

Overview of Various Treatment Approaches and Their Impact on Several Difficult-to-Treat Conditions

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Several therapeutic approaches including medical, nutritional, sensory, and behavioral are reported to be effective in treating debilitating conditions often associated with autism. An overview of these approaches is discussed within the context of three difficult-to-treat conditions including anxiety, self-harming behavior, and sleep disturbances.

Keywords: autism, treatment, medical approach, sensory approach, nutrition approach, sleep disturbances, anxiety, self-harming behavior.

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Обзор различных терапевтических подходов и их влияние на некоторые трудноизлечимые состояния

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Согласно результатам исследований, для эффективной терапии некоторых тяжелых состояний, которые нередко бывают связаны с аутизмом, могут быть использованы несколько терапевтических подходов, включая медицинский, нутритивный, сенсорный и поведенческий. Обзор данных подходов приведен в контексте трех состояний, плохо поддающихся терапии: тревоги, самоповреждающего поведения и нарушений сна.

Ключевые слова: аутизм, терапия, медицинский подход, сенсорный подход, нутритивный подход, нарушения сна, тревога, самоповреждающее поведение

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During the first two decades after autism was initially recognized as a developmental disability [30], professionals assumed that this condition was untreatable. They often told parents to place their children in government or private residential facilities. In the 1960s, the medical and research

communities came to the realization that autism was a biological condition, and that these individuals could benefit from behavioral therapy [19; 34; 50]. Over the past 60 years, there has been a growing consensus that many, if not most, individuals on the spectrum will improve from behavioral, medi-

cal, and other therapeutic interventions. In other words, autism is treatable.

Researchers and experienced clinicians have reported a wide range of effective therapies, and these can be classified into four different treatment categories including behavioral, biomedical, nutritional, and sensory. An overview of these approaches is discussed in relation to three difficult-to-treat challenges including anxiety, self-harming behavior, and sleep problems. It is important to mention that other interventions may also be effective, but a detailed review would involve a lengthy thesis or a comprehensive book on each behavior or condition¹ [15].

Anxiety

Anxiety is estimated to affect as many as 84% of individuals with autism [68]. In his seminal paper on autism, I. Kanner [30] described a child who displayed behaviors consistent with anxiety. He wrote that the child had a “good deal of ‘worrying’: he frets when the bread is put in the oven to be made into toast, and is afraid it will get burnt and be hurt. He is upset when the sun sets” [30, page 233].

There are several types of anxiety commonly associated with autism including generalized anxiety, obsessive-compulsive disorder, phobias and fears, separation anxiety, and social anxiety [68].

Numerous challenging behaviors are associated with anxiety including aggression, disruptive behavior, irritability, repetitive behaviors, self-harming behavior, severe tantrums, and sleep disturbances [42]. Since anxiety involves an internal physical feeling, it is often difficult to evaluate especially in those individuals with communication challenges. As a result, clinicians often assess anxiety by observing specific characteristic behaviors such as flushed face, heavy breathing, pacing, and sweating [44].

A recent survey of the Autism Research Institute’s database of 2,328 cases was analyzed with respect to anxiety. Those who suffer from anxiety are more likely to be female, cover their ears to many sounds, harm themselves, become upset when things are changed, and feel sad or depressed most of the time².

Medical

Certain types of medications are sometimes prescribed to reduce anxiety by altering the GABAergic, noradrenergic, serotonergic, or cannabidiol systems. Beta blockers, such as propranolol, have been shown to reduce anxiety in autism. For reviews, see Hirtoa, Brooks, & Hendren³ and Vasa, Carroll, Noz-zolillo, Mahajan et al. [64].

Nutrition

There is limited empirical support on the impact of nutrition on anxiety. However, some evidence in the scientific literature indicates that healthy nutrition may reduce or eliminate anxiety in the neurotypical population⁴. Several foods have been linked to a reduction in anxiety and include nuts and legumes, fish, fresh fruits, and vegetables [31]. In addition, certain probiotics, such as *L. rhamnosus*, may possibly lower anxiety levels [48]. There is also research indicating that specific supplements may decrease anxiety including magnesium and omega-3 fatty acids [53; 60].

