Pica

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15.1 Symptomatic Presentation of Pica Disorder

Individuals diagnosed with pica disorder all share the same core symptom: the consumption of substances that are considered as non-food. Substances consumed are very idiosyncratic and may range from clay, raw starch, ice, body fluids (e.g., feces, vomit) to hair (for an overview, see [1]). Pica can be fatal, as was highlighted by Cruz and colleagues [2], who collected data on inpatient mortality over a 15-year period in a Portuguese community hospital and found a mortality rate of 9.1% (n = 3 out of n = 31) in pica, compared to, e.g., 0.9% (n = 25 out of n = 1.750) in anorexia nervosa (AN). Risks associated with pica depend on the substance ingested [1] and may include an iron and/or zinc deficiency [3], parasitic infections [4], (gastro)intestinal obstruction, and constipation [5].

Historically, pica behavior has been documented since the sixteenth century [6]. Its first appearance in a diagnostic manual was within the *Diagnostic and Statistical Manual of Mental Disorders* (DSM)-III [7], under the category of "Infancy, Childhood or Adolescence Disorders." In the DSM-IV [8], it remained in the similar category of "Disorders Usually First Diagnosed in Infancy, Childhood or Adolescence," up until the introduction of the DSM-5 in 2013, whereupon pica disorder was classified in "Feeding and Eating Disorders" alongside more commonly known disorders such as AN or bulimia nervosa [9]. This switch in classification highlights that the onset of the disorder may occur not only in childhood or adolescence but also over the entire lifespan [5, 9].

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According to the DSM-5, a diagnosis of pica disorder can only be given if the affected individual is older than 2 years in terms of developmental age and if the pica behavior is shown over the duration of at least 1 month [9]. The former criterion aims to exclude children in whom the oral exploration of non-food substances is considered as age-appropriate due to their lower developmental status. Furthermore, to warrant a diagnosis, the pica behavior should be neither socially nor culturally accepted [9]. In regions like sub-Saharan Africa, South America, and the Caribbean, the consumption of earth-like substances (e.g., clay, soil) is believed to heal different kinds of medical issues (e.g., nausea, infections; [10, 11]) and would therefore not justify a diagnosis of pica disorder. Lastly, a pica diagnosis in the context of another medical condition or mental disorder should only be given if the pica severity warrants additional clinical focus [9]. Not listed in the DSM-5 criteria, but repeatedly reported, is a craving for the ingested substance comparable to substance use disorders [12]. People with pica disorder sometimes spend a lot of their time and monetary resources obtaining the craved substance [13]. On top of this, affected individuals are often confronted with (self-)stigmatization [14], possibly leading to the development of secondary comorbidities (e.g., [15]).

15.2 Prevalence Rates

Reported worldwide prevalence rates for the general population range from 0.02 to 76.5% [12] and up to 27.8% for pregnant women [16], although studies in Western countries have found lower prevalence rates of pica behavior during pregnancy, ranging from 0.2% in Denmark [17] to 8.2% in the USA [18]. In children, single pica behavior incidents often present selectively (20.30%, [1]; 12.30%, [19]; 10%, [20]), but much less in a recurrent form (4.98%, [19]), and even less so above a clinical cut-off score (3.90%, [20]; 3.5 [21]). Specifically, 0.3–25% of children with intellectual disabilities (ID) are reported to have shown pica behavior depending on the setting [21, 22], 14–36% of children with autism spectrum disorders (ASD) [21, 23], as well as 28% of children with both ASD and ID [21].

When interpreting these studies, it should be noted that the criteria and diagnostic tools used to identify pica behavior or disorder vary strongly [24]. Furthermore, generalizing the prevalence rates is only possible to a limited degree, since most studies are community-based and not representative (e.g., [19, 25]).

15.3 Etiology

To date, no integrative etiological model of pica disorder exists. Rather, some etiological theories have been postulated, e.g., by Young [12], who attributes the development of pica behavior to three main reasons: (1) hunger, which might explain the elevated prevalence rates in African communities; (2) compensation for nutritional deficiencies; and (3) protection against other harmful matters. None of these theories have been confirmed empirically. First, pica behavior is shown not only in

African communities but also in societies with unlimited access to food (see Sect. 15.2), and it is not (only) triggered by hunger but rather by aspects such as the taste of the substance, indulgence, curiosity, the release of internal tension, or simply boredom [26]. Second, even though people with pica have an increased risk of anemia as well as lower hemoglobin, hematocrit, and plasma zinc levels, especially when consuming earth-like substances [3], these findings are correlational and do not allow for causal interpretations. And lastly, notwithstanding that some of the commonly ingested pica items have absorbing, detoxifying characteristics (e.g., clay, raw starch), substances consumed are also items that could directly cause injuries or lead to toxic reactions [13].

Despite being identified as often comorbid with anorexia nervosa (AN) in young adults in treatment centers [14], no correlations between pica eating and eating disorder psychopathology in general could be found in youth [19]. Thus, one might argue that hallmark features of the other eating disorders, e.g., body image disturbance and weight control, are not driving factors in the development and maintenance of pica eating [26]. Similarly, pica behavior has been reported to exist alongside learning disabilities [27], schizophrenia [28], obsessive-compulsive disorder [29], and depression [30], although it remains unclear whether there are shared etiological factors at work.

