injurious Behaviour (SIB). In this research, parents of two children with developmental disabilities were also successfully trained to complete FBA and implement FCT in the home environment, via remote coaching. SIB was reduced for both participants following FBA and FCT training. Additionally, Benson et al. (2018) also reported that functional communication skills such as mands, also increased following the remote FBA and FCT training sessions.

Ferguson et al. (2019) completed a systematic review examining research related to Applied Behaviour Analysis (ABA) interventions, delivered via Telepractice. Of the twenty-eight studies included the authors found that all studies indicated a positive outcome for client participants, suggesting that Telepractice may be an "acceptable" method of delivery for ABA interventions. Many of the described studies evaluate the effectiveness of the approach for parents of children with developmental disabilities. There is a paucity of research focusing on training direct care staff, of adults with developmental disabilities, to implement interventions via Telepractice.

Existing literature has also demonstrated that BST can be effectively delivered via Telepractice. A study by Roscoe and Fisher (2008) incorporated the use of BST procedures to teach staff to implement preference assessments. The authors found that BST training procedures, with remote delivery of training, had a positive impact on staff skills in a single training session. Higgins et al. (2017) and Fisher et al. (2014) replicated this study further supporting that BST could be delivered via Telepractice, to teach staff to implement ABA strategies and interventions.

Two comprehensive reviews have provided information around the effectiveness, validity, and quality of the aforementioned research (Ferguson, et al., 2019; Akemoglu, et al., 2019). The outcomes of these reviews indicated that Telepractice may be an acceptable method of training, for parents and staff caring for or working with children and young people with ASD and or ID. Further, both reviews report evidence of social validity. However, Ferguson et al. (2019) and Akemoglu et al. (2019) noted methodological flaws such as a lack of reporting on participant demographics, and variability in baseline and initial training phases. Akemoglu et al. (2019) found that, overall, caregiver led language and communication intervention studies did not report or measure treatment fidelity sufficiently. This omission led to lower quality ratings for these studies. In contrast, Ferguson et al. (2019) reported that treatment fidelity was sufficiently reported and measured in the majority of the included studies, and these studies subsequently measured higher in quality.

Conclusion

Individuals with ASD, with or without a diagnosed ID, can experience significant difficulties related to functional communication. Individuals with communication deficits find it challenging to communicate needs, wants, thoughts, and aspirations with those who support or care for them. The lack of ability to make decisions around their day-to-day routines and care is associated with a reduced quality of life (Beukelman & Mirenda, 2013). Further, individuals with limited ways to communicate their needs, may be more likely to engage in problem behaviours (Walker, et al., 2018). Aided AAC systems, such as PECS, have been demonstrated as effective in

increasing functional communication, social communication skills, and functional play skills for individuals with communication deficits (Jurgens, et al., 2009). Aided AAC interventions have also been used in combination with FCT, which has demonstrated a reduction in challenging behaviours. While the primary objective of PECS is to increase functional communication, problem behaviours have been observed to decrease as a collateral effect of the intervention (Walker & Snell, 2013).

There have been a number of reported barriers to effective implementation of aided AAC interventions such as PECS. As reported in meta-analyses and systematic reviews, issues with generalisation, staff and parent training, treatment fidelity, and social validity may impact on the long-term implementation and effectiveness of these interventions (Flippin, et al., 2010; Lamb, et al., 2018). The PECS training procedure is specified by a training protocol, which may make it a more robust communication intervention in terms of monitoring procedural integrity and treatment fidelity (Frost & Bondy, 2002).

Behavioural Skills Training (BST) has been shown to be effective in increasing treatment fidelity and procedural integrity, when training parents, caregivers, direct-staff, and education professionals to deliver communication and behavioural interventions. Further, BST has also demonstrated that high levels of fidelity were able to be maintained over time (Barnes, et al., 2011). Many of the studies did not sufficiently report on the social validity of BST. However, the success in generalisation and maintenance of trained skills may suggest that BST could potentially be a socially valid training procedure. It is suggested that there may be financial and time costs associated with intensive training procedures such as BST e.g.: travel time, cost of face-to-face consultation, or strain on parent or staff resource capacity (Ferguson, et al., 2019).

Telepractice has been developed to try and address financial, geographical, and time constraints, related to ease of access to evidence based interventions (Chung, et al., 2020). Telepractice has been demonstrated to be equally effective as face-to-face contact in the training of parents, and staff to implement behaviour and communication interventions (Sutherland, et al.,

2018). Further, BST has been successfully trialled as a remote training procedure (Roscoe & Fisher, 2008; Higgins, et al., 2017; Fisher, et al., 2014).

Many of the studies in the aforementioned literature focus on parent and caregiver led implementation for children and young persons with a diagnosed developmental delay. There is a paucity of research examining direct-care staff training in aided communication interventions, specifically PECS, for adults residing in a disability residential setting. The effectiveness of delivering training to direct-care staff in a disability residential setting via Telepractice is also underserved. Therefore, the aims of this research are as follows:

1. To evaluate whether direct-care staff and caregivers can successfully be trained as communication partners, for individuals with an intellectual disability and limited expressive communication skills, using Behavioural Skills Training
2. To evaluate whether direct-care staff can be successfully trained to implement PECS using a Telepractice or remote coaching approach
3. To investigate whether PECS training will increase the frequency of functional communication acts for a non-verbal adult with a diagnosed developmental delay, in a supportive disability residential setting.

Method

Participants

This research included two groups of participants. Group 1 consisted of a client participant, and Group 2 participants were the residential care staff who provided support for the client participant.

Client participant

To be recruited for this research, the client participant needed to meet the following inclusion criteria:

- non-verbal adult
- aged between 20 years and 40 years

- has a diagnosed intellectual or developmental disability
- is accessing disability residential services
- has an Alternative and Augmentative Communication (AAC) goal associated with an existing support plan, which had not been successfully addressed.

The client participant "J" was a 27-year-old male with a diagnosis of Autism and Intellectual Disability. J had been residing in a disability residential setting for 6 years. J was predominantly non-verbal with limited functional communication skills. J was able to point, lead and gesture to communicate to support staff and caregivers. However, he was unable to consistently use vocal communication to express himself. Staff participants advised that J would sometimes make a vocal request for 1 or 2 preferred items, but he did not use any other vocal communication or phrases. J engaged in problem behaviours approximately two times per month. J's problem behaviours were defined as entering the personal space of others i.e.: stand within thirty centimetres of another person, which would predominantly occur when he was becoming anxious when staff were having difficulty understanding what he would like, and breaking items on the floor. Staff participants hypothesise that J engaged in the latter behaviour as he liked to hear the sound of the items breaking.

Staff participants

Staff participants provided direct care to J on a daily basis. Three primary staff participants took part in this research, P1, P2 and P3.

P1 was a female in her forties and had supported J for just less than a year. P1 had not had any formal communication training or previous experience implementing PECS.

P2 was a male in his forties and had supported J for 3 years. P2 had not had any formal communication training or experience implementing PECS.

P3 was a male in his twenties and had supported J for approximately 1 year. P3 also did not have any formal communication training or experience implementing PECS.

J's service manager, P4, took part in all of the training sessions and several implementation sessions. P4 was a female in her forties who had worked with J for 6 years. She did not have any

formal PECS or communication training. P4 stood in for primary staff participants during implementation sessions, where necessary.

Setting

The participant training sessions took place at the dining table, in the dining room of the client participant's residence, and in the communal living area. The generalisation sessions occurred in the back yard area, where the client participant engaged in free time and/or leisure activities. A Samsung Galaxy Tab A10.1 tablet was set up in the baseline, training, implementation and generalisation environments to allow the researcher to provide training and conduct observations via video conference. The researcher was based in an off-site office for all baseline, training, and generalisation sessions. The researcher used an HP EliteBook and headset to connect with the staff participants in the residential setting via video conferencing software.

Materials

PECS folder

The A4 PECS communication folder, comprised of laminated sheets of coloured paper, with 2 Velcro strips placed on either side of a laminated sheet. Three Velcro strips were also placed on the cover of the folder. 3 x 3 cm PECS pictures or symbols were provided in colour, as required.

Technology

Technology used included a Samsung Galaxy Tab A10.1 tablet, video conferencing and recording software, headset with microphone, HP EliteBook.

Data recording and Reinforcement Inventory

Prior to beginning PECS Training, staff participants completed a Brief Reinforcement inventory (Behaviour Assessment Guide, 1993) (see Appendix F). The aim of the reinforcement inventory was to identify items and/or activities that were reinforcing for the client participant. A Modified Primary Intervention Scale (MPRIS) (Lane, Robertson, & Wehby, 2002) was provided for staff participants, to assess their views on the procedures and treatment acceptability (see Appendix G).

Staff participants were also provided with a Problem Behaviour Recording sheet, developed by the researcher (see Appendix H).

Data recording sheets were developed by the researcher to monitor dependant variables and staff independent variables, during baseline, implementation, generalisation, and follow up phases of the research (see Appendices I, J, K, L, M, N, O, and P). Client participant independent variables were monitored using data recording sheets from the PECS Training Manual (Bondy & Frost, 2002) (see Appendices Q and R).

Items for reinforcement

Highly preferred items for reinforcement were provided by the staff participants. These items were chips, bubbles, M + Ms, biscuits, ice cream, massage, and puzzles,

Design

A quasi-experimental, single subject AB design, with pre-test, post-test was used for this research. The single subject AB design is used to assess possible effects of treatment (condition B) on a dependent variable, compared with a baseline (condition A). Pre-test, post-test assessment can be included to strengthen the validity of results (Cooper, Heron & Heward, 2007). In this research, progression for all targeted treatment phases was as prescribed by the PECS Training Manual (Bondy & Frost, 2002).

Independent Variable

The independent variable for the support staff participants was the guided participation in PECS implementation, as prescribed by the PECS training manual (Bondy & Frost, 2002).

There are six stages of PECS. This research involved engaging support staff participants as communication partners and training them to implement the first three PECS stages.

PECS Stage 1: In this stage, the overall aim is to teach the learner or client how to request for a highly preferred item, object, or activity by exchanging a single picture or symbol. Communication partners are trained to immediately respond to the learner's request when it is initiated by the learner.

PECS Stage 2: The objective of this stage is to teach the learner how to generalise (his/her) new skill. The learner is taught to use the same picture to exchange for the preferred item, object, or activity, across different communication partners. The learner also learns to use their new skill across varying distances, and to be more persistent with their communication.

PECS Stage 3: In this stage, the learner is taught how to discriminate between two or more pictures, before they initiate their request. To achieve at this stage the learner is also required to generalise the skills learned at stage 2 e.g.: travelling over a short space to gain the attention of a communication partner.

Dependent Variables

A number of dependent variables were measured for both the client participant and the staff participants during generalisation sessions. For the client participant, the frequency of PECS mands, vocal mands, and unprompted communication initiations were recorded for baseline, generalisation, and follow up phases. Problem behaviour can sometimes arise due to a deficit in functional communication skills such as, manding (Beukelman & Mirenda, 2013). Behaviours of concern were identified for the client participant, with the intention that data would be collected for behaviour throughout the duration of the intervention. Overall changes in frequency of problem behaviour occurrences were to be assessed by calculating a mean number of occurrences per week, with the aim of observing any collateral effects of PECS training on problem behaviour. For staff participants, the frequency of communication opportunities, timely reinforcement, appropriate prompts, and appropriate modelling and error correction procedures were recorded across baseline, generalisation, and follow-up phases. Data was not collected on dependent variables during training and implementation sessions as the client and staff participant responses would not be considered to be "natural" in this context. During baseline, training, implementation and generalisation sessions, the fidelity of each PECS trial was assessed in accordance with the criterion set for the corresponding PECS phase.

Operational definitions of client participant DVs:

- *PECS Mand*- The PECS mand involves a request being made by exchanging a picture or symbol for a desired item, activity, or object. It may or may not be accompanied by a vocalisation
- *Vocal Mand*- A vocal mand is a vocal request for an item, activity, unaccompanied by a PECS picture or symbol
- *Unprompted communication initiation*- A learner communication attempt is defined as any spontaneous initiation of communication directed towards an available communication partner that is not a mand, or not in response to communication initiated by someone else
- *Behaviour of concern*- A behaviour of concern can be defined as an undesired behaviour that may appear socially unacceptable, which may increase the risk to personal safety and or safety of others. It may also lead to a restriction in the participation of everyday activities. J's behaviours of concern were described as entering the personal space of others, and breaking items or objects by throwing them on the floor.

Operational definitions of staff participant DVs:

- *Communication opportunity*- A communication opportunity may be provided through an environmental manipulation by communication partners, in which the learner is required to communicate to gain access to something that they want or need. For example, a desired item may be placed in view, but out of reach. This creates the opportunity for the learner to communicate their desire for the item, by initiating a request.
- *Timely delivery of reinforcement*- Timely delivery of reinforcement is defined as when a communication partner responds within 0.5 seconds of the learner's communication attempt
- *Prompting*- communication partners and physical prompters use appropriate prompting methods, as specified in the PECS Training Manual, where necessary.
- *Modelling and error correction*- communication partners and physical prompters use appropriate modelling and error correction methods, as specified in the PECS Training Manual, where necessary.

Procedure

Pre-Baseline Assessment The researcher contacted the staff participants at an agreed time, via video conference, to explain the purpose of the Reinforcement Inventory. The Reinforcement Inventory was then emailed to staff participants to complete. Once completed, the staff participants emailed the document back to the researcher. The researcher also introduced the Problem Behaviour Recording sheet and asked that the staff participants begin using this to record occurrences of problem behaviour. It was explained that the recording sheet was required to be filled in daily for the duration of the project.

Baseline Phase

Support Staff and client participant dependent variables

The researcher arranged two 30-minute baseline observations across the period of one week. The baseline observations focused on staff participant and client participant interactions in a natural or non-training setting. The observations were completed via video conference at a time that was convenient for the staff. Data was collected on staff and client participant dependent variables.

Staff participant PECS implementation

Staff participants received written instructions for the first PECS Phase and the PECS folder was made available ahead of the training sessions, which aimed to measure staff accuracy in the implementation of PECS. The researcher arranged three 30-minute training sessions where, in the first training session, staff participants role played PECS implementation based on the information and resources that had been provided. Data was collected on key implementer skills as derived from the PECS Implementer Assessment. As training sessions progressed, staff participants were given the opportunity to rehearse and receive corrective feedback.

Intervention phase

Staff participant training sessions

Training sessions were approximately 30 minutes in length. They occurred on consecutive days until each staff participant reached 80% accuracy in PECS implementation. The training sessions took place over a 1-week period, at times that were convenient for the staff participants and residential provider. During training sessions, the researcher was based in an off-site office and

training was provided via video conferencing software. Training sessions were also recorded using video capture software to allow for interobserver review.

