Pica is defined as the compulsive, recurrent consumption of nonnutritive items. Pica behavior often occurs in individuals with developmental disabilities; therefore, education and clinical professionals may be required to participate in various aspects of management, including identification, assessment, and treatment. This article will discuss several facets of the pica phenomenon, including the scope of human populations involved, the variety of items ingested, possible etiologies, health risks, and a number of treatment programs that are reported in the literature.

**Pica Populations**

**Pica in Typically Developing Children**

Exploration of objects by mouthing and tasting is part of normal, healthy development and is not considered pathological pica behavior. Pica is suspected only when (a) nonfood items are consumed repeatedly over the course of a month or longer, despite efforts to curtail the behavior; (b) the behavior is considered inappropriate for the individual's developmental age (i.e., beyond the 18-month level); (c) it is not a cultural practice; and (d) the behavior is a symptom of another mental disorder and is of sufficient concern to warrant medical attention (American Psychiatric Association, 1994).

**Cultural Pica**

Cultural pica is reflected in the histories of many countries and remains a common practice in communities all over the world. Very often, pica behavior, especially geophagia, the ingestion of soil or clay, is associated with pregnancy, childbearing, and breastfeeding (Abrahams & Parsons, 1996; Edwards et al., 1994; Grigsby, Thyer, Waller, & Johnston, 1999; Jackson & Martin, 2000; Nag, 1994). In many rural communities in India, for example, pregnant women report consumption of mud, clay, ash, lime, charcoal, and brick in response to cravings (Nag, 1994). Sometimes pica is embedded in fertility rituals, as with East African women, who eat soil before, during, and after pregnancy because they believe in the soil's magical potential to ensure future offspring (Abrahams & Parsons, 1996). Cultural pica is reflected in the histories of many countries and remains a common practice in communities all over the world.
rations used to treat diarrhea (e.g., Kapectate; Grigsby et al., 1999).

**Pica Associated with Medical Conditions**

Various picas are associated with iron-deficiency anemia. Pagophagia (excessive eating of ice/freezer frost) has been reported in patients receiving dialysis treatment for kidney disease (Atkin, 1999). Some children and teens with sickle cell anemia are known to ingest sponge or foam rubber (Hakworth & Williams, 2003; Roberts-Harewood & Davies, 2001). Medical diagnosticians continue to debate the “chicken or egg” dilemma of whether the pica occurs as a symptom of the anemia, because the body craves the deficient mineral, or the anemia is a result of the ongoing pica, because ingested material interferes with mineral metabolism (Roberts-Harewood & Davies, 2001).

**Pica Associated with Developmental Disabilities**

Pica is observed with relative frequency in individuals with DD (Ali, 2001; Burke & Smith, 1999; Danford & Huber, 1982; Decker, 1994; Katsiyannis et al., 1998; Lofts et al., 1990; Piazza, Hanley, & Fisher, 1996; Piazza et al., 1998). Some investigators have attempted to determine the actual prevalence of pica among individuals with DD and have reported rates ranging from 9.2% (McAlpine & Singh, 1986) to 25.8% (Danford & Huber, 1982). Most published studies involving pica in individuals with disabilities took place in large-scale residential institutions, and researchers acknowledge inconsistencies in prevalence data due to underreporting of pica behavior in clients’ records, varying definitions of pica, and mixed populations of residents (Ali, 2001). According to Ali, trends in the data indicate that the higher the population of individuals with autism and/or severe/profound intellectual disability within a given facility, the higher the prevalence of pica.

Individuals with Prader-Willi syndrome, a genetic disorder resulting in mental retardation and DD, are known for their pica-like behaviors (Dykens, 2000; Glover, Maltzman, & Williams, 1996). The most salient feature of the disorder is compulsive overeating (hyperphagia) and food foraging due to physiological factors that prevent a feeling of fullness after eating (Dykens, 2000). In the absence of treatment and monitoring, individuals develop life-threatening obesity. While they appear to prefer conventional food items when available, the literature contains numerous anecdotes in which people with Prader-Willi consumed contaminated food from the garbage or floor; unconventional edibles, such as raw meat, pet food, and cake mix; and odorized inedibles, such as lemon-scented soaps (Dykens, 2000; Glover et al., 1999).

**Items Ingested by Individuals With DD.** The list of target items discussed in the pica literature relative to individuals with DD is amazingly long and diverse. Organic materials, such as leaves and acorns, were cited as pica targets, along with inorganic materials, such as matches and paint chips. Soft materials, like paper and cloth, are consumed in relatively equal proportion to hard materials, such as nails and coins. Although some people with DD seem to consume nonfood items rather indiscriminately, as illustrated by the personal accounts in the next section, others tend to “specialize” by regularly ingesting one or two particular preferred items. An entire vocabulary of “phagias” has evolved to describe some of the most common and unusual pica behaviors. A glossary of pica terminology is included in Table 1. In addition, a partial listing of commonly ingested items (not yet formally labeled) can be found in Table 2.

