Pica Behaviour and Positive Behavioural Support: Best Practice in assessment and intervention.

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Abstract

Background: Pica (the ingestion of non-edible items) is a dangerous and relatively common behaviour presented by people with intellectual disabilities.

Method and materials: Non-systematic review of studies that are compatible with Positive Behavioural Support related to the definition, prevalence, assessment and intervention for PICA.

Results: PICA has a high prevalence in people with intellectual developmental disabilities and is potentially dangerous and multi-factorial in its causation. A range of suggested intervention strategies compatible with PBS were found with reported reductions in PICA ranging from 70-90% with a clear indication that multi-element interventions are likely to be the most effective.

Conclusions: Whilst the results reported in the studies reviewed are encouraging, there remain concerns regarding the feasibility of the implementation of these interventions and the extent to which the risk associated with PICA need to be managed even in the context of relatively effective interventions.

What is pica?

Pica has been defined as the repeated and compulsive consumption of inedible items which have no nutritional value (Stiegler, 2005). According to the DSM-5, the symptoms must persist for over one month, be inappropriate to the developmental level of the individual, not be part of a culturally supported or socially normative practice and be a symptom of another mental disorder and severe enough to warrant independent clinical attention (American Psychiatric Association, 2013). Although DSM-5 states that pica is of “non-food” items, some researchers have suggested that pica topography can be broadened to include the ingestion of edible but insufficiently prepared food (e.g. raw potatoes; Lacey, 1990) and food that is contaminated or retrieved from inappropriate places (e.g., floor, bin; Hirsch & Smith-Myles, 1996). Items consumed by individuals who engage in pica vary considerably but often include sharp

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objects, faeces, paper, plastic, dirt, paint, rocks, cloth, soap, coffee granules, ice, hair, leaves, twigs, raw potatoes and cigarette butts (Rose, Porcerelli, & Neale, 2000; Stiegler, 2005). Some individuals with intellectual disability can consume a wide range of items whilst others may consistently ingest one or two specific preferred items (Stiegler, 2005).

Prevalence

The prevalence of pica in people with intellectual developmental disabilities has been reported to be between 5.7% and 25.8% (Ashworth, Martin & mHirdes, 2008). In the largest study, Danford and Huber (1982) reported that 25.8% of a population of 991 adults with intellectual disabilities living in an institution engaged in pica with prevalence among individuals with intellectual disability increasing with the severity of their intellectual disability (Ali, 2001; American Psychiatric Association, 2013). Intellectual Disabilities has a high comorbidity with Autism Spectrum Disorder (ASD) (LaMalfa, Lassi, Bertelli, Salvini, & Placidi, 2004). LaMalfa et al. estimated 70% of individuals diagnosed with ASD were dually diagnosed with intellectual disability.

The research literature suggests that although pica is observed to occur within varying groups, it is most commonly comorbid with intellectual disability and autism spectrum disorder (ASD) with prevalence among individuals with intellectual disability increasing with severity of intellectual disability (Ali, 2001; Hong & Dixon, 2018). Although pica is often under identified, underreported and undertreated (Ali, 2001; Call et al., 2015; Hong & Dixon, 2018; Rose et al., 2000; Stiegler, 2005) thus the prevalence is difficult to ascertain.

Medical complications of pica

Pica is a concerning behaviour for individuals with intellectual disability, their families and clinicians as one occurrence can result in fatal medical consequences (Call et al., 2015). Serious health risks associated with pica include 1) toxicity related to lead poisoning from ingesting urban soil, paint chips or other leaded items, 2) obstructions and perforations of gastrointestinal or respiratory tracts from ingesting sharp objects, foreign bodies or chronic ingestion of hair (Rose et al., 2000; Stiegler, 2005), 3) parasitic infections from the consumption of dirt, soil, sand and faeces (Danforth and Huber, 1982). These complications can result in impairment of intellectual and physical development, emergency surgery (McAdam, Sherman, Sheldon, & Napolitano, 2004), choking (Hagopian, Rolider, & Rooker, 2012), and even death (American Psychiatric Association , 2013; Call et al., 2015)

Distressing but less serious medical consequences have been reported as oral and dental health problems from the mouthing, chewing or ingestion of sharp or solid objects, nutritional deficiency, irritable bowels and constipation (Call et al., 2015; Stiegler, 2005).