Sensory

High arousal levels have been associated with anxiety⁵ [20] as well as hypersensitivity to certain sensory sensations such as bright lights and strong colors as well as loud, especially unanticipated, sounds⁶ [61].

As with nutrition, there is a limited amount of research supporting sensory approaches to treating anxiety. There is some evidence that vestibular stimulation (i.e., slow, rhythmic movement) and

¹ Edelson S.M., Johnson J.B. (eds.). Understanding and treating anxiety in autism. London: Publ. Jessica Kingsley Publishers, 2021.

² Edelson S.M., Johnson J.B. (eds.). Understanding and treating anxiety in autism. London: Publ. Jessica Kingsley Publishers, 2021.

³ Hirtoa T., Brooks J., Hendren R.L. Pharmacotherapy for anxiety in individuals with autism spectrum disorder. In Edelson S.M., Johnson J.B. (eds.) Understanding and treating anxiety in autism. London: Publ. Jessica Kingsley Publishers, 2021. pp. 133–146.

⁴ Barnhill K.M. Dietary and nutrition intervention to address issues of anxiety. In Edelson S.M., Johnson J.B. (eds.) Understanding and treating anxiety in autism. London: Publ. Jessica Kingsley Publishers, 2021. pp. 78–90.

⁵ Sokhadze E.M., Casanova E., Lamina E.V., Kelly D., Casanova M.F. Psychophysiological markers of arousal and anxiety in children with autism spectrum disorder. In Edelson S.M., Johnson J.B. (eds.) Understanding and treating anxiety in autism. London: Publ. Jessica Kingsley Publishers, 2021. pp. 21–43.

⁶ Spielmann V., Miller L.J. Sensory integration and processing — impact on anxiety in autism. In Edelson S.M., Johnson J.B. (eds.) Understanding and treating anxiety in autism. London: Publ. Jessica Kingsley Publishers, 2021. pp. 91–119.

deep pressure may reduce arousal levels and may lead to a calming effect [2; 3; 14].

Irlen (tinted) lenses are popular in the adult autism community [22; 69; 70] and have been reported to lower arousal by reducing brightness and color sensitivity in the non-autism population [29]. Auditory interventions, such as auditory integration training (AIT) and the Tomatis method, are reported by parents to reduce anxiety, but there are no known supportive studies. However, there is evidence that AIT may reduce sound sensitivity [51; 52], and loud sounds may be associated with anxiety⁷. In addition, Sokhadze, Casanova, Tasman, & Brockett [58] documented improved inhibitory neural processing as a direct result of AIT.

Behavior

Numerous researchers have reported benefits soon after providing behavioral therapy [24; 45]. Some of these therapies include modeling (i.e., watching another person confront the situation or interact with the stimulus) and positive reinforcement for “brave” behavior [47]. Two other popular behavior approaches include gradual exposure to the feared object or situation (e.g., systematic desensitization, shaping) and relaxation training (e.g., deep breathing, progressive muscle relaxation)⁸ [25].

Self-harming behavior

This is one of the most devastating and difficult-to-treat behaviors exhibited by many individuals on the autism spectrum. Surveys indicate that over 25% of the autism population engage in some form of self-harming behavior [57]. These behaviors vary greatly and range from mild (causing redness or bruising) to moderate (leading to bleeding) to severe (causing bone fractures). Behaviors may involve hitting or banging the head, biting the wrist, hand, or arm, or excessive scratching or pinching of the skin [12].

Medical

Physicians may focus their efforts on alleviating discomfort or pain associated with self-harming be-

havior. For example, ear hitting may indicate an ear infection, and hitting or banging the head may indicate a headache or migraine [10; 12]. Face-hitting can be a reaction to sinus allergies, dental pain, or even an impacted object in the ear or in the nose [23; 71].

Physicians may also prescribe medications to control the behavior itself including antipsychotics, antidepressants, and opioid agonists [9; 17].

Nutrition

The nutritional approach often takes into account the suspected underlying reason(s) for the self-harming behavior. For example, eye-poking may be a result of a calcium deficiency [8]. In addition, self-harming behavior has been associated with gastrointestinal distress [46; 49]. A popular treatment strategy is to normalize the microbiome using digestive enzymes and/or probiotics (see for a review [55]).