**Personal Accounts.** To heighten the reader’s awareness of both the health concerns and the level of disruption pica behavior can present to families, the following personal accounts from the archives of an electronic discussion list dedicated to autism are presented:

Pica is such a devastating SIB [self-injurious behavior]. Over the last couple years we have pulled out of [our son’s] throat: a set of keys, large bulldog clips, sticks, rocks, wads of paper, opened safety pins, wire (from the screen, screws, etc.). Plus add the stuff that he gets down before we can get it out: magnets from the fridge, Barbie parts, paper, money, paper clips, etc. (Menard, 1999)
Our four year old son chews or puts in his mouth the following items: his shirt, candles, wooden puzzle blocks and pieces, his socks, pennies, zippers, his fingers, telephone cords, wet or dry sand, etc. (Greene, 1997)

One year, my [son] happily ate shiny bulbs off the Christmas tree. Chewed thoroughly then down the hatch! He chewed so well that there were no large pieces to worry about, as verified by the very interesting x-ray image we viewed later that day! (Jorde, 1997)

My pica-maniac eats paper, soap and soaplike items, crayons, markers and art supplies generally. Special favorites are glue in any form and his sister’s cosmetics. (O’Mara, 1999)

Is there no end to the variety of odd objects autistic children will eat? There are days when I believe my son would be quite happy with a daily menu of baby lotion, rabbit food—and perhaps a little toilet paper for roughage! (Feinstein, 2000)

Possible Etiologies for Pathological Pica

There is no single known etiology for pica. While many theories are discussed in the literature, it is often unclear as to whether an individual’s pica is a primary, secondary, or multifactorial phenomenon. We do know that the behavior cuts across cultural, regional, socioeconomic, gender, and age boundaries and may occur in any clinical setting, and thus it should be included in the general professional knowledge base.

Nutritional Factors

Iron and/or zinc deficiency are repeatedly implicated as causal factors for pica (Roberts-Harewood & Davies, 2001; Rose et al., 2000). In the literature, anemia related to sickle-cell disease, kidney/liver disease (e.g., dialysis patients), celiac disease in childhood (malabsorption of nutrients, often due to gluten intolerance), pregnancy, and malnutrition due to neglect have all been associated with pica (Hackworth & Williams, 2003; Lemanek et al., 2002; Rose et al., 2000). There is no consensus as to why some anemic individuals with normal intellect tend to crave nonnutritive substances such as ice, starch, and foam rubber (as these substances contain no iron), or as to why pica is frequently exhibited by individuals who are not anemic (Kirchner, 2001; Zamula, 1985). Individuals with DD (e.g., those with autism) often exhibit strong food preferences and aversions based on taste, texture, or appearance, but there is no evidence of higher-than-normal levels of anemia in that population.

Environmental Factors

External factors such as stressful events (experience or anticipation), impoverished environments, lack of active participation in activities, and insufficient levels of human interaction are associated with pica onset and maintenance (Burke & Smith, 1999; Edwards et al., 1994; Mace & Knight, 1986; Rose et al., 2000). Burke and Smith provided a case study of a man with DD who lived in a group home with few available communication partners and insufficient leisure activities. He secretly consumed enough small metal objects (nuts, bolts, nails, and screws) to result in illness, hospitalization, and surgery.

It is noteworthy that many people with autism are particularly vulnerable to stress and limited human interaction. Difficulty with the recognition and interpretation of stimuli sometimes lead to prolonged, heightened states of fear and anxiety (Anzalone & Williamson, 2000). In addition, the social and/or behavioral differences in individuals with autism tend to reduce their opportunities for satisfying human interaction.

Mental Health Factors

Pica is observed in individuals with normal intellect and diagnosed mental illnesses, such as obsessive–compulsive disorder (OCD), pathological anxiety, schizophrenia, emotional disturbance, and depression (Burke & Smith, 1999; Rose et al., 2000). Solyom, Solyom, and Freeman (1991) described a woman with a personality disorder and extreme anxiety who regularly consumed pebbles. In another report, a woman with chronic schizophrenia and normal intelligence reportedly consumed so many coins that she required surgery for their removal (Becerro, Bach, Tunstall, & Howard, 1998). Furthermore, the ingestion of hair (trichophagia), fabric fibers, string, and thread has been associated with emotional prob-
lems, especially in girls and women (e.g., Santiago-Sanchez, Garau-Diaz, & Lugo-Vicente, 1996).

Some people with DD are diagnosed with concomitant mental health difficulties. Such factors should not be ignored during attempts to discover the root of an individual’s pica behavior. Moreover, mental health professionals with an understanding of pica may be valuable as team members during intervention planning and implementation.