Other complications of pica

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Pica behaviour has been associated with aggressive and disruptive behaviours in some individuals (Danford and Hauber, 1982) thus it is worth considering the impact on the individual, their families and caregivers when managing pica behaviour. An individual's peers or caregivers may experience a range of feelings and emotions when they observe an individual engaging in pica. Some may feel repulsed at some pica behaviour such as watching ingestion of faeces, whilst others may feel anxious, stressed or even fear if they have to observe an individual putting themselves or others at risk when they are searching for or ingesting an item. Ashworth and Martin (2011) conducted a qualitative study to understand the perspectives of support workers who support individuals with intellectual disability and pica. The authors found that the majority of community staff interviewed expressed feelings of embarrassment about their client's behaviour when in public and as a consequence were at times reluctant to take the individual out in the community. It has been suggested that when caregivers or peers experience these emotions and challenges there is an increased risk of social stigmatisation and consequently social isolation for the individual who is engaging in pica behaviours with staff choosing to remain at the individuals home or go on "safe" outings (e.g. parks, familiar restaurants) to avoid embarrassment or negative reactions from the public (Ashworth & Martin, 2011). In line with this, other researchers have reported that a consequence of engaging in pica is that it can have a negative impact on the individual's quality of life (e.g. decreased engagement in recreational, productive, and social activities; Ashworth, Martin & Hirdes, 2009; Burke & Smith, 1999; Stiegler, 2005). Mace & Knight (1986) found in their study that decreased levels of social interaction lead to increased levels of pica, fitting with the hypothesis that when an individual receives low levels of interaction and restricted access to meaningful activity, there is more time for the individual to search for and ingest pica items, thus feeding into the maintenance of pica over time (Hong & Dixon, 2018; Stiegler, 2005).

Causes of pica

Recent literature recognises that pica is multifactorial in nature (Carter, Wheeler, Mayton, 2004). The most common cited cause for pica is attributed to nutritional deficiencies in iron and zinc (Rose et al., 2000). One meta-analysis found that individuals with pica were more likely to have anaemia, low haemoglobin concentration, low haematocrit concentration, and low plasma zinc concentration (Miao, Young, & Golden, 2015) resulting in nutritional deficiencies. It is suggested that these individuals experience cravings and engage in pica behaviour to satisfy the cravings and eliminate the nutritional deficiencies (Barrett, 2008). However, it is unclear whether the nutritional deficiencies were the cause or the result of the pica (Hong & Dixon, 2018). Stiegler (2005) also states that there is no consensus as to why some people without anaemia engage in pica behaviour and there is no evidence that individuals with intellectual and developmental disabilities have higher than normal levels of anaemia than the general population.

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While the direct causes of pica remain unclear there is much support for a functional behavioural aetiology (Favell, McGimsey, & Schell, 1982; Hagopian, Rooker, & Rolider, 2011). Pica is found to be most commonly maintained by automatic reinforcement rather than social contingencies (Hanley, Iwata & McCord, 2003; Goh, Iwata, & Kahng, 1999). That is, pica is often considered to be self-stimulatory, as in the individual would appear to take 'pleasure' in the sensory properties of the items they ingest (Piazza, et al, 1998). However, some single subject studies suggest that pica can also be a function of social attention (Mace & Knight, 1986; Piazza et al., 1998). Based on this we can hypothesise that pica behaviour is likely to have specific functions unique to the individual (Ashworth & Martin, 2011).

Behaviour Assessment

In earlier behaviour literature, pica was assessed through a variety of methods: Baiting the environment with items that are safe to ingest (i.e. safe pica items) or with items that are similar to the pica items the person had ingested before but are safe to consume in controlled amounts (i.e. simulated pica items) (Foxx & Martin, 1975; Piazza et al., 1998), use of placebo pica stimulus (Donnelly & Olczak, 1990), X-Rays (Burke & Smith, 1999) and component analyses whereby a series of analyses were systematically conducted to identify the component of cigarette pica which was efficacious in changing the pica behaviour (Piazza, Hanley & Fisher, 1996).

Assessment of pica is an area that is continually developing and has become more refined through the use of Functional Behavioural Assessment (FBA) procedures (Carter et al., 2004; Hirsch & Myles-Smith, 1996; Piazza, Hanley, Blakeley-Smith, & Kinsman, 2000).