Behavioural Skills Training- for each stage of PECS, staff participants were provided with written instructions and video models via email, ahead of training sessions. At the agreed training times, the researcher contacted the staff participants via video conference. Before training commenced, the staff participants were able to ask questions if procedural clarifications were required. During training sessions, support staff participants took turns acting in the role of either the physical prompter, the communication partner, or the learner, The researcher provided feedback after each block of 5 trials up to the end of the 30-minute training session. Further modelling was also provided where necessary.

Implementation sessions

As recommended by the PECS Training Protocol (Bondy & Frost, 2002), a minimum of 5 learner training sessions were planned for each PECS Phase. During implementation sessions, staff participants engaged the client participant in PECS implementation. Implementation sessions lasted for a maximum of 30 minutes, or the session was terminated if it appeared that the client participant was no longer interested in engaging or had lost interest in the reinforcers being used. If a session was terminated, staff participants were supported to identify alternative reinforcers for the next implementation session. Client participant progress during implementation sessions was monitored using data collection sheets, included in the PECS Training Manual (Bondy & Frost, 2002). A PECS phase was considered mastered, based on the criteria specified in the PECS Training Manual. Once a PECS Phase was considered mastered by the client participant, staff participant training began for the next PECS Phase. Support staff accuracy of PECS implementation continued to be recorded throughout both training and implementation phases. Support staff were encouraged to continue to provide multiple opportunities for the client participant to request for preferred items and or activities each day, while training for each new phase took place.

Generalisation sessions

A 30-minute generalisation session was conducted for PECS Phases I and II once mastery criterion had been met by the client participant. During generalisation sessions staff participants engaged with the client participant in a natural environment but were not formally engaging in PECS training. Corrective feedback was not given. The researcher observed the generalisation sessions remotely and recorded data on staff and client dependent variables. Staff accuracy of PECS implementation was also recorded.

Follow up sessions

One formal 30-minute observation of PECS implementation in a generalised setting was scheduled two weeks after the client participant mastered the second PECS Phase. Data was recorded as per the generalisation sessions. A two month follow up was also initially scheduled but it became clear that this was not going to be possible to complete within the timeframes of this research. However, it became possible to confirm staff availability for Phase III training, which commenced 5 weeks after the two week follow up session. A small number of Phase II trials were completed as an informal follow up at the beginning of the first Phase III training session, to ensure staff and client skills had been maintained. Data on client and staff participant dependent and independent variables was also recorded for these trials. However, the data was approximated for this session as it was 20 minutes shorter than the baseline, generalisation, and two week follow up sessions. This was achieved by calculating the rate of communication opportunities for the seven-week follow up session and dividing the time-period of a full session by the same rate.

Treatment Fidelity

Treatment fidelity refers to how well the treatment follows prescribed protocols. It is important to ensure treatment fidelity is kept throughout an intervention so that the outcomes are valid, comparable, and the research is able to be replicated (Dane & Schneider, 1998). The researcher recorded support staff performance for each training and implementation session using a data collection sheet derived from the PECS Implementer Assessment (Bondy & Frost, 2002), to ensure adherence with the training protocols specified in the PECS Training Manual (Bondy and Frost, 2002), thereby, ensuring treatment fidelity was maintained for PECS implementation.

Social Validity

It is important, particularly in single subject research designs, that there is a way of measuring the social validity of an intervention. Following the completion of PECS training, support staff participants were invited to complete the Modified Primary Intervention Scale (MPRIS) to assess their views on the procedures and treatment acceptability.

Interobserver Agreement

Interobserver agreement was calculated for client participant dependent variables; PECS Mand, Verbal Mand, and Spontaneous Communication Initiation, staff participant dependent variables, staff participant performance during PECS Phases I and II (treatment fidelity), and client participant performance during PECS Phases I and II. The interobserver reviewed 20% of all sessions. Agreement was assessed on a trial-by-trial basis and calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. Total agreement for reviewed sessions was 94%.

Results

Staff participant results

Data for the staff participant independent variables was collected across baseline, PECS implementation sessions (Phase I and II), generalisation and follow up. The independent variables were based on the Implementer Skills Assessment from the PECS manual (Bondy & Frost, 2002) and doubled as a treatment fidelity measure.

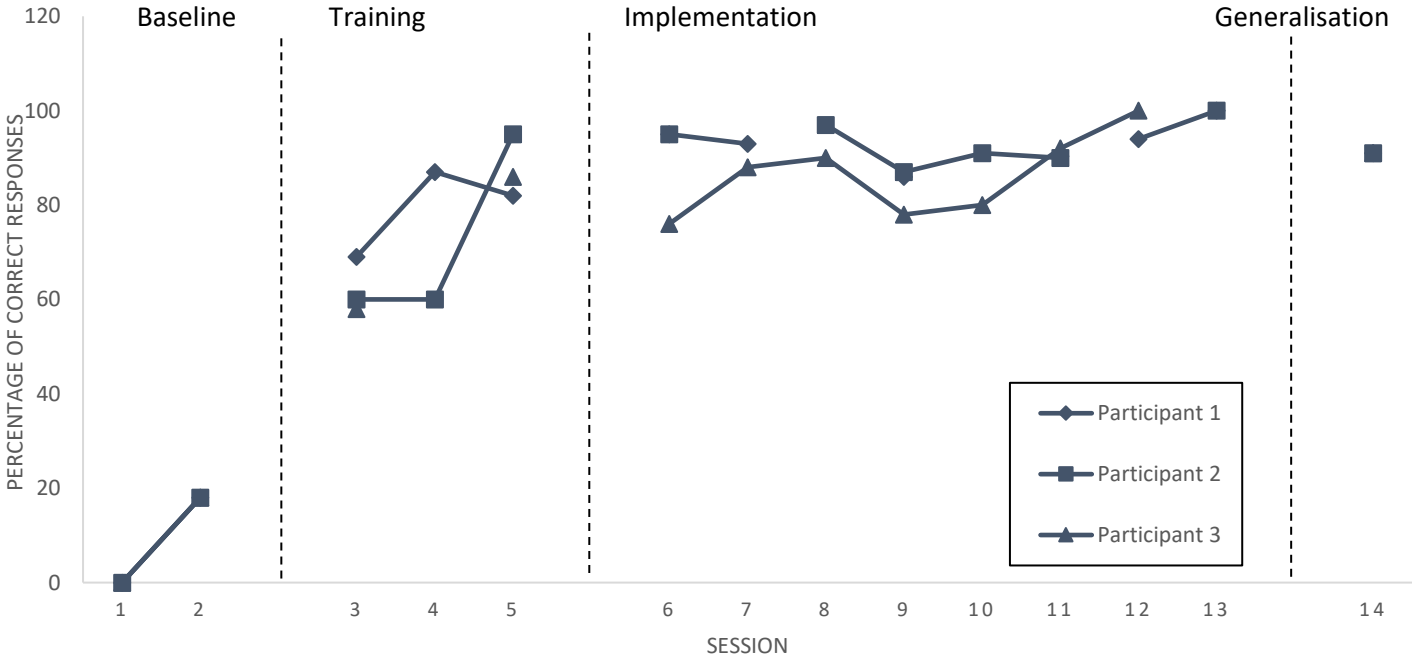
Data was collected for each individual staff participant during training and implementation phases. However, as not all staff were available for baseline or generalisation, all three participants were represented by the data collected at baseline and generalisation. Figure 1 illustrates staff performance, calculated as a percentage of correct responses, across baseline, training, Phase I implementation, and generalisation. As can be seen from Figure 1, staff participant percentage of correct responses were 0% at baseline session 1, and 18% at baseline session 2.

All three staff participants improved in their performance during the training phase, which commenced after the staff participants had viewed the written instructions and video models for

Phase I. During the training phase, staff participants were given the opportunity for rehearsal, and received feedback on their performance.

Figure 1

Percentage of steps performed correctly by staff participants during PECS Phase I



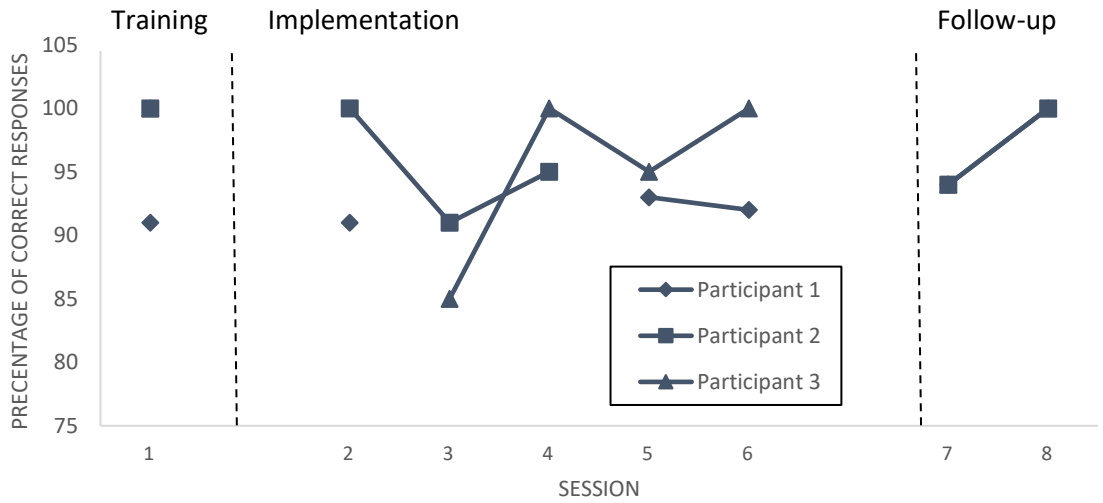
The criteria for progressing to the implementation phase required all three staff participants to achieve at least 80% accuracy during training. Participant 1 achieved 82% accuracy by the end of session 5, Participant 2 95%, and Participant 3 86%. During the implementation phase staff participants began implementation with the client participant. Staff participants continued to receive feedback on their performance. During the implementation phase accuracy was maintained at criterion levels, except for two sessions where Participant 3 achieved just under 80%, achieving 76% during session 6, and 78% during session 9. During the generalisation phase, accuracy remained above criterion levels at 91% correct responses.

Figure 2 illustrates staff performance across implementation of PECS Phase II and at follow up. Correct responses were calculated as a percentage for each staff participant during implementation. Follow up data was also calculated as a percentage of correct responses. However,

the data from follow up was again used to represent all three staff participants due to limited staff participant availability.

Figure 2

Percentage of steps performed correctly by staff participants during PECS Phase II

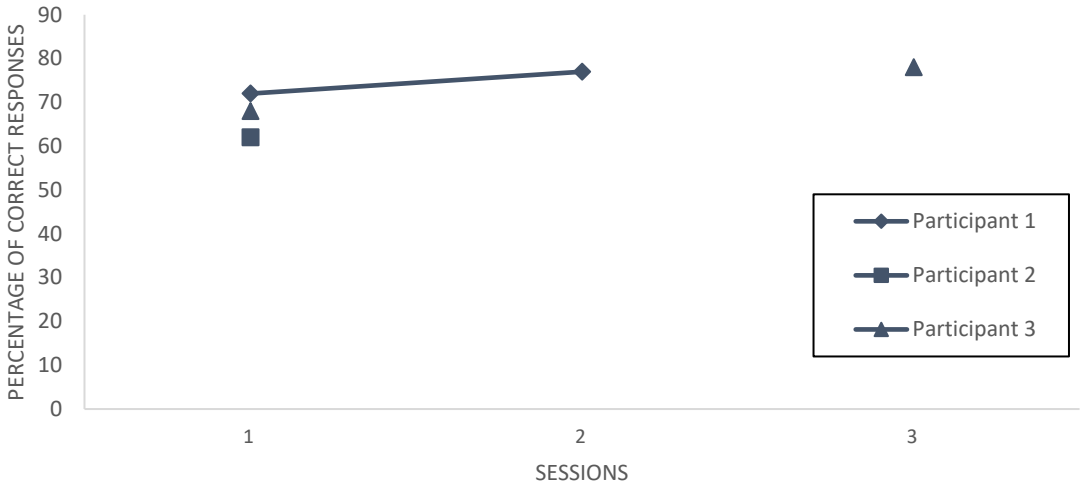


Training for Phase II commenced after the staff participants had viewed both the written instructions and video models. The criteria for progression to the implementation phase required the staff participants to achieve at least 80% accuracy during training. As can be seen from Figure 2, all three staff participants achieved above criteria levels during session 1, with Participants 2 and 3 both achieving 100% accuracy. Implementation with the client participant began at session 2 and performance for all three staff participants remained above 80% accuracy throughout the implementation phase, and during the follow-up sessions.

Training for Phase III commenced after the staff participants had viewed both the written instructions and video models. Unfortunately, Phase III training was delayed by COVID-19 restrictions and progression to implementation was not possible within the timeframes of this research. Figure 3 illustrates an improvement in staff participant accuracy as training progressed, with Participant 1 achieving 72% at session 1, and 77% at session 2, and Participant 3 achieving 68% and 78% respectively. Participant 2 was unable to take part in the last two training sessions.

Figure 3

Percentage of steps performed correctly by staff participants during PECS Phase III training



While not directly measured, it is worth noting that there was a slight difference in accuracy of implementation dependent on whether the staff participant was in the role of the communication partner or the prompter, with slightly higher accuracy observed when staff participants were in the role of the communication partner.

Data was collected for the staff participant dependant variables at baseline, generalisation, and a two week follow up session, which doubled as a further generalisation and maintenance session. A further follow up session took place 5 weeks after the two week follow up, at the commencement of Phase III training. The number of communication opportunities were calculated as a mean across sessions. The number of communication opportunities were approximated for the 7-week follow-up. The number of correct staff participant reinforcement, and prompts, were calculated as percentage correct across sessions. Figure 4 shows the number of communication opportunities provided by staff participants, for the client participant, across baseline, generalisation and follow up sessions. The number of communication opportunities increased from baseline (M = 0.5) to generalisation (M = 6), two week follow up (M = 8) and seven-week follow up (M= 9.0).