**Sensory/Physiologic Factors**

Many individuals with normal intellect report that they engage in pica simply because they take pleasure in the texture, smell, and/or taste of the items they ingest (Rose et al., 2000). One hypothesis is that people with DD simply seek items with sensory characteristics that they find satisfying, and the ingestion of those items automatically reinforces the pica (Piazza et al., 1998). In addition, it is possible that individuals with DD who ingest cigarette butts and/or foliage experience the physiologic effects of these substances (e.g., nicotine), and satisfying an addiction maintains the pica behavior over time (Ali, 2001; Piazza et al., 1996).

**Health Risks Associated with Pica**

Some picas pose serious health risks, which include toxicity; intestinal infections and/or parasites; malnutrition, anemia, and other nutritional deficiencies; oral and dental health problems; and intestinal obstruction/perforation (Ali, 2001; Decker, 1994; Santiago-Sanchez et al., 1996; Wahbeh, Wyllie, & Kay, 2002). Indirect complications include being avoided by others and the danger of bodily harm related to the process of searching for desired items. In certain cases, pica may be life-threatening (Burke & Smith, 1999).

**Toxicity**

The most commonly noted toxic complication of pica is lead poisoning. Lead is known to cause serious damage to a child’s developing central nervous system, and in adults it can lead to significant behavioral changes (Ali, 2001; Head, Siklar, Tanyer, Dallar, & Gunay, 2000). Individuals with cognitive disabilities are considered at high risk for lead toxicity and further disabling consequences due to pica involving urban soil; chips of old leaded paint; or other leaded items, such as plumbing components (Ali, 2001).

**Parasitic Infections**

In studies involving relatively large numbers of individuals with pica, significant percentages of the sample populations are diagnosed with parasitic infections. Danforth and Huber (1982) found that 68.8% of their sample of institutionalized individuals with DD who engaged in pica had pinworms. Similarly, in a study of Jamaican children with pica, over 70% were infected with worms (Robinson, Tolan, & Golding-Beecher, 1990). Parasitic infections may be particularly associated with geophagia and coprophagia (eating feces).

**Malnutrition**

Iron-deficiency anemia is commonly associated with pica (Ali, 2001; Hackworth & Williams, 2003; Lemanek et al., 2002; Roberts-Harewood & Davies, 2001; Rose et al., 2000). Certain substances are shown to interfere with absorption of iron by the body; however, pica is more often seen as a physiologic response to a preexisting iron deficiency (Ali, 2001). Nutritional deficiencies can also result when individuals substitute nonfood items for calorie-bearing, nutritive foods (Rose et al., 2000). Conversely, individuals who eat substances such as laundry starch or cornstarch (amylophagia) may experience excessive calorie intake (Lacey, 1990).

**Oral and Dental Health Problems**

Depending on the composition of the target substance, pica can result in dental trauma, oral lacerations, gum disease, and/or erosion of tooth enamel. Obviously, individuals who mouth, chew, or ingest sharp objects (e.g., glass, nails) are at risk for trauma to oral structures. Serious dental injury may result from prolonged pica involving hard substances, such as stone, metals, or ice (Atkin, 1999; Rose et al., 2000). Also, persistent ingestion of the tobacco in cigarette butts is associated with oral cancer and gum disease (Ali, 2001).

**Obstructions and Perforations**

In severe circumstances, ingested nonnutritive material leads to an obstruction in and/or perforation of the gastrointestinal or respiratory tracts, and surgery may be necessary. Chronic ingestion of hair, for example, can result in the formation of a solidified mass (trichobezoar) in the stomach or intestine that presents with medical complications (Santiago-Sanchez et al., 1996). Ingestion of sharp objects such as glass, pins, and nails may result in perforations that require surgical closure (Decker, 1994). In addition, foreign bodies (consumed intentionally or unintentionally) may lodge in the oropharynx, esophagus, stomach, or small intestine (Heiss, Baker, Martin, & Bredfeldt, 1995; Ratcliff, 1991; Wahbeh et al., 2002). Moreover, foreign bodies are sometimes aspirated (Franzese & Schweinfurth, 2002). In young children, both ingested and aspirated items can remain undetected for months, until symptoms such as hoarseness, aphonia, dysphonia, dysphagia, coughing, stridor, drooling, or wheezing begin to occur (Virgilis et al., 2001; Wahbeh et al., 2002). One report even described temporary vocal fold paralysis associated with objects impacted in the esophagus (Virgilis et al., 2001).
Other Complications

It has been documented that individuals with pica for specific substances may be extremely aggressive in their search for these items (Danford & Huber, 1982; Piazza et al., 1996). Consider, for example, the case of an individual with a specific pica for cigarette butts (tobaccophagia), who felt compelled to find and swallow all butts, even ones that lay discarded on a busy street (Klein, 1997; Solomon, 1995). Major health and safety risks were associated with both the ingestion of large quantities of butts and the accompanying search behavior. Not insignificantly, some pica behaviors may have the side effect of repulsing peers and caregivers so that they avoid contact with the individual. Though not life-threatening, this complication may feed into the maintenance of pica over time, given that fewer social interactions allow more time to search for and ingest pica targets.