As pica is reported as being under identified especially in community settings for people diagnosed with intellectual and other developmental disabilities (Ali, 2001; Rose et al., 2000) some researchers have suggested that an earlier stage of assessment should involve pica screening procedures in clinical settings (Hong & Dixon, 2018). Scales which have reportedly demonstrated good validity and reliability in identifying pica are; the Screening Tool of Feeding problems (STEP; Matson & Kuhn, 2001) and the Behavior Problems Inventory (BPI; Rojahn, Matson, Esbensen, & Smalls, 2001). Embedding these procedures in clinical settings may serve to be a helpful proactive measure in identifying the presence of pica and subsequently decrease risks of injury for individuals who engage in pica.

Positive Behaviour Support Interventions for Pica

Best practice in PBS recommends assessing possible underlying medical factors that might be contributing to or causing problem behaviour before implementing behaviour-analytic treatments (O'Neil et al., 1997). In instances where an individual's pica is caused by vitamin, mineral or nutritional deficiencies, several studies have

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successfully demonstrated the efficacy of treating the imbalance by correcting the deficiency. For example, Arbiter and Black (1991) demonstrated the efficacy of two forms of iron supplementation, sodium iron ededate and iron sulphate, in reducing the pica behaviour of two typically developing males to zero levels.

FBA is a core component of PBS (Gore et al 2013) and its use to determine the function of pica behaviour and teach replacement behaviours has revolutionised treatment with a resultant shift from punishment based to reinforcement based procedures (Vollmer & Iwata, 1992). Once the function is identified, options are then available for the reinforcer responsible for maintaining the pica to be withheld contingent on the behaviour (i.e. extinction or response blocking) or provided contingent on an alternative or incompatible desired behaviour (differential reinforcement of alternative behaviour (DRA) or incompatible behaviour (DRI). Several behaviour-analytic interventions for pica have been examined in the literature, including, antecedent based procedures (i.e. non-contingent reinforcement (NCR), response manipulation, discrimination training), consequent interventions (i.e. reinforcement-based procedures, response blocking) and treatment packages (i.e. combining antecedent and consequent interventions, combining different consequent interventions such as response blocking and DRA)

Primary Prevention Strategies

Adaptations to the physical environment

Environmental controls that are often used to reduce pica behaviour include the removal and locking up objects from the environment that could be ingested by the individual (i.e., “pica proofing”) to help reduce risk and the amount of time the individual must be supervised or their movement restricted (Carter, Wheeler & Mayton, 2004).

Adaptions to the social environment

Favell et al. (1982) found that pica was associated with being alone or unoccupied and that by enriching their environment the frequency of pica was reduced. Hirsch and Smith-Myles (1996) demonstrated that the availability of a “pica box”, containing safe edible and inedible items to a 10-year old child with autism decreased her pica behaviour. Similarly, a few studies have shown that increased stimulation, in the form of activities, social interaction, and attention, can reduce pica (Mace & Knight, 1986; Piazza et al., 1998).

Noncontingent Reinforcement (NCR)

Non-contingent reinforcement (NCR) is the most commonly used intervention for pica (Hagopian et al., 2012; Hong & Dixon, 2018). NCR is a well-established treatment that can be useful for interrupting or preventing automatically maintained behaviour by providing alternative sources of reinforcement (Favell et al., 1982). During a NCR procedure, a known reinforcer is presented on a timed schedule (usually variable or fixed time) independent of an individual engaging in the pica behaviour (Cooper, Heron

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& Heward, 2007). The reinforcer does not have to be functionally related to the pica behaviour (Hong & Dixon, 2018). Researchers suggest this procedure may be effective for two reasons. First, the NCR procedure contains the extinction component meaning the response-reinforcer relation is broken as the consequences of the pica behaviour are provided independently of engagement in pica (Hagopian et al., 2012). Secondly, frequent and free access to reinforcement may decrease the motivation to engage in pica behaviour (Cooper et al., 2007). Favell et al., (1982) provided non-contingent access to popcorn and toys to three individuals diagnosed with intellectual and developmental disabilities who engaged in pica. The behaviour was hypothesised to be maintained by gustatory reinforcement. Pica behaviour was reduced to 0% in two study participants and 5% in the third participant. Goh et al. (1999) found that a dense schedule of NCR (edibles delivered every 10 seconds for 5 minutes) successfully reduced pica behaviour in one individual with intellectual and developmental disabilities. However, Hagopian and Adelinis (2001) found that NCR alone was not sufficient to reduce pica and had to introduce a response blocking and redirection component. Similarly, Piazza et al. 1996 provided free access to food items alongside cigarette butts for an individual who engaged in eating cigarette butts. The NCR component alone did not decrease the consumption of cigarette pica behaviour. A contingent verbal interruption “no butts” was added to reduce levels of pica to 0 responses per minute.