Figure 4

Number of communication opportunities provided by staff participants across phases

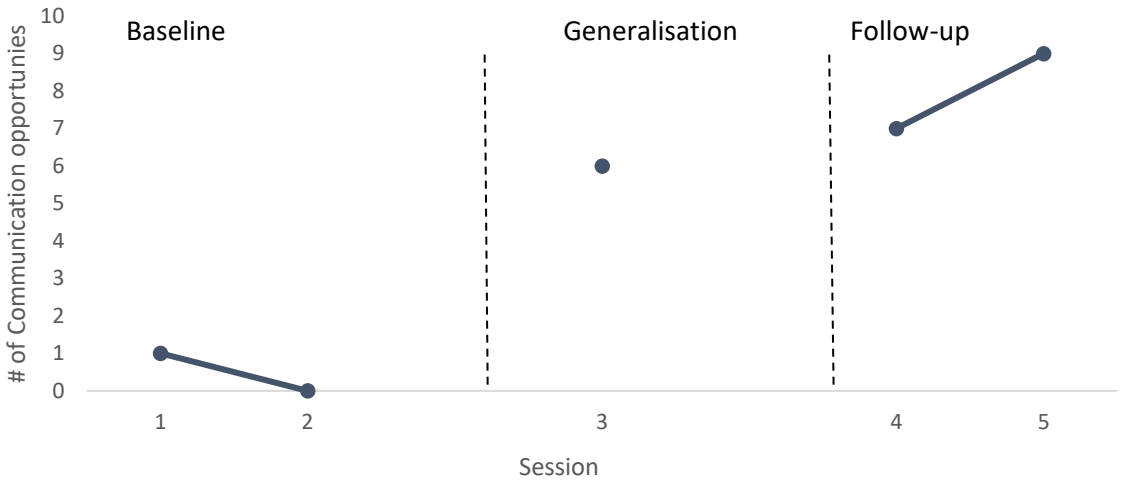
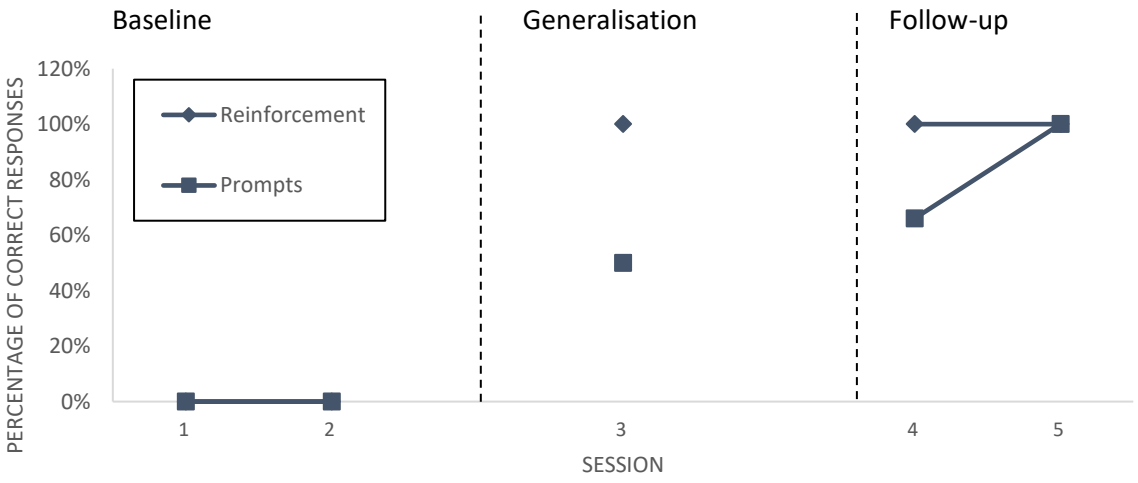


Figure 5 illustrates the percentage of reinforcement provided correctly per communication opportunity, and the number of times prompts were correctly delivered. Both reinforcement and prompts were delivered correctly 0% of the time during baseline. Staff performance improved to 100% correct reinforcement, and 50% correct prompts at generalisation, 100% and 66% at the two week follow up, and 100% correct reinforcement at the seven-week follow up. Prompting was not required at the seven-week follow up.

Figure 5

Percentage of correct responses by staff participants across phases



Client participant results

Data was collected for the client participant independent variables across PECS implementation sessions. This data was used to measure client progress within PECS phases, and inform when one stage had been mastered, which would enable a progression forward to the next PECS phase.

Figure 6

Client responses during PECS Phase I implementation

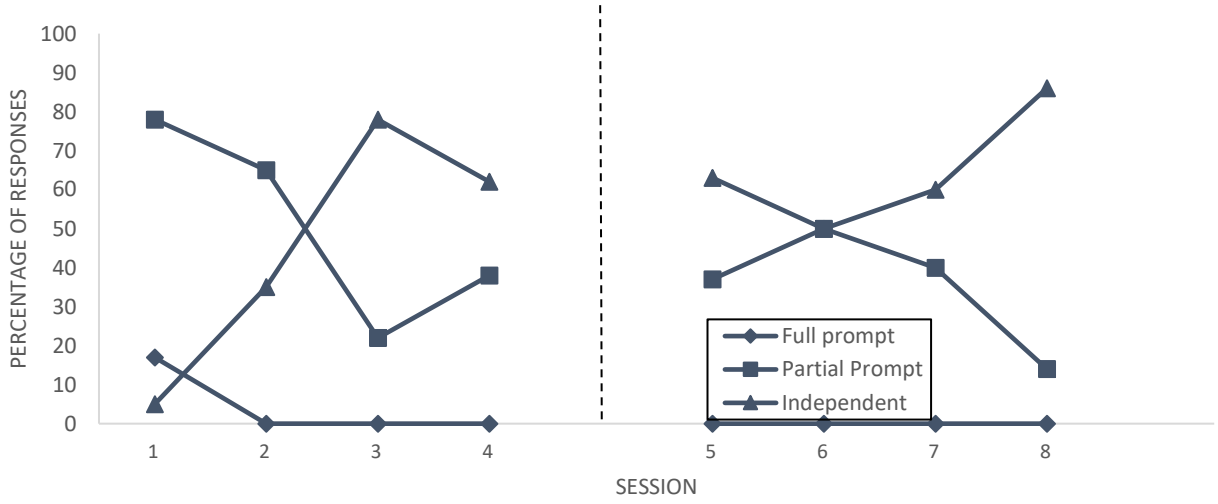


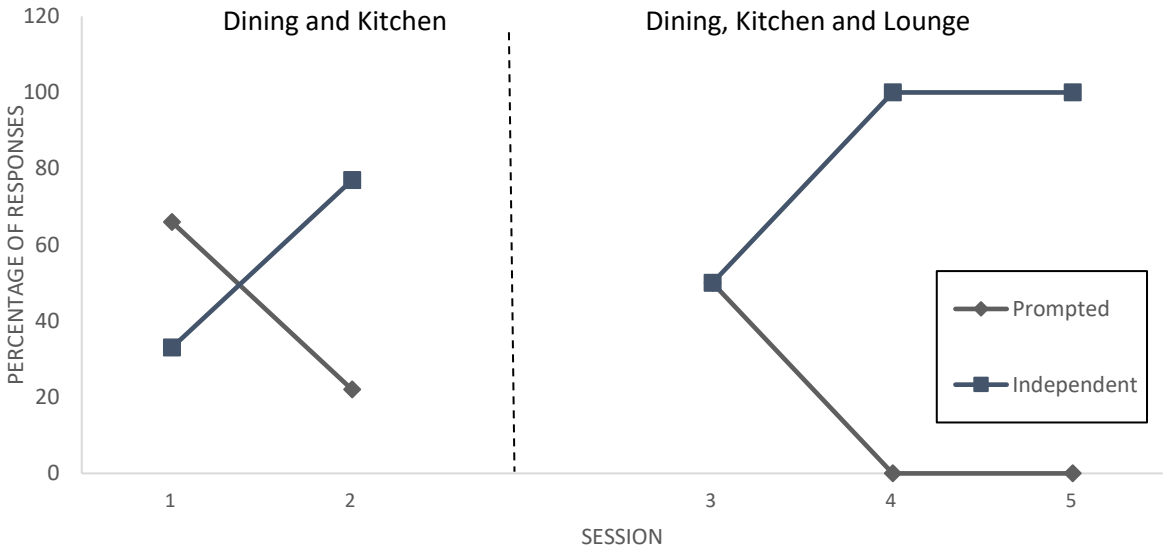
Figure 6 shows client participant responses as either fully prompted, partially prompted, or independent for Phase I. Client participant responses were measured as a percentage. Client independent responses decreased at two points during implementation of PECS phase I. At session 4 a generalisation component was included, which required the client participant to generalise PECS mands to a new environment. At session 6, a variety of new reinforcers needed to be introduced to maintain the client participant's motivation to mand. Following session 6, independent responses increased again to above 80% across 3 communication partners (including Participant 4), 5 reinforcers, and 2 environments, which indicated a progression to PECS phase II would be appropriate.

Figure 7 shows client participant performance across PECS phase II. Client responses were rated as either prompted or independent, and calculated as a percentage. Independent responses also decreased for Phase II when a generalisation component was introduced, requiring the client

participant to generalise his responses to a new environment at session 3. Following session 3 independent responses increased to 100% at the end of session 5, across three environments, three communication partners and three reinforcers. This indicated that a progression to Phase IIIa may have been possible with a larger time frame for intervention.

Figure 7

Client responses during PECS Phase II implementation



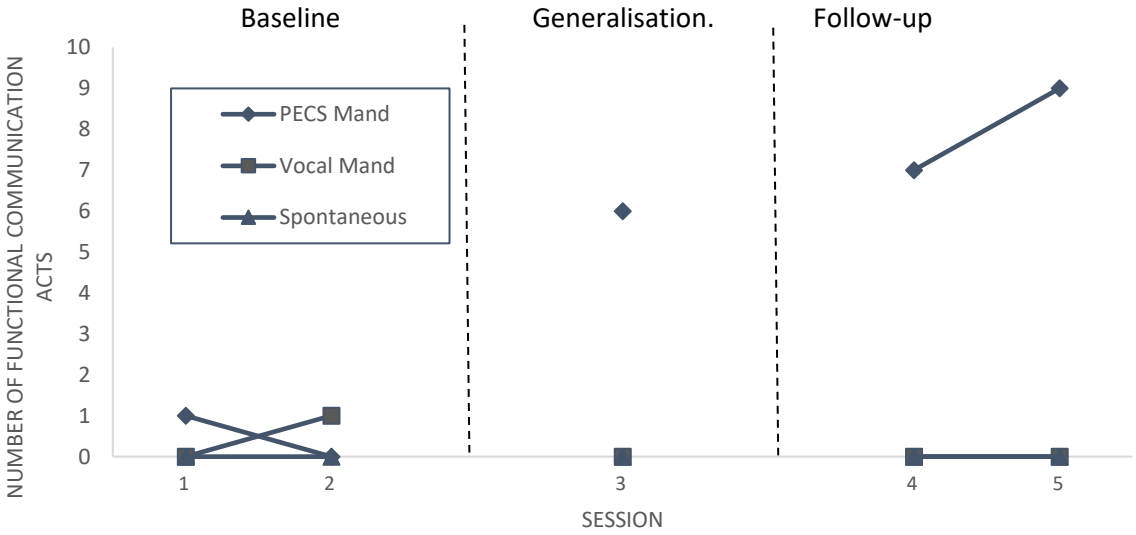
While data was not specifically being collected for client participant independent variables at the two-week follow-up session, it is noteworthy that independent responding did decrease to 68%, with initial prompting required on the first trial, and further prompting required when a new reinforcer was introduced for further generalisation. However, independent responding increased again to 100% at the seven-week follow up.

Data was collected for the client participant dependant variables at baseline and generalisation sessions, a two week follow up session, which doubled as a further generalisation and maintenance session, and a brief seven-week follow up session. The rate of functional communication acts; PECS mands, vocal mands and spontaneous communication initiations, were calculated as a mean across sessions. The rate of functional communication acts was also approximated for the seven-week follow up session, by calculating the rate of functional communication acts, and dividing the time-period of a full session by the same rate.

Figure 8 shows the change in rate of PECS mands, vocal mands, and spontaneous communication initiations across baseline, generalisation and follow up sessions. As can be seen from Figure 8, PECS mands occurred infrequently for the client participant at baseline (M = 0.5).

Figure 8

Frequency of functional communication acts from baseline through to follow-up



The rate of PECS mands increased across generalisation and follow up sessions (M = 6.0), (M = 7.0), and (M= 9.0) respectively. The rate of vocal mands varied across baseline, generalisation and follow up sessions (M = 0.5) (M= 0.0), and (M = 0.0) respectively. The client participant did not make any spontaneous communication initiations across baseline, generalisation, or follow up sessions. However, staff participants fed back anecdotally that the client participant used the phrase "thank you" twice, and manded for "spaghetti" and "baked beans" during the intervention period. These words and phrases had not previously been used by the client participant.

Social Validity Results

A modified Primary Intervention Rating Scale (MPIRS) was provided for staff participants to provide feedback about the PECS intervention and training methods. Feedback was gained from two staff participants. Both staff participants rated the intervention and training methods as being appropriate for the client, and well suited to the disability residential environment. Staff participants

also indicated that they would use PECS again, and that they believed that the client participant's improvements in functional communication would continue after the intervention ended. Further, staff participants also reported that they viewed the intervention has having a positive impact on client behaviour.

Discussion

This research was focused on three key objectives:

1. To evaluate whether direct-care staff and caregivers can successfully be trained as communication partners, for individuals with an intellectual disability and limited expressive communication skills, using remotely delivered Behavioural Skills Training
2. To investigate whether PECS will increase the frequency of functional communication acts for a non-verbal adult with a diagnosed developmental delay, in a supportive disability residential setting.

Overall, the data suggests that Telepractice or remote coaching is an effective way to provide behavioural skills training to support staff in a disability residential setting. More specifically, this training modality appears to be effective for the delivery and implementation of PECS, with requisite skills acquired and maintained for support staff participants. There was a corresponding positive effect on functional communication for the client participant.

There are several studies in the existing literature assessing the effectiveness of Behavioural Skills Training (BST). Studies exploring Telehealth as a mode of service delivery have increased in recent years. However, a limited number of studies exist that examined the effectiveness of BST delivered via Telehealth. Akemoglu et al. (2019) highlight a further gap in the existing literature, finding that only a small number of existing studies provide a clear assessment of treatment fidelity. In this study, staff participant independent variables doubled as a treatment fidelity measure and were assessed by using a modified version of the Implementer Skills Assessment from the PECS Manual 2nd Ed (Frost & Bondy, 2002). The data indicates that, following training, all three staff participants were able to maintain a high level of accuracy throughout the intervention, with two

staff participants achieving 100% accuracy through sessions 4 and 5 of Phase II implementation. Staff participant accuracy for Phase I and II was also maintained at the two-week follow-up. Phase III training took place 5 weeks after the planned follow up session for Phase II. An opportunity was taken to complete a seven-week follow up for Phase II, prior to beginning the first Phase III training session. Staff participants continued to demonstrate a high level of accuracy, with both staff participants achieving over 80% accuracy. Staff participant performance improved in accuracy over three Phase III training sessions. This demonstrates that not only is BST an effective practice for training direct caregivers to implement PECS, it also indicates that the PECS program successfully incorporates measures to effectively assess and maintain fidelity.