Treatments

The pica literature contains reports of various treatments for pathological pica, including nutritional, psychological, pharmacological, behavioral, ecological, and sensory approaches. This section will briefly explain each of the aforementioned treatment approaches and their rationales, with a particular focus on individuals with DD. Next, patterns of application regarding more and less intrusive treatments will be described. Finally, considerations for addressing the pica behavior of individuals with DD in community settings, with least intrusive approaches, and a focus on quality-of-life issues will be presented.

Nutritional Interventions

Nutrient supplements are often used to reduce pica in individuals with and without DD. Iron supplements are recommended most often, and reductions of pica occur in some cases (Burke & Smith, 1999; Katsiyannis et al., 1998; Kirchner, 2001; Rose et al., 2000). Pica is also somewhat effectively treated with zinc supplements. In an institution in North Carolina, 54% of residents with known pica behavior were judged to have low zinc levels. After supplementation, pica behavior decreased from 23 incidents to 4.3 incidents per person across a 2-week period. (Loftis et al., 1990)

Psychological Interventions

Counseling and psychotherapy have been recommended for individuals without DD in whom pica is believed to be attributable to emotional or psychogenic disturbances (e.g., Santiago-Sanchez et al., 1996). In addition, adults distressed about their own pica behavior, and parents of children with pica, sometimes request and receive psychological treatment (e.g., Roberts-Harewood & Davies, 2001). The present study revealed no published data regarding counseling or psychotherapy as a treatment for people with DD.

Pharmacological Interventions

Medications are often used to treat pica in individuals with and without DD. Selective serotonin reuptake inhibitors are recommended most often (Katsiyannis et al., 1998; Kirchner, 2001; Rose et al., 2000). In one case study involving a young person dually diagnosed with DD and clinical depression, pica behavior reduced significantly during a course of antidepressant medication and recurred when the medication was withdrawn (Jawed, Krishnan, Prasher, & Corbett, 1993).

Behavioral Interventions

A number of behavioral approaches have been reported in the literature. Used in isolation or in combination, behavioral interventions have been applied almost exclusively to individuals with DD. Claims regarding treatment efficacy should be evaluated with the understanding that many of the studies have involved restricted/institutional environments, large staff-to-client ratios, and unusual procedures, such as baiting (enriching the experimental environment with pica targets). In addition, many of the participants were adults with long-standing histories of pica behavior.

Overcorrection. Overcorrection procedures were implemented in a number of studies on controlling pica (e.g., Foxx & Martin, 1975; Kalfus, Fisher-Gross, Marvullo, & Nau, 1987; Matson, Stephens, & Smith, 1978; Singh & Bakker, 1984; Singh & Winton, 1985). In general, overcorrection for pica was administered as follows: Each time a pica incident was observed, the individual was required to spit out the item then immediately brush his or her teeth for 5 to 10 minutes with a soft toothbrush soaked in strong antiseptic mouthwash. This was sometimes followed by a period of vigorous hand and face washing (and anus washing, in cases of coprophagia), placing the pica item in a trash can, emptying the trash, and tidying the surrounding area, all with physical assistance, if necessary, and lasting a total of 10 to 30 minutes (Foxx & Martin, 1975; Singh & Winton, 1985).

Foxx and Martin (1975) used overcorrection procedures to suppress pica behavior in four institutionalized adults with profound DD. Treatment was effective for all four participants, as episodes of scavenging for pica materials were reduced by about 90% within 4 days. The success of the overcorrection protocol was attributed to its aversive components. It should be noted, however, that there was necessarily a significant increase in human interaction/attention, and expanded periods spent participating in self-help and domestic activities, both of which could have contributed to the positive results. A later study, by Matson et al. (1978), used a similar overcorrection procedure to dramatically reduce the tobaccophagia of a
woman with profound DD. Three months after the experimental intervention ended, the woman’s pica had resumed near baseline frequency, once again raising the possibility that the level of human contact and activity, rather than the aversive nature of the treatment, was a key factor in the woman’s improvement.

Singh and Bakker (1984) used an alternating treatment design to compare the efficacy of Foxx and Martin’s (1975) overcorrection procedure with a physical-restraint procedure. Though both treatments suppressed pica, the 10-second physical restraint was found to be more effective in both participants than the 15-minute overcorrection. A subsequent study looked at the effects of the three individual components of the overcorrection protocol (oral hygiene, personal hygiene, and tidying; Singh & Winton, 1985). Both participants demonstrated decreased pica episodes in response to each separate component of the treatment, then exhibited further improvement when only the oral hygiene component was used. To enhance the likelihood of generalization, four different trainers participated across three different settings, adding the element of increased human interaction. Yet, again, the simpler, somewhat less invasive protocol produced results that equaled or exceeded those of the more complex procedure.