NCR is relatively easy to implement as it simply requires providing the individual access to the identified reinforcer. The challenge is identifying a reinforcer which competes with the reinforcement maintaining the pica behaviour. A competing stimulus assessment (CSA) has become the preferred approach for identifying reinforcers that are associated with reduced pica (Goh et al., 1999). In the studies conducted by Piazza et al (1996), Piazza et al. (1998), Goh et al. (1999) and Hagopian, Gonzalez, Rivet, Triggs, & Clark (2011) a CSA was conducted in an environment baited with simulated pica materials that are safe to ingest. In the study conducted by Piazza et al. (1998), 2 out of 3 participants pica was found to be maintained by attention and automatic reinforcement. The noncontingent presentation of attention and continuous access to tangible reinforcement led to significant reduction in pica.

Discrimination training

These procedures aim to prevent pica by teaching individuals to correctly discriminate edible versus nonedible items. Discrimination alone cannot eliminate pica and thus are applied in conjunction with a response contingent intervention following pica attempts (Hagopian et al., 2012). Bogart, Piersel, & Gross (1995) taught a 21-year old female with profound intellectual disability to discriminate between food and non-food items and subsequently place the nonedible items in the bin.

Response Effort Manipulations

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Response effort manipulations have been demonstrated to be an effective treatment for pica maintained by automatic reinforcement (Carter, 2009; Piazza, et al., 2000; Piazza, Roane, Keeney, Boney, and Abt, 2002). The goal is to increase the effort required to engage in the response beyond the level supported by obtained reinforcement (Hagopian et al., 2012). To illustrate, Piazza et al. (2002) effectively reduced the pica behaviour of three individuals with intellectual disability by increasing the response effort required to engage in pica whilst decreasing the response effort to ingest alternative edible items. The authors found that when preferred pica items and appropriate food items were simultaneously and noncontingently available, the participants were more likely to consume the alternative item. When the response effort to obtain an item was increased, the participants consumed whatever items could be accessed with the least effort. A second study combined NCR and response effort manipulations to reduce pica behaviour and increase appropriate toy play for one boy who was blind by attaching toys to a string. The authors found that when it was less effort to locate the toys, the young boy played with the toys rather than engaging in pica (Piazza, et al., 2000).

Consequent-based Interventions

Reinforcement based procedures

Differential reinforcement procedures have also shown to be effective at reducing pica (Cooper et al., 2007; Donnelly & Olczak, 1990; Kern, Starosta, & Adelman, 2006; Ricciardi, Luiselli, Terrill, & Reardon, 2003) specifically differential reinforcement of alternative behaviours (DRA) and differential reinforcement of incompatible behaviours (Hagopian et al., 2012). DRA involves providing a reinforcer (e.g. preferred item, activity, edible) contingent on a desired response that is an alternative to the pica behaviour whereas DRI involves providing a reinforcer contingent on a desired response which is topographically incompatible with the pica behaviour (Cooper et al., 2007). Studies using differential reinforcement to treat pica have targeted eating non-pica items, playing with alternative items, or discarding/ exchanging potential pica items. Donnelly & Olczak (1990) demonstrated how a DRI procedure effectively decreased the latency of pica behaviour for three individuals when each individual was provided with chewing gum and reinforcement was delivered every 5 seconds in the form of praise and a preferred edible. Another study taught a 7-year old boy diagnosed with autism to discard items into the bin as an alternative response to pica (Ricciardi, et al., 2003). Results indicated that the DRA was effective at reducing but not eliminating the young boy's pica behaviour at school with treatment effects being maintained during a 4 month follow up. A further DRA procedure involving an exchange response for food items has been demonstrated to be effective at reducing automatically maintained pica behaviour for two boys with developmental disabilities in naturalistic settings (Kern, et al. 2006). When the exchange procedure was introduced across multiple settings, the authors found that additional training with alternative pica items was necessary to produce reductions in pica behaviour for one

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of the boys. Treatment effects were maintained when schedules of reinforcement were thinned.