It is important to note that staff participants continued to receive corrective feedback throughout training and implementation, as a component of BST. This appeared to be correlated with continued increases in accuracy of implementation of PECS. This finding reflects the results of studies by Wood et al. (2007), Rosales (2009), Rosales et al. (2014), and Collins (2014). It may also partially explain why Barnes et al. (2011) did not gain the same positive results, with their research including only two of the four components of BST, written instructions, and video models.

Staff performance also improved for dependent variables across intervention phases I-II, with (M= 0.5) communication opportunities provided at baseline, (M= 6.0) at generalisation, (M= 8.0) at the two-week follow-up, and (M = 9.0) at the seven-week follow up. As discussed in the results section, the data from the seven-week follow up was approximated due to the timeframe being 20 minutes less than the baseline, generalisation, and two-week follow-up sessions. The rate of appropriate reinforcement delivery improved from 0% to 100% from baseline to two weeks follow-up and was maintained at the seven-week follow up. The rate of appropriate prompting also improved from 0% at baseline, 50% at generalisation, and 66% at the two-week follow-up. These findings suggest that direct care staff can be trained as effective communication partners using BST via Telehealth. As acknowledged in the results section, not all staff participants were available for baseline, generalisation, and follow-up sessions. However, all three staff participants attended

training sessions and at least two staff participants attended each implementation session. It is possible that the amalgamation of staff participant data at baseline, generalisation and follow-up had some impact on the results. However, the effect is not likely to be large, as none of the staff participants had previously received any formal communication training or had any experience with PECS. This suggests that the indicated improvement across intervention phases is likely to be a true reflection of performance for each of the staff participants. Staff participant performance at generalisation and follow-up sessions is also likely to reflect all three participants, as each staff participant maintained similarly high levels of accuracy throughout intervention. Notably, accuracy was also maintained following absences from training or implementation sessions.

It is interesting to note, that while overall levels of accuracy were above criteria levels, that is to say, above 80%, there was a small difference between the accuracy of responses in the role of communication partner versus the role of the physical prompter. Staff participant accuracy in the role of the physical prompter was slightly less than in the role of the communication partner. This difference was more significant for Phase I than Phase II, which could indicate that correct prompting procedures took slightly longer to master. The most common prompting error was that staff participants would gesture or point when fading a prompt instead of appropriately fading a physical prompt. This was one of the common implementation errors as highlighted by Jurgens et al. (2012), which may suggest that, even with intensive training procedures more emphasis on appropriate prompting may be required. In addition, staff participants took longer to improve their accuracy during PECS Phase III training. None of the primary staff participants reached 80% accuracy by the end of the intervention. However, Participant 1 did achieve 77% and Participant 3, 78%. The error-correction procedures included in Phase III accounted for almost all of the incorrect responses made by staff participants, which further highlights the need for more emphasis on prompting and error-correction.

The data gained from the modified Primary Intervention Rating Scale (MPIRS) suggested that the support staff participants found PECS to be an appropriate intervention for J, and that

Telehealth was acceptable as a service delivery mode. The results also indicate that PECS was considered an appropriate and sustainable intervention in a disability residential setting.

Client participant data shows that the number of functional communication acts did increase as the client participant "J" progressed through PECS Phases I and II. The frequency of PECS mands increased from (M = 0.5) to (M = 9.0) from baseline to seven-week follow-up. Interestingly, the rate of verbal mands did not appear to increase throughout the intervention, based on the data collected at baseline, generalisation, and follow-up. However, staff did feedback anecdotally that J manded for baked beans, spaghetti, and verbalised the phrase "thank you" on two separate occasions. Further, in two implementation sessions J also manded for chippies. Despite the absence of concrete data to support these observations, the described increase in vocal manding and spontaneous vocal communication does reflect the findings of previous PECS research (Jurgens, Anderson, & Moore, The effects of teaching PECS to a child with Autism on verbal behaviour, play and social functioning, 2009; Charlop Christy, Carpenter, Le, LeBlanc, & Kellet, 2002; Conklin & Mayer, 2011; Anderson, Moore, & Bourne, 2007) that indicate an increase in vocal or verbal manding may be correlated with progression through PECS training.

J was also able to master PECS Phases I and II. Unfortunately, due to COVID-19 restrictions, training for Phase III was further delayed and it was not possible to formally begin implementation. PECS Phase I was mastered after a total of eight implementation sessions. A common issue that is highlighted in relation to PECS implementation is that the learner is not often taught to mand from someone in their natural environment i.e.: the learner begins PECS training with a specialist trainer. Further, the learner may not learn to generalise their manding to more appropriate communication partners e.g.: caregivers, or teachers, or to more natural or appropriate environments (Lamb et al., 2018). In this study, J was encouraged to mand by three different staff participants from the beginning of implementation. J reached 80% independent requesting across the staff participants by session 3. Care was also taken to ensure that J was requesting across a variety of different reinforcers. A further generalisation component was also introduced at session

4, which required J to generalise his responding to another environment. The rate of independent requesting did decrease temporarily but began to recover in session 5. The generalisation session took place in a third environment. The rate of independent responding did decrease again to 33%. However, reinforcement did appear to partially impact on performance in the generalisation session, with less PECS mands initiated overall, when compared with the rate of PECS mands during the implementation phase.

Despite the decrease in independent responding at generalisation, the intervention progressed to PECS Phase II. J mastered PECS Phase II in five sessions, with 100% independent responding across three staff participants, three reinforcers, and three environments by the end of session 4. It is possible that the faster acquisition and higher rate of independent responding during PECS Phase II was partially impacted by the generalisation considerations taken in Phase I, as the generalisation components did not have as much of an impact on performance for Phase II. As previously discussed, data for client participant independent variables was not specifically collected for analysis during follow-up sessions. However, it is interesting to note that the rate of J's independent responding did decrease to 68%, at the two-week follow-up, with prompting required on the first trial, and again when a new reinforcer was introduced. Staff participants endeavoured to continue to provide a high number of communication opportunities over the two weeks between the final implementation session and the follow-up session. However, at times, only one PECS trained staff person was on shift. While communication opportunities were still provided, staff participants advised that they were less inclined to provide opportunities where a physical prompter was not available, should J require prompting. This may have had an impact on J's performance during the follow-up session, as he may not have been gaining as many opportunities to use his skills as he was during the implementation phase. Further, with decreased opportunities to mand using PECS, it is possible that J also did not continue to expand on the reinforcers already in his repertoire.

The results of several studies have indicated that Functional Communication Training (FCT) may decrease challenging behaviour (Heath et al., 2015). Further, positive effects on challenging

behaviour have been found for individuals with a developmental delay who have been trained to communicate using PECS (Conklin & Mayer, 2011; Frea, Arnold, & Vittimberga, 2001). Despite problem behaviour initially being targeted as a client dependent variable, problem behaviours were not identified as high frequency or severity for J, and therefore, data collection was not continued by the support staff participants. However, it may be important to note that staff participants indicated on the MPIRS that they viewed the intervention as having a positive effect on J's behaviour. This may tentatively lend support to the social validity of this approach.

Data regarding the effect of PECS on challenging behaviour limited in this study. It may be possible to tentatively suggest that PECS training did not increase challenging behaviour. However, the results do add to the existing literature in several other ways. Several studies have examined the effect of PECS implementation on gains in functional communication and speech. Flippin et al. (2010) completed a meta-analysis of the existing literature with a focus on communication and speech gains as the dependent variables. The authors hypothesised, based on their results, that speech gains may be more likely to increase as the learner progresses through Phases IV-VI of PECS. A significant effect size for an increase in functional communication had been shown across all PECS Phases. While the effect size for speech gains had been found to be small for Phases I-III, significant results for an increase in speech have been found in some studies (Jurgens, Anderson, & Moore, The effects of teaching PECS to a child with Autism on verbal behaviour, play and social functioning, 2009; Charlop Christy, Carpenter, Le, LeBlanc, & Kellet, 2002; Conklin & Mayer, 2011; Anderson, Moore, & Bourne, 2007). Data was not collected for client participant dependent variables across all phases of the intervention, which meant that a more accurate impression of changes in functional communication and speech gains could not be gained. However, the results from this study may increase evidence for gains in functional communication and speech, associated with training in PECS Phases I-III.

The number of studies demonstrating the effectiveness of PECS are growing. However, there are several factors that have been highlighted as needing further consideration, for PECS to

become established as an evidence-based practice (EBP) (Lamb, et, al., 2018, Alsayedhassan, et, al., 2016 & Flippin, et, al., 2010). Meta-analyses and systematic reviews such as those completed by Lamb et al. (2018) and Flippin et al. (2010) highlight that further studies should increase focus on generalisation, maintenance, parent and practitioner training, and treatment fidelity. An effort was made within the current research to include generalisation components within the intervention itself, by training J to request across three different staff participants as Phase I training commenced. Further, in Phase I, J learned to request across three different environments, and five different reinforcers. J was also able to generalise to a fourth communication partner, Participant 4, when Participant 4 was required to step in for one of the three primary staff participants. These results increase evidence that PECS training procedures, as specified in the PECS Training Manual 2nd Ed (Frost & Bondy, 2002), can successfully incorporate components which may facilitate generalisation.

A longer-term maintenance follow-up had been planned to take place 2 months post implementation; however, this was not able to be completed within the timeframe of this research. A two-week post implementation follow-up was completed following Phase II training, which showed that staff participants were able to maintain accuracy above 80%. As discussed, J's rate of independent responding did decrease during the follow-up session. Despite this finding it is encouraging that staff participants still demonstrated a high level of treatment fidelity. This may suggest that J's rate of independent responding may have remained at mastery levels if communication opportunities had continued to be provided at the same rate as during training and implementation. Staff participants were encouraged to provide at least ten communication opportunities each day, following the two week follow up. The results from the seven-week follow up showed a recovery in performance for J. It is possible that the recovery in performance correlates with increased communication opportunities. This further highlights that frequent communication opportunities may be critical for maintaining learner skills. A high level of treatment fidelity continued to be maintained for staff participants at the seven-week follow up. These further results increase support for the social validity of PECS.

Behavioural Skills Training (BST) has gained support as an effective training practice for parents who are implementing EBP's with their own children (Shaefer & Andzik, 2021). BST has also been used to train education staff to implement PECS with students who have a diagnosis of ASD, and to train direct care staff to implement Phase I of PECS with a client in a disability residential setting (Homlitas & Rosales, 2014; Wood et al., 2007). Further, in the aforementioned studies, parents, education staff, and direct-care staff demonstrated high levels of accuracy across implementation, generalisation, maintenance, and follow-up. The current study utilised BST to train direct-care staff, ensuring an effective training procedure, which could be clearly documented. This increases the validity of the results. Treatment fidelity was also measured by using a modified version of the Implementer Skills Assessment from the PECS Training Manual 2nd Ed (Frost & Bondy, 2002). The results of the current research also show that direct care staff can be trained to implement PECS using BST, and that high levels of accuracy can be maintained. Further, the research design made it possible to demonstrate that PECS implementation procedures were also adhered to. This not only increases support for PECS as an EBP, but also for BST as an effective training practice for training direct care staff to implement PECS with an adult learner, with a developmental delay, in a disability residential setting.

A small number of studies have focused on the use of BST to train direct care staff to implement PECS in a disability residential setting, with learners who have a diagnosed developmental delay. The quality of these studies has been reasonable (Horner et al., 2005), and results have been promising with staff maintaining accuracy in their responding across generalisation and follow-up sessions. However, only one of these studies, by Collins (2014) included a measure for social validity. The current research has been modelled on existing literature, with consideration given to improving the social validity of the intervention. There are a number of ways in which the research design may have contributed to improved effectiveness and sustainability of training and implementation. One of these ways reflects a study by Wood et al. (2007), where training and implementation took place in the disability residential setting, predominantly within normal shifts, and with staff participants who would be J's natural

communication partners. Sessions were also reduced from five per week, to three per week to create a better fit for the staff on shift. A further consideration was that training was delivered via Telehealth. This became important particularly during COVID-19 lockdowns. COVID-19 lockdowns did impact on the ability of the team to meet for training sessions, which did create a delay in progressing with the intervention. However, once training was completed implementation sessions could continue during lockdown conditions, without compromising the health and safety of J and the staff participants. Feedback from staff participants gained from the adapted PIRS showed that the training procedures and the PECS programme were viewed as appropriate for their service and for J. The inclusion of a social validity measure adds strength to the current research and provides further evidence for the appropriateness of BST as a training practice for direct care staff in a disability residential environment, and PECS as an effective AAC mode for clients with functional communication deficits. It is also important to note that anecdotally, staff participants expressed their enthusiasm about the potential to increase J's functional communication. Staff participants indicated, in particular, that the most highly anticipated PECS phase was Phase III. They expressed that they would feel more confident and happier supporting J if they could ensure that he was able to make a genuine choice about items or activities that were offered to him. Additionally, they felt that this would have a positive impact of J's quality of life. Quality of life for the individual who receives treatment is also an important factor when considering the social impact of an intervention (Beukelman & Mirenda, 2013; Wolf, 1978). Unfortunately, due to COVID-19 restrictions, PECS Phase III was unable to be fully trained and implemented within the timeframes of this study. However, feedback from staff, results from the adapted PIRS, and J's performance across PECS Phase I and II suggest that it may have been possible to achieve J's communication goals within a larger timeframe, which may have had a further positive impact on his quality of life.

Comprehensive reviews have been completed of literature examining the effectiveness of Telehealth, or Telepractice, as a method of training and service delivery (Akemoglu et al., 2019; Ferguson et al., 2019). The results of these reviews indicated that Telehealth was an effective mode for delivering training to parents and staff caring for or working with children and young people

with ASD, with or without an accompanying ID. Further, studies by Roscoe (2008), Higgins et al. (2017), and Fisher et al. (2014) showed that Telehealth did not decrease the effectiveness of BST for training direct care staff who were implementing ABA strategies and interventions. The results of the current research increase evidence for the validity of Telepractice as a mode of delivering training to direct-care staff, in a disability residential setting. The results also increase evidence for the appropriateness of Telehealth as a mode of delivering BST. These results are important in the current climate, where face to face meetings have become more restricted due to COVID-19. Further, the results indicate that Telepractice offers an effective mode for connecting with and providing services for remote and or rural clients.