Whereas earlier studies implemented overcorrection techniques with institutionalized adults, Kalfus et al. (1987) used a modified version of overcorrection with positive reinforcement techniques to address pica behavior in a 4-year-old boy with DD named Joey. The mother provided treatment at home, and classroom staff did so at school. Because Joey’s parents regarded toothbrushing as a positive experience, they refused the oral hygiene training. Instead, when Joey demonstrated pica, an adult would loudly say, “No,” remove the item from his mouth, and wipe his lips and mouth area with moderate pressure for 15 seconds with a soft washcloth kept prepared in an ice bucket. In addition, Joey received praise and physical affection contingent on nonpica behavior. As treatment progressed, the frequency of pica was radically reduced, but the mother and classroom personnel became increasingly uncomfortable with the overcorrection procedure and expressed an unwillingness to continue its implementation. An alternative treatment that employed time-out and positive reinforcement was used, and this was reportedly also associated with very low levels of pica. The authors noted that perhaps the less aversive, less restrictive procedure should have been tried first (Kalfus et al., 1987).

**Facial Screening/Physical Restraint Procedures.** To address situations in which pica behavior in individuals with profound disabilities is considered life-threatening, facial screening and a variety of mechanical restraints have been used as self-protection devices (SPDs; Ausman, Ball, & Alexander, 1974; Bogart, Piersal, & Gross, 1995; Paisey & Whitney, 1989; Rojahn, Schroeder, & Mulick, 1980). Immediately following an attempt to ingest a pica target, individuals were required to wear fencing masks, bibs (pulled up over the mouth), specially constructed helmets, straitjackets, mesh bags/hoods, and/or camisoles. The idea was to totally eliminate access to pica targets for a predetermined time period, ranging from 30 seconds to 15 minutes (Bell & Stein, 1992; Burke & Smith, 1999). Similarly, physical holding by one or more caregivers has been used in attempts to eliminate severe, chronic pica (Bell & Stein, 1992; Bogart et al., 1995; Burke & Smith, 1999, Fisher et al., 1994; Panigua, Braverman, & Capriotti, 1986; Singh & Bakker, 1984, Winton & Singh, 1983).

Ausman et al. (1974) studied Mike, an institutionalized teenage boy with severe DD who had sustained seven surgeries to remove intestinal blockages caused by pica. Treatment began in a training room baited with very small, inedible objects selected because they could traverse the digestive tract without causing an obstruction. As soon as Mike would pick up one of the pica target items, a trainer would rush into the room, say, “Don’t eat that, Mike,” and place the boy into a time-out helmet constructed from sheet metal and plexiglass and pop-riveted to a jacket that laced up the back. After 15 minutes, the helmet and jacket were removed and the session continued until 15 restraint-free minutes were accumulated. After 50 sessions, Mike began to remove himself from the vicinity of the pica targets, and often “spent most of the session looking out a window” (Ausman et al., 1974, p. 17). As sessions continued, treatment was varied in length and frequency (with sometimes as many as eight consecutive 1-hour sessions occurring in a single day) and provided in many different locations within the facility. Baits were increased in number and varied to include bits of candy (e.g., jelly beans, caramels) placed on the floor. After several months and a total of 263 sessions, Mike’s pica was considered reliably under control, with only minimal, minor recurrences. In a follow-up program, staff provided food and praise for every half-hour of pica-free behavior but still used the helmet and jacket in response to sporadic pica attempts. Staff would also periodically test Mike’s control by baiting the floor with pica items, including candy, and reported, nine months after the completion of the study, that pica remained under control.

It must be concluded that Ausman et al. (1974) took such drastic measures because they considered the situation dire. They wrote about Mike: “It was believed that he could not survive additional surgery. The attainment of behavioral control was literally a life or death matter” (p. 16). Nevertheless, it is possible that Mike’s life might have also been saved using a less invasive treatment that better preserved his dignity. Rojahn et al. (1980) did an ecological assessment of SPDs (fencing masks and camisoles) that were routinely used with three institutionalized adults with DD who engaged in pica. They found that although SPDs helped prevent pica, they also led to a decrease in positive, adaptive behaviors and significantly decreased social interactions between the restrained individuals and their caregivers. Several subsequent studies have shown that treatment packages bundling relatively brief periods (30 seconds or less) of hand- or arm-held restraint with additional intervention strategies can be successful (Bogart et al., 1995;
Aversive Substances. Several substances have been used to supersed any automatic or social reinforcers that were thought to be maintaining pica behavior in individuals with DD. Specific punishers that have been reported in the literature are water mist sprayed toward the face, aromatic ammonia capsules held under the nose, and lemon juice or hot sauce squirted in the mouth (Fisher et al., 1994; Goh, Iwata, & Kahng, 1999; Paisey & Whitney, 1989; Rojahn, McGonigle, Curcio, & Dixon, 1987). Rojahn et al. found that both water mist and ammonia were effective in reducing pica in an adolescent with autism, but the reduction was more immediate with the water mist and thus the latter was considered more effective. Conversely, Fisher et al.’s behavioral assessment paradigm indicated that water mist was ineffective for their participants. Paisey and Whitney conducted several experiments involving squirts of lemon juice into participants’ mouths contingent on pica behavior, packaged with other interventions. Although suppression in pica behavior did occur, the data did not clearly show that the lemon juice punisher was the effective factor. Goh et al. found that neither water spray nor hot sauce consistently reduced pica in one participant with established tobaccophobia.