Hagopian and colleagues (2011) combined a response interruption and redirection (RIRD) component with a DRA procedure to effectively reduce automatically maintained pica behaviour of 2 individuals diagnosed with autism and intellectual disability to significantly low levels. The authors of this study also incorporated noncontingent access to items (NCS) which were assessed to compete with pica behaviour during treatment sessions. The instruction “clean up” acted as a discriminative stimulus for picking items up from the floor and was eventually transferred to serve as a SD for putting items away, in the bin or to play with them appropriately once the item was the individual’s hands. Pre-treatment training established a history of reinforcement for engaging in the alternative behaviour (discarding the item). All pica attempts were interrupted and redirected to the alternative response to eliminate potential automatic reinforcement for engaging in pica. Treatment was initially implemented in a hospital setting and then generalised to multiple settings in the community.

Another type of DRA, Functional Communication Training (FCT), involves teaching individuals to engage in an alternative communicative response instead of engaging in problem behaviour; FCT has been shown to be an effective treatment for a variety of problem behaviours including pica (Tiger, Hanley, & Bruzck, 2008). For example, Napolitano, Blakkman, Kohl, Vallese & McAdam (2007) taught a 6-year old boy diagnosed with autism and intellectual disabilities to verbally request a preferred edible to successfully reduce automatically maintained pica behaviour. The young boy had previously used FCT procedures effectively and was enrolled in a highly structured teaching environment with teaching staff trained in Applied Behaviour Analysis (ABA). The study did not evaluate if this procedure would be effective in classrooms with less carer support or with caregivers who had not received ABA training.

Response Blocking and Response Interruption

Response blocking or response interruption is a procedure which involves preventing a behaviour from occurring and has been shown to be effective in reducing problem behaviour maintained by automatic reinforcement (Cooper et al., 2007). Response blocking as a treatment for pica has produced mixed results as a stand-alone procedure. Rapp, Dozier, and Carr (2001) reported that response blocking did not reduce pica to clinically acceptable levels and produced aggression as a side effect. McCord, Grosser, Iwata, & Powers (2005) evaluated two response blocking procedures and discovered that response blocking in the form of introducing the blocking response to prevent the individuals from inserting the items past the plane of their lips was ineffective at reducing behaviour for all three individuals. The authors found that by changing the blocking procedure to blocking the individuals from touching the item, response blocking was effective in reducing the automatically maintained pica behaviour of two out of the three individuals to clinically significant

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levels. This suggests that it is important to think about when in the chain of pica behaviour a blocking procedure should be implemented (McCord et al., 2005). McCord et al. reported in the study that additional interventions (e.g. NCR, RIRD) were required to reduce pica behaviour to zero level responding for the third individual, meaning response blocking as a stand-alone procedure was not effective in treating pica for one individual. The authors reported that the response effort required to implement the procedure was intensive suggesting there could be complications for replicating this treatment in community-based settings where supervision levels are reduced and if caregivers have competing demands. By contrast, LeBlanc, Piazza, & Krug (1997) found that response blocking was an effective procedure in reducing the pica behaviour of a young girl. The authors also reported that response effort of the therapist was reduced in comparison to using a restraint procedure.

Similar to the study conducted by Rapp et al. (2001), Hagopian and Adelinis (2001) found that when response blocking was implemented alone for a 26-year old man with a diagnosis of developmental disability and bi-polar disorder, there was an observed increase in aggression. To address this, the authors introduced a redirection component which involved prompting the man to request popcorn, resulting in response blocking with redirection to a FCT response proving effective in reducing pica behaviour without inducing aggression. The authors noted that having noncontingent access to popcorn alone did not suppress pica, indicating that the combined effects of blocking and redirection were necessary components of the treatment (Carter et al., 2004).

Response blocking procedures are time and staff intensive in that they require a caregiver to provide constant supervision and remain in close proximity to the participant in order to physically block pica access. McCord et al. (2005) suggest that response blocking can only be effective if every pica attempt is blocked. As a consequence, response blocking procedures are rarely used alone and instead are included as part of a wider intervention package (Williams & McAdam, 2012).