15.4 Diagnostic Assessment and Treatment

Previous studies did not reach consensus on the definitions of pica behavior or the diagnostic criteria for pica disorder. Only a small number of validated diagnostic and screening instruments for pica behavior or pica disorder exist. These can generally be divided into clinical interviews, which aim to confer a diagnosis, and questionnaires, which are either used as screening instruments or to examine the pathological behavior dimensionally, e.g., through self-constructed questionnaires (e.g., [25, 26]). To date, there are no standardized questionnaire-based instruments for adults [31], and only a few recent studies have tried to assess pica by using checklists in accordance with the DSM-5 criteria (e.g., [14]). Furthermore, the existing diagnostic interviews and questionnaires were constructed separately for children and adults [31], thus impeding the comparability of the measures across the age span. For instance, both the Screening Tool of Feeding Problems [32] and the Eating Disorders in Youth-Questionnaire [33] include pica behavior, but only focus on children. One step toward a standardized diagnostic instrument based on DSM-5 criteria was recently undertaken through the development of the semi-structured Pica, Avoidant Restrictive Food Intake Disorder (ARFID) and Rumination Disorder Interview (PARDI; [31]), which is applicable for both children and adults. Although reliability and internal validity of the PARDI have only been tested for ARFID and not yet for pica, it has shown promising results, which warrant further research attention. The PARDI, the Eating Disorder Assessment for DSM-5 (EDA-5; [34]), and the Diagnostic Interview Schedule for Children (DISC-IV; [35]) are the only approaches to an interview-based diagnosis of pica disorder. The most established

diagnostic instrument for mental disorders, namely, the Structured Clinical Interview for DSM-5 (SCID-5; [36]), does not include a diagnostic segment on pica. Another diagnostic tool that can be used to achieve a better understanding of the functional properties and severity of pica is a behavioral analysis. According to the majority of the functional analyses carried out in reported (case) studies, pica behavior appears to be highly automatically reinforcing (e.g., [13, 37–40]). While the underlying mechanisms are not yet fully understood, self-stimulation or self-reassurance has been mentioned (e.g., [19]).

In terms of treatment, Sturmey and Williams [13] formulated five goals based on their review of the literature: (1) reducing the rate of pica, (2) increasing alternative behavior, (3) achieving a generalization and maintenance of the effects, (4) reducing behavior management strategies, and (5) preserving the safety of the patient. In order to achieve these goals, effective interventions are necessary. So far, only two randomized controlled trials assessing the treatment effects of micronutrient or iron supplementation on pica behavior in children have been published. Iron supplementation did not show significant effects in terms of treating pica behavior when compared to the administration of saline solution [41]; neither did the placebo-controlled administration of iron or micronutrient supplementation show significant predictive value for a reduction in geophagy [42]. Based on a systematic literature review of treatment studies, consisting predominantly of case studies, Moline and colleagues recommended a combination of reinforcement-based treatment techniques [37]. Notably, most of the studies included in the review targeted youth, meaning that these recommendations need to be taken with caution when referring to adult patients. In more detail, non-contingent reinforcement (NCR), differential reinforcement (DR), and environmental enrichment (EE) showed promising effects [37]. In NCR, a desired stimulus is added on a time-based schedule to provide an alternative to the automatic reinforcement of the pica substance. When used in combination with response blocking (RB), NCR has been found to lead to an initial 80% reduction in pica behavior in youth compared to baseline [43] and to result in an immediate reduction of pica behavior to near-zero levels [44]. By contrast, other studies did not yield such promising results (e.g., [45]). When using DR, only desired behaviors (e.g., not showing pica behavior, engaging in alternate behaviors) are reinforced, while the unwanted behaviors are extinguished. Even though one study found that DR led to initial decreases in pica ([46]), and another study reported short-term effects of DR combined with response blocking (RB) [47], long-term effects still need to be assessed [37]. EE works through the permanent availability of alternative reinforcing stimuli and seems to be more effective as part of a combination of treatments [48, 49] than as a solitary treatment approach [37].

Punishment-based techniques are often mentioned in older case studies (e.g., [50]), while it is nowadays mostly agreed that they should only be used if the pica behaviors endanger the patient and other strategies did not work. Methods like time-out, the use of contingent aversive stimuli, and physical restraint have proven to be effective in initially reducing pica behavior (e.g., [51–53]), but with limited maintenance of the effects [37].

15.5 Outlook

In sum, knowledge about pica disorder, and its etiological and maintaining factors, is limited, and studies on prevalence rates and treatment outcomes are restricted to certain target populations. Given the potentially fatal outcome of the disorder, there is a pressing need to better understand both its development and its treatment. Future research should therefore include patient groups that are diagnosed by standardized structured interviews based on DSM-5 criteria and should examine different combinations of the promising treatment techniques in order to gain a deeper understanding of their applicability across age groups, ethnicities, and comorbidities. Additionally, longitudinal studies are needed in order to better understand both the development and course of the disorder. And finally, randomized controlled trials to evaluate treatment options are called for.

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