The results of the current research are promising. However, several methodological limitations should be taken into consideration when interpreting the results. The current research used a single subject AB design. A limitation of the single subject AB design is that it is quasi-experimental. Therefore, it is difficult to achieve experimental control. This can mean that it becomes harder to conclude that the changes in behaviour are directly related to the treatment or intervention being used (Cooper, Heron, & Heward, 2007). Additionally, the data at baseline had to be generalised across all three staff participants, due to limited staff availability for the baseline sessions. There were only two baseline sessions for this intervention due to time constraints, as a result of COVID-19 lockdown delays. It would have been useful to conduct more baseline sessions, which would have ensured that baseline data could have been collected for all three staff participants. Further, with repeated measures at baseline the subject acts as a control and a clearer pattern of responding may be able to be established, prior to the treatment phase beginning (Engel & Schutt, 2013). This may have further strengthened the internal validity of the research. A further limitation is that single subject research requires replication to increase external validity of the results (Jurgens et al., 2009). However, this research demonstrated clear methodology, which will facilitate replication.

An initial maintenance plan was comprised of two follow up sessions, scheduled to take place at 2 weeks, and 2 months post intervention. However, again due to COVID-19 lockdowns and changes in circumstances for client and staff participants, a 2 month follow up was not possible within the timeframe of this research. This means that the results of this research should be interpreted with caution as, although implementation accuracy was maintained at 2 week follow up, it is not yet clear whether the skills gained by staff participants will be maintained over a longer period of time. However, it is promising that staff accuracy was shown to be maintained at the beginning of Phase III training, 5 weeks after the two week follow up.

Relatedly, this intervention required at least three staff participants for training, and at least two staff participants for implementation for PECS Phases I and II. This did mean that, at times, training and/or implementations sessions had to be cancelled e.g.: due to illness, or staff being required to work at a different service. This impacted on the timeframes of the intervention, which could potentially be an issue for a disability residential service in terms of sustainability of continuing training and implementation sessions over time. In addition, at times, only one PECS trained staff member was able to be on shift. This appeared to have an impact of the number of communication opportunities engineered for J, when training and implementation sessions were not taking place. This may have had a subsequent impact on J's performance during the two-week follow-up session. Despite this limitation, the flexibility of BST via Telehealth and consistency of PECS enabled the intervention to be easily adapted, where necessary, without negative impact on treatment fidelity. It is possible that the flexibility of the intervention meant that support staff still rated the training and implementation methods as appropriate and sustainable for their service and the client participant.

A small number of studies have investigated the effectiveness of teaching PECS to adult learners with a diagnosed developmental delay e.g.: ID and/or ASD in a disability residential setting, with untrained direct-care staff as communication partners (Wood, Luiselli, & Harchik, (2007); Collins, 2014). While the outcomes of the existing research have been promising, these

studies did not measure the effects of training learners to use PECS past Phase II. An original aim of this study was to ascertain whether support staff could be trained to implement Phases I through to III, and whether an adult learner with a diagnosed developmental delay would be able to master the corresponding learner responses. Unfortunately, learner data was only able to be collected for Phase I and II of PECS within the allocated timeframe for this research. This means that, within the current study, it is not possible to ascertain whether requisite skills would continue to be as successfully acquired in a natural setting past Phase II. However, training for Phase III did commence and data was able to be recorded for the first three staff training sessions. It has been agreed with the residential provider that Phase III training will still continue following the completion of the research. Therefore, it may still be possible to gain further useful data regarding PECS implementation for an adult learner with a diagnosed developmental delay at Phase III.

It is important to note that an auxiliary aim of this research was to investigate the effect of PECS training on client participant challenging behaviour. Staff participants described and rated "mildly" challenging behaviours such as becoming insistent and entering the space of others when J was unable to communicate his needs and smashing items/objects by throwing them on the ground. Staff participants believed the function of the latter behaviour was to hear the sound that the item made as it broke. However, neither of these behaviours were high frequency and data was not consistently collected by staff throughout intervention. Therefore, while feedback from staff indicated that the intervention did not increase instances of challenging behaviour, there is not any concrete data to draw accurate conclusions regarding the impact of PECS on client participant challenging behaviours.

The use of video conferencing software was valuable, as sessions could be recorded in real time and data could be further reviewed following the session. However, at times, segments of training and implementation sessions did not record properly. Further, in a small number of sessions, participants appeared to be visible in real time, but became obscured when the recording was reviewed. For example, in one of the recorded implementation sessions for PECS Phase I the

physical prompter could not be seen. It is likely that enough cumulative data has been collected for the results to be valid, as these issues occurred for less than 10% of the total number of training and implementation sessions. However, the results are still limited to the data that was possible to observe and record.

Despite the limitations, this study builds on previous research in the field and lends tentative support towards the effectiveness of BST via Telehealth, and the effectiveness of staff implemented PECS for adult learners with a diagnosed developmental delay. Additionally, both the data and the limitations provide direction for further research. An increased focus on challenging or problem behaviour would strengthen the social validity of PECS, when implemented with adult learners with a diagnosed developmental delay, in a disability residential setting. Increased evidence for correlation between an increase in functional communication and a decrease in challenging behaviour would not only be viewed as desirable by direct-care staff, but it would also increase the likelihood that the intervention would have a meaningful positive impact for the client. This may increase the likelihood that PECS strategies would continue to be implemented and treatment gains would continue to be maintained (Wolf, 1978). Relatedly, there are a limited number of studies reporting on sufficient long-term maintenance data with regard to staff accuracy in PECS implementation, and treatment gains for the client. Future research may seek to focus on or incorporate more long-term follow-up sessions, as this would further strengthen the social validity of PECS implementation in a disability residential setting.

It may also be useful for future research to assess the benefits of incorporating a strategy for encouraging and maintaining a minimum number of communication opportunities outside of training sessions, and a tool for measuring this variable. For example, an intervention may incorporate a daily run sheet of items that have been requested, or staff participants may engage in regular peer reviews. This may mean that any implementation issues outside of training could be quickly identified such as only one PECS trained staff person on shift. Maintaining a high rate of

communication opportunities may also increase the likelihood that treatment gains would be maintained (Jurgens, Anderson & Moore, 2019).

Relatedly, it may be useful for future research to expand on studies such as, Erath et al., (2020), which focus on a pyramidal or "train the trainer" approach. This may help to address issues around staff availability at training sessions and may increase the progression of training to a larger number of direct care staff. This may also then reduce the likelihood that only one trained staff person would be available for prompting during a shift.

It is important to be mindful of capturing valid data, while still maintaining a sustainable and non-intrusive intervention, particularly in a disability residential setting. Capturing daily data in relation to the rate of functional communication acts would add to the workload of direct care staff, particularly, if daily data is also being collected for problem behaviours. However, the cost of daily recording may be offset by the benefits gained from a successful and well documented intervention. Concrete data was not collected on functional communication acts outside of baseline, generalisation, and follow-up. Increases in the rate of functional communication acts could only be implied based on anecdotal staff feedback. Therefore, it may also be useful for future research to assess the appropriateness of incorporating daily recording of functional communication acts. The availability of concrete data would strengthen evidence with regard to the correlation between PECS implementation and increased rates of functional communication acts.

Conclusion

This research indicates that BST, when delivered remotely, can be used to train direct care givers to implement PECS. The results also show that the use of PECS can increase functional communication for an adult client with a developmental delay, residing in a disability residential setting.

It has been important to highlight that treatment fidelity was maintained by staff participants throughout the study, which lends support to the validity of this intervention. It is also significant

that staff participants viewed the intervention as appropriate for the residential setting, and for the client participant. Social validity is further supported by the increase in functional communication, across several communication partners and contexts, for the client participant, and perceived positive impact on behaviour.

One of the main limitations of this research was the impact of staff availability for training, on the progression of the intervention, which contributed to the gaps in data collection and the ability to train all three PECS Phases within the timeframes of this intervention. However, the COVID-19 restrictions also contributed significantly to the feasibility and frequency of staff training sessions. Despite this limitation, the staff and client participants still performed well in Phase I and II, with a promising start to Phase III for the staff participants. Further, staff participants also indicated that despite the time that it took to train these phases, that they were happy with the intervention and the outcomes achieved.

Further replications of this research would be useful in increasing the generalisability of these results. Future research could also build on the existing literature with further considerations to long term follow ups, maintenance of learner skills, and a pyramidal approach to training larger numbers of staff in a disability residential setting.

Overall, this research has contributed to existing literature, increasing support for the use of BST train direct care givers, the validity of Telepractice, and the effectiveness of PECS for increasing functional communication acts for adults with a developmental delay and associated communication deficits.

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Appendix A.

ORGANISATION INFORMATION LETTER

Dear ( )

We are seeking permission to conduct research within residential homes, managed by your organisation. The research has been proposed to meet the requirements of a Master of Applied Psychology program at The University of Waikato. The researcher for this project is Melissa Svensson, a Master of Applied Psychology student. Melissa can be contacted on 021 029 57978 or ms389@students.waikato.ac.nz throughout the duration of the research period. Melissa will be supervised by Associate Professor Angelika Anderson, from the school of Psychology at The University of Waikato.

What is the aim of the research?

This research aims to evaluate the impact of teaching the Picture Exchange Communication System (PECS) to a non-verbal adult, living in a disability residential setting. The research objectives are to determine:

A: If the use of PECS increases the frequency of functional communication acts in a generalised setting for an adult with an intellectual disability, in a disability residential setting

B: whether residential support staff and caregivers can be trained as effective communication partners to support the development of functional communication in individuals with an intellectual disability and limited expressive communication skills, using Behavioural Skills Training via Telehealth

Picture Exchange Communication System
The Picture Exchange Communication System (PECS) is a kind of Alternative and Augmentative Communication, designed to teach functional communication. It has gained empirical support through a large number of replicated studies**.**

Who will the participants be?

Group 1 Participant: The client participant

To be recruited for this research, the client participant would have met the following inclusion criteria:

- non-verbal adult
- aged between 20 years and 40 years
- has a diagnosed intellectual or developmental disability
- is accessing disability residential services
- has an Alternative and Augmentative Communication (AAC) goal associated with an existing support plan, which has not been successfully addressed

Group 2 Participants: Support staff participants
The research will also include 5-8 support staff who provide care for the client participant daily.

What will the participants have to do?

Potential participants and their carers will be sent information sheets and consent forms and invited to an information session, where they will have the opportunity to ask questions and have them answered.
Consenting participants will experience baseline assessments. This will involve collecting data regarding client participant and staff participant communication. Data will be collected from baseline observations. Staff participants and client participants will also be engaged in PECS training, and further observations in generalisation sessions. The researcher will engage with participants in the residential environment for approximately 1-2 hours, 3-5 times per week.

The researcher will be engaging with participants remotely. Video conferencing technology will be used during observations, PECS training, and generalisation sessions. Video recording technology will also be used to enable observation, training, and generalisation sessions to be recorded. This will allow the researcher to review footage and data collection.

It is expected that total participation would be 10-12 weeks.

What are the expected benefits to the participants?
The client participant will likely benefit by developing functional communication skills with a possible reduction in negative behaviour. The staff participants will also benefit by learning valuable new skills, which could be useful with other clients in their care, where relevant and appropriate.

What can be expected in terms of organisation rights and confidentiality?

Participation is voluntary. All participants are able to withdraw from the study anytime after the information session up until two weeks after data collection is complete. Anonymity and confidentiality will be preserved: All information will be anonymised. The participants and stakeholders will be referred to by pseudonym in any research reporting. During the research period, data will be stored on a password protected computer, After the researcher has submitted their thesis, all data will be given to the chief supervisor. This will be stored on a secure university drive for a minimum of five years. After the specified time-period has passed, the data will be permanently deleted.

If your organisation has any further questions or is interested in recruiting participants please contact the student researcher as below.

Associate Professor Angelika Anderson
School of Psychology, Waikato University
Phone: 07 838 4466 ext. 9209
Email: angelika.anderson@waikato.ac.nz

Melissa Svensson
Student Researcher
Phone: 021 029 57978
Email: ms389@students.waikato.ac.nz

This research project has been approved by the Human Research Ethics Committee (Health) of the University of Waikato. Any questions about the ethical conduct of this research may be sent to the chair of the committee (humanethics@waikato.ac.nz).

Appendix B.

GROUP 1 (CLIENT PARTICIPANT) INFORMATION SHEET

Associate Professor Angelika Anderson
Faculty of Social Science
Waikato University
Phone: 07 838 4466 ext. 9209
Email: angelika.anderson@waikato.ac.nz

Melissa Svensson
Phone: 021 029 57978
Email: ms389@students.waikato.ac.nz

Your (son / daughter / charge) is invited to participate in a research project conducted by myself, Melissa Svensson, under the supervision of Associate Professor Angelika Anderson from the School of Psychology at the University of Waikato. This project is part of the requirement for the completion of my Master of Applied Psychology in Behaviour Analysis at the University of Waikato. Please read this information sheet in full before deciding if you will permit your (son / daughter / charge) to participate. If you would like further information about the project, please contact myself or Associate Professor Anderson via the contact details above.

What is the aim of the research?

This research aims to evaluate the impact of teaching the Picture Exchange Communication System (PECS) to a non-verbal adult, living in a disability residential setting. The research objectives are to determine:

A: If the use of PECS increases the frequency of functional communication acts in a generalised setting for an adult with an intellectual disability, in a disability residential setting

B: whether residential support staff and caregivers can be trained as effective communication partners to support the development of functional communication in individuals with an intellectual disability and limited expressive communication skills, using Behavioural Skills Training via Telehealth

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To be recruited for this research, the client participant would have met the following inclusion criteria:

- non-verbal adult
- aged between 20 years and 40 years
- has a diagnosed intellectual or developmental disability
- is accessing disability residential services
- has an Alternative and Augmentative Communication (AAC) goal associated with an existing support plan, which has not been successfully addressed

Group 2 Participants: Support staff participants

The research will also include 5-8 support staff who provide care for the client participant daily.

What will the participants have to do?

- The client participant and support staff participants will take part in PECS training for the first 3 stages of PECS. As recommended in the PECS Training Protocol (Bondy & Frost, 2002), a minimum of five training sessions will be adhered to for each PECS stage. PECS training sessions are expected to be approximately 30 minutes in duration. The researcher will be providing PECS training sessions via video conference, so the client participant would not be expected or required to engage with the researcher.
- Two 30-minute generalisation sessions will be scheduled to take place immediately following the final two training sessions for each PECS stage. This is where the client participant will engage in their normal activities, it is just that they will be observed while doing so.
- All training and generalisation sessions will also be recorded via secure video recording software. This will help the researcher review footage and improve the accuracy of data collection.
- Follow up observations will also be completed remotely by the researcher. Follow up observations will also be 30 minutes in duration. Two follow up sessions will be completed both at 2 weeks after PECS training has been completed, and at 2 months.
-
- Participants and stakeholders will be invited to a shared morning tea to mark the end of the research and thank them for their contributions. A results presentation will be included in this, and a written summary will be offered to all participants.