Negative Practice. Using reasoning similar to the rationale for aversive substances, Duker and Nielen (1993) administered negative practice as punishment to a woman, K, with DD and Prader-Willi syndrome. K regularly chewed, and sometimes swallowed, education materials such as pencils, paper clips, and puzzle pieces. During intervention, a therapist would intervene just as pica was about to occur, taking K’s hand with the nonnutritive object in it, pressing the object against her lips without allowing her to bite on it, and simultaneously saying, “Good, K, chew on it!” for a 2 minute interval. Pica was reduced to minimal levels during the experiment and maintained for 7 months afterward in one environment at K’s residential facility.

Edible/Nonedible Discrimination Training. The rationale behind discrimination training is that some individuals with DD may need assistance in learning to distinguish food from nonfood items. This approach has not been reported as a stand-alone treatment. In the first portion of a four-phase experiment, Bogart et al. (1995) used a kit of medically approved nonfood items and a distinctively shaped set of red dishware to train a woman with profound DD. Edibles were placed on the dishware, and nonfood items were placed on the table. If an edible was chosen, the woman was allowed to consume it; if a nonfood item was brought toward the mouth, the trainer said, “No,” removed the item, and applied handheld restraint for 10 seconds. No observable reduction in pica occurred during this condition. Burke and Smith (1999) incorporated discrimination training into the intervention package they devised for an adult male with multiple disabilities. This participant had lived in residential institutions for most of his life but currently resided in a group home. Training was administered using both pictures and actual objects. The individual was asked, “What is food?” and presented with various items. He was required to place all food items on one mat and nonfood items on another mat, with positive reinforcement for correct answers, and format variations to prevent rote responding. Pica behavior was reportedly decreased, but a causative connection to discrimination training was not established.

Response Blocking, Redirection, and Differential Reinforcement. Response blocking is an approach based on the hypothesis that some picas are maintained by automatic reinforcement (Hagopian & Adelinis, 2001; Piazza et al., 1996). The idea is to eliminate the reinforcement by preventing the pica behavior altogether. Piazza et al. studied Don, a teenage male diagnosed with autism and severe DD who had been regularly ingesting cigarette butts for more than 4 years. He would often run from caregivers to obtain butts from the ground, garbage cans, and toilets, and was known to aggress if anyone attempted to stop him. Additionally, Don would covertly obtain butts when his caregivers were not looking and hide them on his person (e.g., in his pockets and shoes, under his arms) to consume in private. A noncontingent food condition was paired with response blocking. Don was placed in a room equipped with preferred foods, games, and activities. The floor was baited with clean, unsmoked cigarette butts. Before each session, Don was told not to touch the butts, to eat the food, and to engage in the available activities. A purple card was taped to the wall in hopes that Don would associate treatment contingencies with the presence of the card. Whenever Don touched a cigarette butt, a therapist came in and gave the verbal reprimand, “No butts.” (Don always responded by dropping the butt, but if he had not, he would have been physically guided to do so.) Pica was suppressed to zero levels. Later, when the purple card was given to Don in the absence of the response-blocking reprimands, zero levels of tobaccophobia were maintained across 12 trials and five different environments. The authors cautioned that it is unknown how often the purple card would need to be paired with the response-blocking procedure to permanently eliminate pica.
Hagopian and Adelinis (2001) pointed out that response blocking can lead to aggression in some individuals. Their concern was that in attempting to decrease pica, interventionists may inadvertently establish undesirable behavior patterns. Response blocking—a verbal prompt to stop combined with physical guidance away from an area baited with bits of paper—was paired with verbal and physical redirection to go to a bowl of popcorn (known preferred food) and eat it. For their single participant, a man with moderate DD and bipolar disorder, the response-blocking-plus-redirection condition was significantly effective in the laboratory setting.