Multi-element intervention

In accordance with best practice in PBS (Gore et al 2013), there are several papers which argue for the need to consider using a multi-element package to reduce pica behaviour. As mentioned above, several behavioural treatments have demonstrated that they are not effective in reducing pica to clinically significant levels when used as a stand-alone procedure (Bogart et al., 1995; Hagopian et al., 2011; McCord et al., 2005; Piazza et al., 1996; Piazza et al., 1998; Rapp et al., 2001) and therefore require additional procedures to be added to ensure effectiveness. This review also suggests a wider treatment package should be considered when using a response blocking/ interruption procedure to avoid inducing aggression (Hagopian & Adenlinis, 2011; Rapp et al., 2001), and when implementing the procedure in settings which do not have access to high levels of supervision due to the intensive nature of the procedure (Williams & McAdam, 2012). Finally, discrimination training has been reported to be

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an ineffective procedure in reducing pica when used as a stand-alone procedure with researchers recommending it be combined with a consequent intervention (e.g. a reinforcement and blocking and redirection; Hagopian et al. 2012).

One example of a successfully implemented treatment package included the noncontingent presentation of leisure items, response blocking combined with DRA for edible items. During the DRA, the individual identified and threw away pica items to earn edible items. The combination of these procedures was effective at decreasing pica behaviour (Hagopian et al., 2012). A further example of a successfully implemented treatment package to reduce cigarette pica for 3 out of 4 individuals included: multi-component assessment, NCR with alternative edibles, DRA whereby the individual engaged in a pica exchange procedure, response blocking and redirection and the implementation of preventative measures to reduce the occurrence of cigarette pica (Goh et al., 1999).

Discussion

The widespread use of FBA has led to a shift toward the development of interventions based on the understanding of the functions of behaviour as an alternative to using default interventions to override existing contingencies (Hagopian et al., 2012). Researchers have indicated that since the introduction of PBS and in particular FBA procedures, there has been a noticeable trend within the pica research related to the increased proportion of studies which have incorporated reinforcement based procedures (Carter et al., 2004; Hagopian et al., 2012) and an increase in individualised, comprehensive treatment packages which include multiple elements of behavioural procedures (Hagopian et al., 2012; Hong & Dixon). NCR and environment enrichment appear to be the most effective in reducing pica maintained by automatic reinforcement (Hong & Dixon, 2018) and the application of NCR as a treatment component for pica has increased with the more common use of FBA procedures for pica (Hagopian et al., 2018).

Overall, behavioural interventions have resulted in a 70-90% reduction in pica behaviour for individuals with intellectual disabilities (Call et al., 2015). However, given the severity of health risks posed by pica, it is not typically acceptable for this behaviour to occur at any level in any context, thus the goal of any treatment should be to reduce the rate of pica to zero occurrences (Call et al., 2015; Hagopian et al., 2012; Hong & Dixon, 2018; Williams and McAdam, 2012).

A majority of the studies have implemented treatment procedures within controlled clinical settings, often hospital settings as opposed to community-based settings, with only 11 of the 26 studies reviewed in the McAdam et al. (2004) paper evaluating generalisation of behaviour. Often, even when generalisation has been programmed for, in the initial stages, treatment packages were implemented in controlled settings. Thus, it is unclear if the treatment procedures would be as effective when implemented in community settings.

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It has also been widely reported that the implementation of treatment procedures (e.g. discrimination training, response-contingent procedures and multicomponent treatment packages) can be time and staff intensive. Additionally, response blocking procedures and differential reinforcement are reported to require high levels of treatment integrity to ensure effectiveness.

A qualitative study conducted by Ashworth and Martin (2011) examined the perspectives of support staff who support individuals with intellectual disabilities who engage in pica in community settings and how they frequently managed pica behaviour. Their findings suggested that preventative measures (i.e. pica proofing environments and providing access to preferred activities), having a good network of support and knowing the individual well were paramount in reducing pica behaviour in these settings. The authors also identified that inadequate resources, lack of knowledge of pica and effective treatment interventions, lack of interagency collaboration and the lower functioning level of the individual all acted as barriers to implementing effective behavioural strategies to reduce the impact of pica on the person's life. They also found that these barriers contributed to an increased use in physical intervention and the use of mechanical restraints to manage pica behaviour.

The current literature review of pica assessment and treatment procedures suggests that the effective implementation of behavioural interventions to reduce pica behaviour requires high levels of supervision, controlled environments and trained and consistent carers. This is not always practically possible within community-based settings and the results of the Ashworth and Martin (2011) study are especially pertinent when considering how support networks can manage risk and implement effective intervention packages across a variety of community settings.

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