It is expected that total participation would be 10-12 weeks.

What are the expected benefits to the client participants?
The client participant will likely benefit from developing their functional communication skills. Improved communication skills are likely to reduce the client participant's vulnerability by reducing the occurrences of negative behaviour and the potential aversive consequences associated with this. A summary of the results can be forwarded to you on request, as can a copy of any published journal articles.

Right to withdraw

Participation in this project is voluntary and you are under no obligation to give consent to participate. All participants have the right to withdraw from the project at any time, for any reason, and with no consequence. This includes the destruction of data, upon request, up to 2 weeks after participation in the project is complete.

Confidentiality

Although the client's name will be known to me, participation in this project will remain confidential and no identifying information will be disclosed to anyone outside of the study. Codes and pseudonyms will be assigned to all participants to ensure no data can be traced back to any participants. Neither the residential care facility, nor participants will be identifiable in the presentation of any results.

What happens now?

If you are happy to participate in this project, please complete the consent form for teachers and return to myself. If you have any questions regarding the project, please contact me on the details at the top of this form.

This research project has been approved by the Human Research Ethics Committee (Health) of the University of Waikato. Any questions about the ethical conduct of this research may be sent to the chair of the committee (humanethics@waikato.ac.nz).

Appendix C.

GROUP 2 (STAFF PARTICIPANT) INFORMATION SHEET

Associate Professor Angelika Anderson
Faculty of Social Science
Waikato University
Phone: 07 838 4466 ext. 9209
Email: angelika.anderson@waikato.ac.nz

Melissa Svensson
Phone: 021 029 57978
Email: ms389@students.waikato.ac.nz

You are invited to participate in a research project conducted by myself, Melissa Svensson, under the supervision of Associate Professor Angelika Anderson from the School of Psychology at the University of Waikato. This project is part of the requirement for the completion of my Master of Applied Psychology in Behaviour Analysis at the University of Waikato. Please read this information sheet in full before deciding if you will agree to participate. If you would like further information about the project, please contact myself or Associate Professor Anderson via the contact details above.

What is the aim of the research?

This research aims to evaluate the impact of teaching the Picture Exchange Communication System (PECS) to a non-verbal adult, living in a disability residential setting. The research objectives are to determine:

A: If the use of PECS increases the frequency of functional communication acts in a generalised setting for an adult with an intellectual disability, in a disability residential setting

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Picture Exchange Communication System

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Who will the participants be?

Group 1 Participant: The client participant

To be recruited for this research, the client participant would have met the following inclusion criteria:

- non-verbal adult
- aged between 20 years and 40 years
- has a diagnosed intellectual or developmental disability
- is accessing disability residential services
- has an Alternative and Augmentative Communication (AAC) goal associated with an existing support plan, which has not been successfully addressed

Group 2 Participants: Support staff participants

The research will also include 5-8 support staff who provide care for the client participant daily.

What will the participants have to do?

All participants and stakeholders will be invited to an information and informed consent information session. Informed consent will be determined by the researcher's supervisor, Associate Professor Angelika Anderson. If informed consent is determined, the research procedure will be as follows.

- Support staff participants will complete a Reinforcement Inventory. It is intended that this will take staff participants approximately 30 minutes.
- The client participant and support staff participants will take part in PECS training. It is intended that the client participant and staff participants will take part in training for the first 3 stages of PECS. As recommended in the PECS Training Protocol (Bondy & Frost, 2002), a minimum of five training sessions will be adhered to for each PECS stage. PECS training sessions are expected to be approximately 30 minutes in duration. The researcher will be providing PECS training sessions via video conference
- Two 30-minute generalisation sessions will be scheduled to take place immediately following the final two training sessions for each PECS stage. This is where staff participants will practice positive learner communication strategies, while the client participant engages in their normal activities.
- All training and generalisation sessions will also be recorded via secure video recording software. This will help the researcher review footage and improve the accuracy of data collection.
- Follow up observations will also be completed remotely by the researcher. Follow up observations will also be 30 minutes in duration. Two follow up sessions will be completed both at 2 weeks after PECS training has been completed, and at 2 months.
- Participants and stakeholders will be invited to a shared morning tea to mark the end of the research and thank them for their contributions. A results presentation will be included in this, and a written summary will be offered to all participants.

It is expected that total participation would be 10-12 weeks.

What are the expected benefits to the participants?
It is proposed that staff participants will benefit as they would have learned a valuable new skill, which could be generalised to other clients in their care, where relevant and appropriate. A summary of the results can be forwarded to you on request, as can a copy of any published journal articles.

Right to withdraw

Participation in this project is voluntary and you are under no obligation to give consent to participate. All participants have the right to withdraw from the project at any time, for any reason, and with no consequence. This includes the destruction of data, upon request, up to 2 weeks after participation in the project is complete.

Confidentiality

Although the staff participant's name will be known to me, participation in this project will remain confidential and no identifying information will be disclosed to anyone outside of the study. Codes and pseudonyms will be assigned to all participants to ensure no data can be traced back to any participants. Neither the residential care facility, nor participants will be identifiable in the presentation of any results.

What happens now?

If you are happy to participate in this project, please complete the consent form for teachers and return to myself. If you have any questions regarding the project, please contact me on the details at the top of this form.

This research project has been approved by the Human Research Ethics Committee (Health) of the University of Waikato. Any questions about the ethical conduct of this research may be sent to the chair of the committee (humanethics@waikato.ac.nz).

Appendix D.

GROUP 2 (Care staff) CONSENT FORM

Please retain a copy of this form for your personal records.

Research Project: Increasing functional communication skills for non-verbal adults with an intellectual disability. Using Picture Exchange Communication System in a disability residential setting.

Name of participant: _____

I have received a copy of the Information Sheet describing the research project and have been given sufficient time to read it. Any questions that I have, relating to the research, have been answered to my satisfaction. I understand that I can ask further questions about the research at any time during my participation, and that I can withdraw my participation at any time (up to two weeks) after completion of data collection.
I understand that I can ask to have the observations stopped at any time.
When I sign this consent form, I will retain ownership of the collected data, but I give consent for the researcher to use the data for the purposes of the research outlined in the Information Sheet.
I understand that my identity will remain confidential in the presentation of the research findings

Please complete the following checklist. Tick (✓) the appropriate box for each point.	**YES**	**NO**
1. I have read the Participant Information Sheet (or it has been read to me) and I understand it.		
2. I have been given sufficient time to consider whether or not to participate in this study		
3. I am satisfied with the answers I have been given regarding the study and I have a copy of this consent form and information sheet		
4. I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the study at any time without penalty		
5. I have the right to decline to participate in any part of the research activity		
6. I know who to contact if I have any questions about the study in general.		
7. I understand that the information supplied by me could be used in future academic publications.		
8. I agree to take part in PECS training and generalisation sessions		
9. I agree to take part in completing a Reinforcement Inventory		
10. I consent to participating in video recordings of training and generalisation sessions		
11. I understand that my participation in this study is confidential and that no material, which could identify me personally, will be used in any reports on this study.		
12. I wish to receive a copy of the findings		

Participant:	_____	Researcher:	_____
Signature:	_____	Signature:	_____
Date:	_____	Date:	_____
Contact Details:	_____	Contact Details:	_____
	_____		_____
	_____		_____

Appendix E.

GROUP 1 (Client participant) CONSENT FORM

Please retain a copy of this form for your personal records.

Research Project: Increasing functional communication skills for non-verbal adults with an intellectual disability. Using Picture Exchange Communication System in a disability residential setting.

Name of participant: _____

I have received a copy of the Information Sheet describing the research project and have been given sufficient time to read it. Any questions that I have, relating to the research, have been answered to my satisfaction. I understand that I can ask further questions about the research at any time during my participation, and that I can withdraw my participation at any time (up to two weeks) after completion of data collection.
I understand that I can ask to have the observations stopped at any time.
When I sign this consent form, I will retain ownership of the collected data, but I give consent for the researcher to use the data for the purposes of the research outlined in the Information Sheet.
I understand that my identity will remain confidential in the presentation of the research findings

Please complete the following checklist. Tick (✓) the appropriate box for each point.	**YES**	**NO**
1. I have read the Participant Information Sheet (or it has been read to me) and I understand it.		
2. I have been given sufficient time to consider whether or not to consent for _____ to participate in this study.		
3. I am satisfied with the answers I have been given regarding the study and I have a copy of this consent form and information sheet		
4. I understand that taking part in this study is voluntary (my choice) and that I may withdraw _____ from the study at any time without penalty		
5. I have the right to decline for _____ to participate in any part of the research activity		
6. I know who to contact if I have any questions about the study in general.		
7. I understand that the information supplied by me could be used in future academic publications.		
8. I consent to_____ participating in PECS training and generalisation sessions		
9. I consent to_____ participating in video recordings of training and generalisation sessions		
10. I understand that_____participation in this study is confidential and that no material, which could identify them personally, will be used in any reports on this study.		
11. I wish to receive a copy of the findings		

Participant:	_____	Researcher:	_____
Signature:	_____	Signature:	_____
Date:	_____	Date:	_____
Contact Details:	_____	Contact Details:	_____
	_____		_____

Appendix F.

positive partnerships
Working together to support school-aged students on the autism spectrum

REINFORCEMENT INVENTORY

Name: …… Age: …… Date: ……

School: …… Parent/Carer: ……

Completed by: ……

Items are to be marked with the appropriate code:

H -Highly preferred **M** - Moderately preferred **N** - Non-preferred **D** - Disliked

Edibles/drinks	Specify & code
sweet biscuits	
dry biscuits	
chips	
pretzels	
M & Ms	
popcorn	
liquorice	
fruit roll-ups	
ice cream	
icy poles	
lollies	
fruit (specify) :	
nuts	
chocolate	
marshmallows	
cupcakes	
cereal	
water	
fruit juice (specify):	
Other (specify):	

Sensory activities	Specify & code
water	
bubbles	
listening to music	
objects that glitter	
spinning objects	
holograms	
kaleidoscopes	
applying lotion	
rocking	
quiet time	
hugging pillows	
'flicking' objects	
jumping/trampoline	
bouncing on lap	
Other (specify):	
Social activities	
parties	
adult attention	
smiling	
high fives	
applause	
singing in a group	
freedom from adults	
Other (specify):	

positive partnerships
Working together to support school-aged students on the autism spectrum

Toys/games	Specify & code
cars	
trains	
stuffed animals	
peg boards	
play dough	
puzzles	
beads	
computer games	
Game boy	
Wii /interactive	
blocks	
stringing beads	
board games	
Sudoku	
chess	
Other (specify):	

Activity based	Specify & code
walking	
drawing	
painting	
wearing jewellery	
computers - general	
being read to	
visit other classes	
cooking	
having a class job	
activity workbooks	
activity sheets	
colouring	
dress up	
riding bicycles	
playing catch	
bouncing balls	

Other areas of interest	
numbers	
letters	
dinosaurs	
insects	
shapes	
movies	
animals	
figurines	
balloons	
sports scores	
Other (specify)	

Playground activities	
running	
skate boarding	
shooting balls/nets	
basket ball	
soccer	
Other (specify):	

Summary

Highly Preferred reinforcers

Comments

The Positive Partnerships initiative is funded by the Australian Government Department of Education and Training through the Helping Children with Autism Package and is delivered by Autism Spectrum Australia. The views expressed in this publication do not necessarily represent the views of the Australian Government or the Australian Government Department of Education and Training.

autism spectrum AUSTRALIA

Appendix G.

Modified Primary Intervention Scale (PIRS)

Having finished implementing the PECS intervention, please evaluate the intervention by circling the number which best describes your agreement or disagreement with each statement. Please answer all questions.

From: https://www.ci3t.org/wp-content/uploads/2017/09/Ci3T-PIRS-Implementation-2017-09-23-to-post.pdf

		Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
1.	PECS was an acceptable intervention for this client.	1	2	3	4	5	6
2.	Most staff would find PECS appropriate in a disability residential environment.	1	2	3	4	5	6
3.	PECS proved effective in increasing functional communication for this client.	1	2	3	4	5	6
4.	I would suggest the use of PECS to others.	1	2	3	4	5	6
5.	Communication deficits were severe enough to warrant the use of PECS.	1	2	3	4	5	6
6.	Most staff would find PECS suitable for increasing functional communication	1	2	3	4	5	6
7.	I would be willing to use PECS again.	1	2	3	4	5	6
8.	PECS resulted in negative side-effects for the client.	1	2	3	4	5	6
9.	PECS may be appropriate for a variety of clients.	1	2	3	4	5	6
10.	PECS was consistent with other strategies I have used in this setting.	1	2	3	4	5	6
11.	PECS was a fair way to encourage functional communication for the client.	1	2	3	4	5	6
12.	I liked the procedures used in PECS.	1	2	3	4	5	6
13.	PECS was a good way to increase functional communication.	1	2	3	4	5	6
14.	Overall, PECS was beneficial for the client.	1	2	3	4	5	6
15.	PECS had a positive impact on client behaviour.	1	2	3	4	5	6
16.	PECS will produce a lasting improvement in functional communication.	1	2	3	4	5	6
17.	Soon after using PECS, I noticed a positive change in the client's functional communication.	1	2	3	4	5	6
20.	The client's functional communication will likely remain at an improved level even after PECS training is discontinued.	1	2	3	4	5	6
21.	The PECS maintenance procedures are appropriate and sustainable for the disability residential environment.	1	2	3	4	5	6

Appendix H.

Client name:
Week Beginning:

Behaviours of Concern			
1		5	
2		6	
3		7	
4		8	

Time	Mon	Tues	Wed	Thurs	Fri
8-9am					
9-10am					
10-11am					
11-12pm					
12-1pm					
1-2pm					
2-3pm					
3-4pm					
4-5pm					
5-6pm					
6-7pm					

Appendix I.

Client Participant Generalisation/Learner outcome sheet

	PECS Generalisation Session Date: PECS Phase:			PECS Generalisation Session Date: PECS Phase:		
	PECS Mand	Verbal Mand	Spontaneous communication initiation (list)	PECS Mand	Verbal Mand	Spontaneous communication initiation (list)
	Y N	Y N		Y N	Y N	
	Y N	Y N		Y N	Y N	
	Y N	Y N		Y N	Y N	
	Y N	Y N		Y N	Y N	
	Y N	Y N		Y N	Y N	
	Y N	Y N		Y N	Y N	
Totals						

	PECS Generalisation Session Date: PECS Phase:			PECS Generalisation Session Date: PECS Phase:		
	PECS Mand	Verbal Mand	Spontaneous communication initiation (list)	PECS Mand	Verbal Mand	Spontaneous communication initiation (list)
	Y N	Y N		Y N	Y N	
	Y N	Y N		Y N	Y N	
	Y N	Y N		Y N	Y N	
	Y N	Y N		Y N	Y N	
	Y N	Y N		Y N	Y N	
	Y N	Y N		Y N	Y N	
Totals						

Appendix J.