Differential reinforcement (DR) is designed to keep an individual’s hands and mouth engaged so that pica is less likely to occur. Chewing gum, sipping a drink, taking bites of snack, participating in activities, and other pica-incompatible behaviors were all reinforced as indirect means of lessening pica (Burke & Smith, 1999; Donnelly & Olczak, 1990; Goh et al., 1999; Hagopian & Adelinis, 2001; Kalfus et al., 1987; Piazza et al., 1996; Piazza et al., 1998). One investigation attempted to test DR with three institutionalized adults with DD who engaged in tobaccophagia (Donnelly & Olczak, 1990). To avoid further exposure of these participants to the dangers of ingesting cigarettes, look-alike placebo “Bogus Butts” made of bread were used as pica baits. Subjects were told, “No cigarette butts,” and were encouraged to chew sugarless mint gum, provided in one-fifth-stick increments. If a participant chewed the gum, he or she was reinforced with sips of decaffeinated coffee and verbal praise. While suppression of pica was achieved under these conditions, it is unknown whether the procedure would apply to natural situations when real cigarette butts were available.

A later DR study looked at four institutionalized adults with DD, all of whom exhibited tobaccophagia (Goh et al., 1999). First, elaborate and meticulously quantified trials were conducted to discover which components of cigarettes each participant preferred (i.e., unsmoked filter only, whole unsmoked cigarette, or smoked cigarette butt), to identify preferred edibles for each participant, and to determine whether the edibles would compete with the cigarette components. The goal of intervention was to train the participants in an alternate response—to hand found cigarette butts to caregivers—in exchange for preferred edibles. Additional procedures for non-contingent reinforcement and response blocking were also included. This package effectively reduced pica for three of the participants. Numerous procedures and stimuli were tested with the remaining participant, Larry, including using herbal cigarettes, chewing tobacco, and nicotine gum instead of edible reinforcers; spiking bait cigarette buttes with hot sauce; implementing an overcorrection procedure involving 5 minutes of practice handing a cigarette to a therapist; and punishing by spraying water mist on Larry’s face or hot sauce into his mouth. None of the treatments were found to be consistently effective, but it is worth noting that this is the only documented instance in which over-the-counter nicotine products were provided for an individual with DD and tobaccophagia.

**Ecological Approaches**

Some researchers and caregivers have tried environmental control/modification as an approach to pica intervention. Indeed, Klein (1997) reported on the mother of a man with DD and severe tobaccophagia who created a pica task force (“Pick Up for Pica”) and attempted to eliminate discarded cigarette butts from her entire community. Conducting careful and routine “pica proofing,” increasing interactions with caregivers, enriching environments with toys/interesting items, and providing more opportunities for participation in domestic and leisure activities have been successfully implemented within multitreatment packages (Burke & Smith, 1999; Favell, McGimsey, & Schell, 1982; Mace & Knight, 1986; Piazza et al., 1998). It is interesting to note that although pica-proofing and increased supervision were not empirically tested as interventions, these were the daily measures ultimately used to control Larry’s intractable tobaccophagia in the aforementioned Goh et al. (1999) study.

**Sensory Approaches**

Anecdotal reports have described sensory approaches to pica intervention. One parent, writing to the aforementioned electronic discussion list, explained, “I watch and if I notice his pica is up, I give him Jujubes and licorice. They seem to be the same texture as the caulking, which is his all time favorite” (Cauldwell, 1997).

A few investigations have sought to decrease pica behavior by attempting to identify the sensory characteristics of preferred pica targets and replace them with edible items that have similar attributes (e.g., texture, appearance; Favell et al. 1982; Hirsch & Myles, 1996; Piazza et al., 1998). Favell et al., who decreased pica by providing chewable toys for institutionalized adolescents with DD, noted that pica reemerged whenever the toys disappeared or were purposely replaced with age-appropriate objects. Piazza et al. worked with two young children, aged 4 and 5 years, and one teenager, all diagnosed with multiple disabilities (two profiles included autism). All participants exhibited nonspecific pica severe enough to require multiple medical interventions and thus were hospitalized for inpatient assessment and treatment. Hypothesizing that the pica behavior was at least partially maintained by the sensory stimulation it provided, the investigators ran sophisticated stimulus preference trials. In general, treatment involved 10-minute sessions, during which the training room was baited with pica materials and participants had continuous access to preferred edibles, activities, and verbal praise. For one participant, a variety of alternative stimuli (e.g., edibles, bubbles, music, mirror play) were effective in reducing pica. For two participants, the attributes of firmness and flavor were manipulated. Zero levels of pica were associated with firm stimuli (e.g., rice cakes), and softer stimuli (e.g., gelatin) had minimal effect.