Sensory

Both hypo-reactivity and hyper-reactivity to sensory sensations have been associated with self-harming behavior (see for a review [40]). For example, low tactile sensitivity may lead to excessive rubbing and scratching, which in turn may lead to an increase in the skin's sensitivity to touch [11]. Tactile stimulation, such as rubbing various textures on the skin, is reported to normalize sensitivity and may reduce chronic rubbing and scratching [56]. Conversely, some individuals on the autism spectrum engage in self-harm as a reaction to certain sounds [61]. As mentioned earlier, AIT has been shown to reduce or eliminate sound sensitivity [51; 52].

Behavior

Behavior therapy has a long and controversial history of treating self-harming behavior by either ignoring or punishing the behavior [35]. Today, behaviorists often attribute the cause and/or maintenance of these behaviors to three reasons: obtain attention, avoid or escape attention, and obtain a tangible [5; 16]. Automatic reinforcement has also been recognized as a contributor in which the behavior itself is rewarding [66]. A functional behavioral assessment is often employed to determine the

⁷ Spielmann V., Miller L.J. Sensory integration and processing — impact on anxiety in autism. In Edelson S.M., Johnson J.B. (eds.) *Understanding and treating anxiety in autism*. London: Publ. Jessica Kingsley Publishers, 2021. pp. 91–119.

⁸ Groden J., Weidenman L., Woodard, C.R. Stress and autism: Adapted coping interventions for everyone on the spectrum. In Edelson S.M., Johnson J.B. (eds.) *Understanding and treating anxiety in autism*. London: Publ. Jessica Kingsley Publishers, 2021. pp. 147–196.

physical and social antecedents and consequences of these behaviors [26; 54].

Behavioral programs may include various schedules of reinforcement such as differential reinforcement of other behaviors (DRO), differential reinforcement of incompatible behaviors (DRI), and differential reinforcement of alternative behavior (DRA), see [41]. Relaxation therapy has also been shown to be effective in reducing self-harming behavior [26; 43].

Sleep

Sleep disturbances are relatively common in the autism population [65]. There are numerous suggested causes of sleep problem associated with autism including alterations of circadian rhythms [21], high arousal level [39], sensory sensitivities [63], gastrointestinal disturbances [32; 50], pain [62], and side effects of medications [38].

The American Academy of Neurology recently recommended three approaches for treating sleep problems in autism and suggested an order in which they should be given [4]. These treatments, listed in order, are behavioral approaches, melatonin, and medical interventions.

Medical

In general, there are several types of medications often prescribed to treat sleep disturbances associated with autism including those that increase GABA and decrease histamine release as well as medications that alter acetylcholine, norepinephrine, and serotonin. See [33] for a review.

Over the last two decades, melatonin has been a popular approach for treating sleep problems in autism [36]. Researchers have shown that melatonin can improve sleep onset and duration, has minimal side effects, and improves quality of sleep and life [37].

Nutrition

Nutrition has long been considered helpful in treating sleep problems in the general population [59]. Certain foods are believed to help induce sleep including

nuts (e.g., walnuts, almonds), meat (e.g., turkey, fatty fish), fruit (e.g., kiwi, tart cherry juice, bananas), and milk and milk products (e.g., cottage cheese) [18].

Sensory

Sensory approaches are often employed to treat sleep disturbances and usually focus on reducing overall nervous system arousal. This may include setting the room to a comfortable temperature, reducing sounds and lighting, applying deep pressure, and providing slow vestibular stimulation such as rocking (see [67]).

Behavior

A behavioral strategy referred to as “sleep hygiene” is often recommended to help a person fall asleep [1]. This can consist of scheduling appropriate times for going to sleep and awakening, minimizing computer and television watching, and reducing emotional and behavioral stimulation prior to bedtime.

Discussion

Certain difficult-to-treat behaviors, such as those described above, may be caused and/or later maintained by one or more factors associated with the person’s biology, sensory system, nutritional status, and/or their surrounding environment. For example, Carr and McDowell [7] reported on a 10-year old boy whose scratching behavior was a result of a skin allergy. Once the allergy was identified and treated, the scratching behavior continued and was maintained by attention contingent on the behavior.