Staff Participant Generalisation Recording Sheet

PECS Generalisation Session Date: PECS Phase:	
Target Skill	
Communication opportunities are set up for the learner	# of opportunities presented:
Reinforcement delivered within 0.5 of a second	Record Y/N for each trial:
Uses appropriate prompts	Record Y/N for each prompt:
Uses appropriate error correction and modelling procedures	Record Y/N for each time procedure is used:

PECS Generalisation Session Date: PECS Phase:	
Target Skill	
Communication opportunities are set up for the learner	# of opportunities presented:
Reinforcement delivered within 0.5 of a second	Record Y/N for each trial:
Uses appropriate prompts	Record Y/N for each prompt:
Uses appropriate error correction and modelling procedures	Record Y/N for each time procedure is used:

Appendix K.

Staff Participant Training and Implementation recording sheet

PECS Training Session Date: PECS Phase I Communication Partner															
Target Skill	Trial #														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Arranges training environment effectively	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
No verbal prompting	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Entices appropriately	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Uses open hand effectively	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Reinforces within ½ second and provides praise	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
No insistence on speech	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N

Appendix L.

Staff Participant Training and Implementation recording sheet

PECS Training Session Date: PECS Phase I Physical Prompter															
Target Skill	Trial #														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Waits for learner to initiate	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Physically guides to pick up, reach, release	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Fades prompts effectively	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Interrupts/prevents interfering behaviours	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
No social interaction with learner	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N

Appendix M.

Staff Participant Training and Implementation recording sheet

PECS Training Session Date: PECS Phase II Communication Partner															
Target Skill	Trial #														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Arranges training environment effectively	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Entices appropriately	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Gradually increases distance from learner	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Teaches learner to cross room to contact Communication partner	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Gradually increases distance between learner and PECS book	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Turns away from learner	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N

Reinforces within ½ second	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Eliminates any subtle prompts	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Does not insist on speech	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Teaches learner to travel from room to room	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N

Appendix N.

Staff Participant Training and Implementation recording sheet

PECS Training Session Date: PECS Phase II Physical Prompter															
Target Skill	Trial #														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Waits for initiation	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Prompts removal of picture from book if necessary	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Physically guides learner to communication partner if necessary	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Physically guides student to communication book if necessary	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Does not interact socially with learner	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Uses back-stepping if necessary	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N

Appendix O.

Staff Participant Training and Implementation recording sheet

PECS Training Session Date: PECS Phase IIIA Communication Partner															
Target Skill	Trial #														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Arranges training environment effectively	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Entices appropriately with both items	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Social reinforcement provided as soon as learner touches correct picture	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Reinforces appropriately with requested item	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Uses a variety of distracter items and target pictures	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Conducts error correction procedures correctly	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N

Moves picture around on book	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Does not insist on speech	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N

Appendix P.

Staff Participant Training and Implementation recording sheet

PECS Training Session Date: PECS Phase IIIB Communication Partner															
Target Skill	Trial #														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Arranges training environment effectively	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Entices appropriately with all items	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Conducts correspondence check	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Conducts error correction procedures correctly	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Moves picture around on book	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Teaches 2- , 3-, way mix	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N

Appendix Q.

PECS Phase I Trial-by-Trial©

Name:	Location:

Date	Trial	Pick Up	Reach	Release	Picture	Activity
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
	13					
	14					
	15					
	16					
	17					
	18					
	19					
	20					

+ = Independent; **FP** = Full Physical Prompt; **PP** = Partial Physical Prompt

Appendix R.

PECS – Phase II©

Student:	

Date	Staff	Travel to CP	Distance to CP	Travel to Book	Distance to Book	Picture	Activity

Travel to Trainer/Book:	**+** = independent	**-** = prompted
Distance to Trainer/Book:	list in feet or location of trainer (next room, across room)	

Appendix S.

Video model scripts Phase I

Setting up the training environment:

The communication partner is positioned in front of the learner e.g.: across from the learner at the table, in front of the learner on the floor.

The physical prompter is located behind the learner.

The picture of preferred item/activity is placed directly in front of the learner.

The preferred item or activity is placed in front of the learner, but out of reach/closer to the communication partner.

Key:

Communication partner = CP

Learner = L

Prompter = P

Video 1- The exchange:

CP: entices learner with desired item/activity

L: reaches for the item

P: uses a full physical prompt to redirect the learner to pick up the picture, and release into the CP open hand (CP opens hand only when L initiates the exchange)

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”

Video 2- Fading physical prompt:

Trial 1

CP: entices learner with desired item/activity

L: reaches for the item

P: uses a full physical prompt to redirect the learner to pick up the picture, reach towards CP and release into the CP open hand (CP opens hand only when L initiates the exchange)

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”

Trial 2

CP: entices learner with desired item/activity

L: reaches for the picture but does not pick it up

CP: opens hand

P: uses a full physical prompt to redirect the learner to pick up the picture and reach towards CP.

L: releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”

Trial 3

CP: entices learner with desired item/activity

L: reaches for the picture but does not pick it up

CP: opens hand

P: uses a full physical prompt to help the learner pick up the card, waits a moment.

L: holds the picture

P: uses a partial physical prompt e.g.: lightly pushes L elbow towards CP, to help the learner reach towards the CP

L: releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”

Trial 4

CP: entices learner with desired item/activity

L: reaches for the card and picks it up, but does not reach out to CP

CP : opens hand

P: uses a partial physical prompt e.g.: lightly pushes L elbow towards CP, to help the learner reach towards the CP

L: releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”

Trial 5

CP: entices learner with desired item/activity

L: reaches for the card but does not pick up

CP: opens hand

P: uses a partial physical prompt e.g.: places L hand on card, to help the learner pick up the card. Waits a moment.

L: reaches towards CP and releases picture into CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”

Video 3- Fading open hand cue:

Trial 1

CP: entices learner with desired item/activity

L: reaches for the card but does not pick up

CP: opens hand

P: uses a partial physical prompt e.g.: places L hand on card, to help the learner pick up the card. Waits a moment.

L: reaches towards CP and releases picture into CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”

Trial 2

CP: entices learner with desired item/activity

L: reaches for the card but does not pick up

CP: opens hand

P: uses a partial physical prompt e.g.: places L hand on card, to help the learner pick up the card. Waits a moment.

L: reaches towards CP and releases picture into CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”

Trial 3

CP: entices learner with desired item/activity

L: reaches for the card and picks it up but does not reach towards CP

P: uses a partial physical prompt e.g.: lightly pushes L elbow towards CP, to help the learner reach towards the CP

CP: opens hand

L: releases picture into CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”

Trial 4

CP: entices learner with desired item/activity

L: reaches for the card and picks it up, then reaches towards CP

CP: opens hand

L: releases picture into CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”

Trial 5

CP: entices learner with desired item/activity

L: reaches for the card and picks it up, then reaches towards CP

CP: opens hand

L: releases picture into CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”

Appendix T.

Video model scripts Phase II

Setting up the training environment:

The communication partner is positioned in front of the learner e.g.: across from the learner at the table, in front of the learner on the floor.

The physical prompter is located behind the learner.

The PECS folder is placed within reach of the learner.

Continue to use one picture and one preferred item/activity per trial but ensure that a variety of pictures and preferred items/activities are available across training sessions. The preferred item or activity is placed in front of the learner, but out of reach/closer to the communication partner for each trial.

Key:

Communication partner = CP

Learner = L

Prompter = P

Video 1- introducing the PECS folder

Trial 1

CP: places picture of preferred item/activity on front of PECS folder and entices learner with desired item/activity

L: reaches for the item

P: uses a full physical prompt to redirect the learner to pick up the picture from the front of the PECS folder, reach towards CP

CP: opens hand

L: releases picture into CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Trial 2

CP: entices learner with desired item/activity

L: reaches for the item

P: uses a full physical prompt to redirect the learner to pick up the picture from the front of the PECS folder, and waits a moment

L: holds picture

P: uses a partial physical prompt e.g.: lightly pushes L elbow towards CP, to help the learner reach towards the CP

CP: opens hand

L: releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Trial 3

CP: entices learner with desired item/activity

L: reaches for the picture but does not pick it up

P: uses a full physical prompt to help the learner pick up the card from the front of the PECS folder, waits a moment.

L: reaches towards CP

CP: opens hand

L: releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Trial 4

CP: entices learner with desired item/activity

L: reaches for the card and picks it up from the front of the PECS folder, then reaches towards CP

CP: opens hand

L: releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Trial 5

CP: entices learner with desired item/activity

L: reaches for the card and picks it up from the front of the PECS folder, then reaches towards CP

CP: opens hand

L: releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Video 2- increasing distance to communication partner

Trial 1

CP: entices learner with desired item/activity

L: reaches for the card and picks it up from the front of the PECS folder, then reaches towards CP

CP: opens hand

L: releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Trial 2

CP: entices learner with desired item/activity

L: reaches for the card and picks it up from the front of the PECS folder, then reaches towards CP

CP: opens hand then moves their hand slightly closer to their body

L: reaches further, then releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Trial 3

CP: entices learner with desired item/activity

L: reaches for the card and picks it up from the front of the PECS folder, then reaches towards CP

CP: opens hand and moves their hand further back towards their body

L: reaches further, then releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Trial 4

CP: sits a foot back from the table/further away on the floor, and entices learner with desired item/activity

L: reaches for the card and picks it up from the front of the PECS folder, then reaches towards CP, but does not get up

P: gently uses a physical prompt to encourage the learner to move towards the CP

L: gets up, moves closer to CP

CP: opens hand

L: releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Trial 5

CP: sits two feet back from the table/further away on the floor, and entices learner with desired item/activity

L: reaches for the card and picks it up from the front of the PECS folder, then reaches towards CP, but does not get up

P: gently uses a physical prompt to encourage the learner to move towards the CP

L: gets up, moves closer to CP

CP: opens hand

L: releases picture into CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Trial 6

CP: stands far enough away that the learner needs to travel 3 steps to reach the CP, and entices learner with desired item/activity

L: reaches for the card and picks it up from the front of the PECS folder, then reaches towards CP, but does not get up

P: gently uses a physical prompt to encourage the learner to move towards the CP

L: gets up, moves closer to CP

CP: opens hand

L: releases picture into CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Trial 7

CP: stands far enough away that the learner needs to travel 3 steps to reach the CP, and entices learner with desired item/activity

L: reaches for the card and picks it up from the front of the PECS folder, then gets up and moves towards CP

CP: opens hand

L: releases picture into CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Trial 8

CP: stands far enough away that the learner needs to travel 5 steps to reach the CP, and entices learner with desired item/activity

L: reaches for the card and picks it up from the front of the PECS folder, then gets up and moves towards CP

CP: opens hand

L: releases picture into CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Video 3- increasing distance to PECS folder

Trial 1

CP: stands nearby and entices learner with desired item/activity

L: reaches for the card and picks it up from the front of the PECS folder, then walks towards CP

CP: opens hand

L: releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Trial 2

P: places PECS folder slightly further away from learner e.g.: on far side of table, but still in direct line/view with the CP

CP: stands nearby and entices learner with desired item/activity

L: reaches for the card and picks it up from the front of the PECS folder, then walks towards CP

CP: opens hand

L: releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Trial 3

P: places PECS folder on another table/space nearby, but far enough away that the learner needs to get up to reach it. Ensure it is still in line of view with the CP.

CP: stands 4-5 steps away and entices learner with desired item/activity

L: stares at the PECS folder

P: uses a physical prompt to encourage the learner to get up and walk towards the PECS folder

L: walks to PECS folder and picks up picture, then walks towards CP

CP: opens hand

L: releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Trial 4

P: places PECS folder on another table/space, far enough away that the learner needs to travel 3-4 steps to reach it. Ensure it is still in line of view with the CP.

CP: stands 5-8 steps away and entices learner with desired item/activity

L: stares at the PECS folder

P: uses a physical prompt to encourage the learner to get up and walk towards the PECS folder

L: walks to PECS folder and picks up picture, then walks towards CP

CP: opens hand

L: releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Trial 5

P: places PECS folder on another table/space, far enough away that the learner needs to travel 3-4 steps to reach it. This time, the PECS folder can be off to the side, so it is not “on the way” to the CP.

CP: stands 5-8 steps away and entices learner with desired item/activity

L: walks towards PECS folder and picks up picture, then walks back towards the CP

CP: opens hand

L: releases picture into the CP open hand

CP: as the learner places the picture in the CP hand, CP simultaneously gives the preferred item/activity and praises e.g.: “ice cream!”. CP then returns picture to the front of the PECS folder.

Appendix U.

Video model scripts Phase IIIA

Setting up the training environment:

The communication partner is positioned near the learner

The PECS folder is placed within reach of the learner.

For this step, use two pictures and two items/activities at a time. One item/activity must be highly preferred and the other non-preferred. Place the two pictures on the front of the PECS folder (remember to still use a variety of preferred and distractor items).

Communication partner may wish to use a tray to place items on a tray to allow for blocking/mobility

Key:

Communication partner = CP

Learner = L

Video 1

Trial 1

CP: places picture of preferred item, and picture of distractor item on front of PECS folder. CP then places preferred item and non-preferred item on a tray near the learner and waits.

L: retrieves picture of preferred item from front of PECS folder.

CP: provides social praise e.g.: “yes!, the spinning top”

L: gives preferred picture to CP

CP: immediately provides access to preferred item

Trial 2

CP: places picture of preferred item, and picture of distractor item on front of PECS folder. CP then places preferred item and non-preferred item on a tray near the learner and waits.

L: retrieves picture of preferred item from front of PECS folder.

CP: provides social praise e.g.: “yes! the spinning top”

L: gives preferred picture to CP

CP: immediately provides access to preferred item

Trial 3

CP: places picture of preferred item, and picture of distractor item on front of PECS folder. CP then places preferred item and non-preferred item on a tray near the learner and waits.

L: retrieves picture of non-preferred item from front of PECS folder.

CP: provides no social reaction

L: gives non-preferred picture to CP

CP: provides non-preferred item and places picture back on the front of the PECS folder

L: places non-preferred item aside, and reaches for preferred item

CP: blocks and redirects learner to look at the correct picture e.g.: by tapping/pointing toward correct picture. CP then opens hand near correct picture to prompt L to give them the correct picture

L: gives CP the correct picture

CP: provides social praise e.g.: “yes, the spinning top”. CP then places picture back on the front of the PECS folder.