In a unique study, Hirsch and Myles (1996) used a “pica box” with Annie, a 10-year-old girl with autism placed in a
Patterns of Treatment Application

In their literature review of pica treatments, Burke and Smith (1999) highlighted several clear and compelling differences in intervention involving individuals without DD versus individuals with DD. First, many reported attempts at treating pica in individuals with developmental disabilities involved relatively intrusive, intensive behavioral approaches. Burke and Smith cited no reports of such approaches being used with individuals without intellectual disabilities, and none were encountered during the literature search for the present review. Second, many individuals with DD with pica were treated in institutional or inpatient settings. People without disabilities typically received treatment in community settings (Burke & Smith, 1999). Third, in reported pica interventions for individuals with DD, unusual baseline procedures, such as baiting (enriching the environment with pica target objects), were used (e.g., Piazza et al., 1998). It is hypothesized that baiting procedures could invalidate results of pica intervention studies, as the natural environment may not reflect the same level of availability of target objects (Burke & Smith, 1999). Baiting procedures were not reported in pica intervention for people without DD.

Finally, it was argued that intrusive treatment approaches are warranted when an individual’s pica is considered life-threatening. However, judging from the literature, there is no proof that more intrusive approaches are any more effective than less intrusive ones (Bell & Stein, 1992; Burke & Smith, 1999). Moreover, many of the treatments that were tried in restricted, inpatient settings would not be considered practical or appropriate in community settings. Indeed, the Code of Ethics and Standards of Practice of the Council for Exceptional Children (CEC) states that interventionists should “refrain from aversive techniques unless repeated trials of other methods have failed and only after consultation with parents and appropriate agency officials” (CEC, 1997).

Considerations

Clinical professionals should be aware of the complexities of pica, its hypothesized causes, its complications, and the numerous aspects of treatment. Some important considerations for pica management are presented as follows:

1. Safety is foremost. Be aware that individuals with pica may ingest or aspirate items that could become lodged in their digestive or respiratory tracts. Physiological symptoms may include hoarseness, aphonia, dysphonia, dysphagia, coughing, stridor, drooling, or wheezing. If such an obstruction is suspected, an appropriate medical referral should be made immediately, with accompanying information about the individual’s pica behavior (Ali, 2001; Burke & Smith, 1999; Wahbeh et al., 2002).

2. Nutritional deficiencies should be ruled out by medical evaluation. It is important that the physician is made aware of the pica behavior (Bell & Stein, 1992; Kirchner, 2001).

3. Because pica has been shown to occur with relative frequency among individuals with autism, members of assessment/intervention teams should routinely inquire about it within case histories and interviews with family members (Filipek et al., 2000; Kinnell, 1985). This way, identification and intervention can happen more quickly.

4. Pica intervention should be collaborative. A team of professionals, paraprofessionals, and family members should convene to discuss the behavior, hypothesize causal factors, and agree on a course of action that will be consistently applied across settings (Ali, 2001).

5. No universal treatment for pathological pica is effective for every person in every setting. Pica intervention should be individualized (Donnelly & Olczak, 1990; Katsiyannis et al., 1998).

6. Early intervention for pica behavior is desirable and may prevent the need for prolonged, complex interventions (Goh et al., 1999).

7. The importance of the communication component of an intervention should not be underestimated. Speech-language pathologists should have knowledge of, and access to, a range of communication symbols (e.g., photographs, objects, line drawings, product packaging) that may (a) allow individuals to comprehend instructions and procedures involved in pica intervention and (b) augment an individual’s ability to communicate choices and preferences within intervention.

8. Quality-of-life issues should be weighed heavily. Team members should reflect on how interventions would affect an individual’s overall contentment and ability to interact socially, and balance this against any immediate danger to the client. Whenever possible, less intrusive approaches should be tried first (Bell & Stein, 1992; Burke & Smith, 1999; Paisey & Whitney, 1989). No behavior management strategy should threaten an individual’s dignity (CEC, 1997).

9. Do not assume that pica is merely a maladaptive behavior to be extinguished and/or replaced. Strive to
discover the factors underlying the outward behavior (Goh, et al., 1999; Piazza et al., 1998).

10. Professionals should be prepared to explain pica to family members, assure them that the behavior is not uncommon among individuals with DD, and assist in arranging acceptable home strategies.

11. Information regarding an individual’s pica behavior and its management history should follow him or her as the individual transitions from one environment to the next (e.g., school to school, home to group home).

**Conclusion**

The literature demonstrates that pica, especially in individuals with DD, has concerned and perplexed practitioners for many years. An array of interventions has been successfully tested. Some of the reported procedures, however, are not considered practical in community and home settings, and others are no longer viewed as appropriate treatments. It is hoped that practitioners who encounter pica behavior will, in partnership with family members and other professionals, thoughtfully modify and adapt useful components of the approaches reviewed here. Moreover, it is recommended that as practitioners conceive and apply new, creative approaches to pica intervention, they share their experiences with colleagues through scholarly presentations and publications.

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**AUTHOR’S NOTES**

1. A preliminary form of this article was presented in a poster session at the 1999 ASHA Convention in San Francisco, California, with S. Genia Britt, under the title The Unusual Practice of Pica.

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**REFERENCES**