As in the example described above, the treatments outlined in this article are not necessarily independent of one another. In fact, an effective therapeutic plan, especially for difficult-to-treat behaviors, could likely involve a multidisciplinary approach and would include two or more treatments given in a specific order or simultaneously [6]. For example, treating anxiety may involve treating their GI disturbances⁹, immune dysregulation^{10, 11}, and challenging behaviors [42].

⁹ Law, Ferguson, Margolis, & Beversdorf. Gastrointestinal symptoms, anxiety, and autism spectrum disorder. In Edelson S.M., Johnson J.B. (eds.) Understanding and treating anxiety in autism. London: Publ. Jessica Kingsley Publishers, 2021. pp. 67–77.

¹⁰ Casanova E.L., Casanova M.F., Sokhadze E.M., Lamina E. Crosstalk between the immune and autonomic nervous systems and their relationship to anxiety in autism. In Edelson S.M., Johnson J.B. (eds.) Understanding and treating anxiety in autism. London: Publ. Jessica Kingsley Publishers, 2021. pp. 45–56.

¹¹ Edelson S.M., Van de Water J., Edelson M.S.G. The immune system and anxiety: A case for toxic exposure. In Edelson S.M., Johnson J.B. (eds.) Understanding and treating anxiety in autism. London: Publ. Jessica Kingsley Publishers, 2021. pp. 57–66.

Treating a condition or behavior using several approaches simultaneously should not be confused with the research examining intensive behavior analytic intervention (IBT) in relation to an eclectic treatment approach and a general education approach [27; 28]. In these studies, the eclectic approach included the TEACCH program, Picture Exchange Communication System (PECS), sensory integration therapy, and some discrete-trial procedures. Numerous assessments were employed and greater improvement was documented in those who received IBT as compared to the other two groups. In these studies, the eclectic approach consisted of three popular education strategies, whereas three of the four approaches described in this article centered on the individual's physical health (i.e., medical, sensory, and nutrition). Note: sensory integration therapy was included in the eclectic approach; however, Howard et al. [27; 28] did not evaluate changes in sensory sensitivities in their studies. Thus, the effectiveness of sensory integration therapy should not have been part of the conclusions drawn by these researchers.

When treating a condition or behavior, it should not be assumed that all treatments are equally effective; and in many cases the most effective interventions will depend, to a large degree, on the underlying reason for the condition or behavior [13]. Such is the case where eye-poking is a result of a deficiency in calcium [8].

An important scientific question regarding appropriate treatment is: How do we determine objectively the most effective treatments for each individual on the autism spectrum? At first, this may appear to be a daunting and complicated research challenge given the heterogeneity of the autism spectrum as well as chronological age (i.e., toddlers, children, teenagers, adults).

Reliance on traditional experimentation may take decades to determine an optimal treatment plan for each individual on the spectrum. A more efficient scientific approach would involve administering numerous valid and reliable assessments before, during, and after each treatments. This could consist of neurological and laboratory testing (e.g., EEG, evoked-related potentials), direct observation (e.g., functional behavioral analysis, Autism Diagnostic Observation Schedule), and sensory assessments (e.g., the Sensory Profile) in addition to interviews (e.g., Autism Diagnostic Interview) and questionnaires (e.g., Aberrant Behavior Checklist, Pervasive Developmental Disorder – Behavior Inventory). Characteristics of each individual should also be documented (e.g., age, sex, communication and social behavior).

The data from such quantitative assessments could then be analyzed in such a way to create one or more statistical algorithms or formulas. Based on probability, these formulas would be able to predict which treatments would be most effective given the characteristics of each individual [13]. Once this has been accomplished, clinicians could simply rely on a set of assessments, as determined by research, to create an effective treatment plan for each individual. This goal can be a reality given a collaborative and well-coordinated effort by both the research and therapeutic communities.

Conclusion

As evident throughout this article, medical, nutritional, sensory and behavioral approaches have been reported to treat similar conditions and behaviors. More research is needed to understand which treatments are most appropriate given the various underlying reasons and the heterogeneity of the autism population. ■

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