CP: turns PECS folder over and asks L to engage in a distractor/”change” action e.g.: clap hands

L: performs “change” activity

CP: turns folder back over and waits for L to retrieve a picture

L: retrieves picture of preferred item from front of PECS folder.

CP: provides social praise e.g.: “yes! the spinning top”

L: gives preferred picture to CP

CP: immediately provides access to preferred item

Trial 4

CP: places picture of preferred item, and picture of distractor item on front of PECS folder. CP then places preferred item and non-preferred item on a tray near the learner and waits.

L: retrieves picture of non-preferred item from front of PECS folder.

CP: provides no social reaction

L: gives non-preferred picture to CP

CP: provides non-preferred item and places picture back on the front of the PECS folder

L: places non-preferred item aside, and reaches for preferred item

CP: blocks and redirects learner to look at the correct picture e.g.: by tapping/pointing toward correct picture. CP then opens hand near correct picture to prompt L to give them the correct picture

L: gives CP the correct picture

CP: provides social praise e.g.: “yes, the spinning top”. CP then places picture back on the front of the PECS folder.

CP: turns PECS folder over and asks L to engage in a distractor/” change” action e.g.: clap hands

L: performs “change” activity

CP: turns folder back over and waits for L to retrieve a picture

L: retrieves picture of preferred item from front of PECS folder.

CP: provides social praise e.g.: “yes! the spinning top”

L: gives preferred picture to CP

CP: immediately provides access to preferred item

Trial 5

CP: places picture of preferred item, and picture of distractor item on front of PECS folder. CP then places preferred item and non-preferred item on a tray near the learner and waits.

L: retrieves picture of preferred item from front of PECS folder.

CP: provides social praise e.g.: “yes! the spinning top”

L: gives preferred picture to CP

CP: immediately provides access to preferred item

Video model scripts Phase IIIB

Setting up the training environment:

The communication partner is positioned near the learner

The PECS folder is placed within reach of the learner.

For this step, use two pictures and two items/activities at a time. Both items will be preferred/of interest to the learner. Place the two pictures on the front of the PECS folder (remember to still use a variety of preferred items).

Communication partner may wish to use a tray to place items on a tray to allow for blocking/mobility

Key:

Communication partner = CP

Learner = L

Video 2

Trial 1

CP: places pictures of preferred items on front of PECS folder. CP then places preferred items on a tray near L and waits.

L: retrieves a picture from the front of the PECS folder and passes it to CP

CP: moves tray closer to L and say's "good, take it" and places the picture back on the front of the PECS folder

L: reaches for the item that does not correspond to the picture they selected

CP: blocks action and points/taps the correct picture. CP then opens hand next to correct picture to prompt L to give them the correct picture

L: gives CP the correct picture

CP: provides social praise e.g.: "yes! the spinning top"

CP: turns PECS folder over and asks L to engage in a distractor/" change" action e.g.: "do this (touching nose)"

L: touches nose/performs change activity

CP: turns PECS folder back over and waits for L to retrieve a picture

L: retrieves correct picture from the front of the PECS folder and passes to CP

CP: moves tray closer to L and says "go ahead, take it"

L: takes correct item

CP: as L retrieves the correct item, CP simultaneously provides social praise e.g.: "yes! the spinning top"

Trial 2

CP: places pictures of preferred items on front of PECS folder. CP then places preferred items on a tray near L and waits.

L: retrieves a picture from the front of the PECS folder and passes it to CP

CP: moves tray closer to L and say's "good, take it" and places the picture back on the front of the PECS folder

L: reaches for the item that does not correspond to the picture they selected

CP: blocks action and points/taps the correct picture. CP then opens hand next to correct picture to prompt L to give them the correct picture

L: gives CP the correct picture

CP: provides social praise e.g.: "yes! the spinning top"

CP: turns PECS folder over and asks L to engage in a distractor/" change" action e.g.: "do this (touching nose)"

L: touches nose/performs change activity

CP: turns PECS folder back over and waits for L to retrieve a picture

L: retrieves correct picture from the front of the PECS folder and passes to CP

CP: moves tray closer to L and says "go ahead, take it"

L: takes correct item

CP: as L retrieves the correct item, CP simultaneously provides social praise e.g.: "yes! the spinning top"

Trial 3

CP: places pictures of preferred items on front of PECS folder. CP then places preferred items on a tray near L and waits.

L: retrieves a picture from the front of the PECS folder and passes it to CP

CP: moves tray closer to L and say's "good, take it" and places the picture back on the front of the PECS folder

L: reaches for the corresponding/correct item

CP: as L retrieves the correct item, CP simultaneously provides social praise e.g.: "yes! the spinning top"

Trial 4

CP: places pictures of preferred items on front of PECS folder. CP then places preferred items on a tray near L and waits.

L: retrieves a picture from the front of the PECS folder and passes it to CP

CP: moves tray closer to L and say's "good, take it" and places the picture back on the front of the PECS folder

L: reaches for the item that does not correspond to the picture they selected

CP: blocks action and points/taps the correct picture. CP then opens hand next to correct picture to prompt L to give them the correct picture

L: gives CP the correct picture

CP: provides social praise e.g.: "yes! the spinning top"

CP: turns PECS folder over and asks L to engage in a distractor/" change" action e.g.: "do this (touching nose)"

L: touches nose/performs change activity

CP: turns PECS folder back over and waits for L to retrieve a picture

L: retrieves correct picture from the front of the PECS folder and passes to CP

CP: moves tray closer to L and says “go ahead, take it”

L: takes correct item

CP: as L retrieves the correct item, CP simultaneously provides social praise e.g.: “yes! the spinning top”

Trial 5

CP: places pictures of preferred items on front of PECS folder. CP then places preferred items on a tray near L and waits.

L: retrieves a picture from the front of the PECS folder and passes it to CP

CP: moves tray closer to L and say’s “good, take it” and places the picture back on the front of the PECS folder

L: reaches for the corresponding/correct item

CP: as L retrieves the correct item, CP simultaneously provides social praise e.g.: “yes! the spinning top”

Appendix V.

PECS Phase I- "How to communicate"

Training procedure

Communication Partner Responsibilities

- Entice or "motivate" the learner
- Ensure that the learner is reinforced within ½ a second of picture exchange
- Pair social praise with delivery of the preferred item/activity
- Make sure the "open hand prompt" is timed appropriately

Physical Prompter Responsibilities

- Most importantly, wait for the learner's initiation!
- Physically prompt the learner to exchange the picture
- Fade prompts as specified below

Setting up the training environment:

The communication partner is positioned in front of the learner e.g.: across from the learner at the table, in front of the learner on the floor.

The physical prompter is located behind the learner.

The picture of preferred item/activity is placed directly in front of the learner.

The preferred item or activity is placed in front of the learner, but out of reach/closer to the communication partner.

Step 1:

The communication partner "entices" the learner by showing/bringing attention to the preferred item or activity

As the learner reaches for the item, the physical prompter uses a full physical prompt to encourage the learner to pick up the picture and release it into the communication partner's open hand.

It is important that the communication partner does not open their hand until after the learner has reached for the item/initiated the picture exchange.

As the learner places the picture in the communication partner's hand, the communication partner simultaneously gives the preferred item/activity and praises e.g.: "ice cream!"

Step 2:

Over several trials, systematically begin to fade the physical prompt by using backward chaining.

1. Fade physical assistance to release picture- continue until the learner releases the picture into the communication partner's hand independently in at least 80% of trials

2. Fade physical assistance to reach for the communication partner's open hand- continue until the learner reaches to place the picture in the communication partner's hand independently in at least 80% of trials
3. Fade physical assistance to pick up the picture- continue until the learner picks up the picture independently in at least 80% of trials

Step 3:

Once the physical prompt has been faded, the communication partner can fade the "open hand prompt", moving from showing an open hand as soon as the learner reaches for the picture, to showing the "open hand" as the learner reaches towards the communication partner with the picture.

Continue to reinforce within ½ a second of the learner placing the picture in the communication partner's hand and pair with social reinforcement e.g.: praise (whatever is tolerated/appropriate for the learner)

Trouble shooting

If the learner is not attending, the communication partner can entice by saying "I have ice-cream, yum" or stirring the spoon in a bowl (to make a noise). Do not gain attention by using the prompt "what do you want".

If the learner is appearing bored by the item/activity, try switching to a different reinforcer, or end the session.

If the learner plays with the picture card or does anything other than try to place it in the communication partner's hand, interrupt the behaviour and begin the trial again, reintroducing a physical prompt if necessary (can fade again as above).

Appendix W.

PECS Phase II – "Distance and Persistence"

Training procedure

Setting up the training environment:

The communication partner is positioned in front of the learner e.g.: across from the learner at the table, in front of the learner on the floor.

The physical prompter is located behind the learner.

The PECS folder is placed within reach of the learner.

Continue to use one picture and one preferred item/activity per trial but ensure that a variety of pictures and preferred items/activities are available across training sessions. The preferred item or activity is placed in front of the learner, but out of reach/closer to the communication partner for each trial.

Step 1:

In this PECS phase, the picture of the preferred item or activity is placed on the front of the PECS folder.

Following the procedure in Phase I, the communication partner entices the learner with the preferred item or activity. The physical prompter may physically assist the learner to pick up the picture from the front of the PECS folder, reach to the communication partner, and release into the communication partner's hand, if necessary. Physical prompts, if needed, can then be gradually faded.

Remember to provide access to the preferred item or activity within ½ of a second of the learner placing the picture in the communication partner's hand, and pair with praise/social reinforcement.

Step 2:

The communication partner will entice the learner with the preferred item or activity. As the learner reaches to release the picture in the communication partner's hand, the communication partner will move their hand slightly closer to their body. This aims to encourage the learner to reach a little bit further.

In following trials, the communication partner will gradually move slightly further away from the learner. The learner will have to learn how to reach further, stand to reach, and eventually travel small distances to reach the communication partner. The physical prompter can guide the learner where necessary, but prompts must continue to be faded as soon as appropriate.

The communication partner should not provide any prompting during this phase. The learner has to learn that they need to gain the communication partner's attention.

Step 3:

Begin step 3 when the learner is consistently travelling 5-8 feet to the communication partner.

The communication partner remains “nearby” (but not directly in front of the learner). During successive trials, the PECS folder is gradually moved further away from the learner, so that they learn to travel to access the folder. For example, PECS folder is moved slightly away to encourage the learner to reach, then slightly further away over several more trials until the learner is able to make a purposeful “detour” to their PECS folder, before approaching the communication partner. Again, the physical prompter may assist where necessary, but all prompts must be faded as soon as appropriate.

Appendix X.

PECS Phase III – Picture Discrimination

Training procedure- Phase IIIA

Setting up the training environment:

As a new skill is being taught, we can make it a little bit easier for the learner by having the PECS folder nearby.

You will need pictures of preferred items/activities and non-preferred "distractor" items/activities

You will need corresponding preferred items/activities and non-preferred items/activities

Step 1:

For this step, use two pictures and two items/activities at a time. One item/activity must be highly preferred and the other non-preferred. Place the two pictures on the front of the PECS folder.

The communication partner will "entice" the learner with the preferred item and the non-preferred item simultaneously.

If the learner picks up the correct picture and gives it to the communication partner immediately provide the preferred item/activity and pair with social praise.

If the learner picks up the incorrect picture (distractor picture) immediately give the item/activity to the learner but do not provide any other reaction. If the learner looks as though they do not want the item e.g.: puts it down, throws it away, use the following 4-step error correction procedure:

PECS 4-Step Error Correction Procedure - Phase IIIA©

Step	Teacher	Student
	Entice with both items	
		Gives incorrect picture
	Give non-preferred item	
		Reacts negatively
1. Model/Show	Get student to look at correct picture	
2. Practice	Prompt student to exchange picture	
		Gives target picture
	Praise (do not give item)	
3. Change	"Do this" or pause	
		Performs action
4. Repeat	Entice with both items	
	(use ½ second rule for selection)	Gives correct picture
	Praise, label, and give item	

Note:

Practice picture discrimination with a variety of preferred and distractor items

Make sure you vary your "change" actions when using the 4-step error correction procedure to avoid forming any rituals.

Training procedure- Phase IIIB

Setting up the environment:

As a new skill is being taught, we can make it a little bit easier for the learner by having the PECS folder nearby.

You will need a variety of preferred items and their corresponding pictures

Step 1:

For this step, use two preferred items/activities. Place their corresponding pictures on the front of the PECS folder.

The communication partner places the two preferred items on a tray near the learner.

Once the learner selects a picture and gives it to the communication partner, the communication partner holds the tray towards the learner and says "good, take it".

If the learner reaches for correct item provide access and pair with social praise.

If the learner reaches for the incorrect item, use the following 4-step error correction procedure:

PECS 4-Step Error Correction Procedure - Phase IIIB©

Step	Teacher	Student
	Entice with both items	
		Gives picture
Correspondence Check	"Take it" "Go ahead" "Here"	
		Reaches for wrong item
	Block access	
1. Model/Show	Get student to look at target picture	
2. Practice	Prompt student to exchange target picture	
		Gives target picture
	Praise (do not give item)	
3. Change	"Do this" or pause	
		Performs action
4. Repeat	Entice with both items	
		Gives picture
Correspondence Check	"Take it" "Go ahead" "Here"	
		Takes correct item
	Allow access, praise, label	

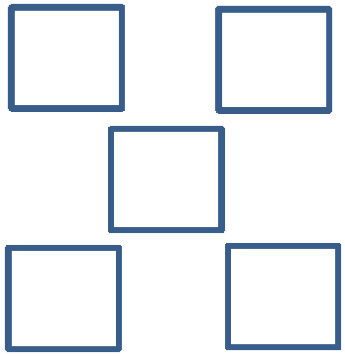
Step 2:

Begin to add pictures to the front of the PECS folder, so that the learner is learning to discriminate between multiple pictures.

Begin with three pictures of preferred items.

Use the 4-step error correction procedure if the learner reaches for the wrong item/activity, as in Step 1.

When the learner has mastered three, move to four, then five. Arrange on the front of the PECS folder as follows:



Step 3:

Once the learner has mastered Step 2, we can begin teaching how to retrieve the picture from the PECS folder.

Begin by clearing all pictures from the front of the PECS folder.

The communication partner places two pictures of preferred items in the PECS folder and leaves the PECS folder open. The communication partner then entices the learner with the items.

As the learner reaches for the picture, the communication partner will close the folder. Hopefully, the learner will simply open the book again to retrieve the picture, if not, they can be physically prompted to. Remember to fade the physical prompt as soon as appropriate.

Rotate the pictures used, and the location of the pictures to different pages in the PECS folder so the learner gets used to "thumbing through" the book to find what they want.

Gradually add more pictures to the folder and categorise in a manner that is meaningful for the learner.