

A Review of Physical Safety for Individual with Autism Spectrum Disorder

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Abstract: Physical safety for individual with Autism Spectrum Disorder plays an important role in improving the quality of life for the group. According to the exist available information, there are some guidelines for construction of safe school and home environment for the group, but it's necessary to deepen further research to customize these criteria. There is a little research about the community safety and transition for Autism Spectrum Disorder, which is needed to enrich relative research, and it is a critical measure to facilitate the quality of life for the family whose member diagnosed as Autism Spectrum Disorder.

Keywords: Review, Physical safety, Disability.

1. Introduction

World Health Organization offers overview of disability: "Disability results from the interaction between individuals with a health condition, such as cerebral palsy, Down syndrome and depression, with personal and environmental factors including negative attitudes, inaccessible transportation and public buildings, and limited social support"[1]. Therefore, disability does not only refer to the individual's own defects, but also includes the problems caused by the surrounding environment of the individual. It can be seen from this that the fewer problems the environment brings, such as improving the accessibility of places, the less predicaments individuals face, and the higher their life happiness index may be.

According to the definition of disability, it's important to create a physical safety to enhance individual autonomy through the adjustment of the environment, such as improving the accessibility through designing and layout of buildings of homes, schools, and communities.

2. Physical Safety

Physical safety includes school, home and community safety.

2.1. School safety

School safety includes dropping and picking up children, physical facilities, outdoor play space and equipment, school compounds, firefighting equipment and first aid kits, water and sanitation, school feeding programs[2]. School safety researches focus on physical security[3].

About this subject, researchers tend to pay attention on autism for their high rate, mobility problem, behavior problem, communication question, and so on. One of main characteristics is their sensory. They maybe employ inappropriate behavior (distracted, self-injurious behavior, head banging or biting oneself) to deal with incoming hyper or hypo sensory stimuli. It may be the biggest concern of safety for Autism Spectrum Disorder (ASD) whose altered sense of the environment and little or no awareness of danger. Altenmüller-Lewis(2017) summarizes factors in the area of

autism-friendly environment based on existing researches[4]. They include zoning and compartmentalization, spatial sequencing, thresholds, way-finding, navigation and circulation, escape spaces and sensory rooms, control of sensory stimuli, acoustics, lighting, color. Although it is the beginning of designing autism-friendly environment, providing physical entities and technologies have the potential to improve the quality of life of ASD. According to the situation of ASD's living, learning and working, architecture and interior spaces have an important role in balance between the environment and an ASD's ability to adapt to it. The modifying factors of environment are color, texture, sense of closure, orientation, acoustics, ventilation, and so on[5] to make the environment safer, more comfortable for the ASD. It's difficult to design or modify suitable physical environment because individuals with ASD of broad range in sensitivity have different quality needs in their surroundings. But physical environment can accommodate the needs of ASD through spatial configuration, lighting, acoustics, ventilation, furnishings and so on. So, there are some quite general guidelines for ASD friendly spaces. For instance, Mostafa (2014) provides general information of seven principles (acoustics, spatial configuration, escape, compartmentalization, transition spaces, sensory zoning, and safety) for students with ASD about school design without listing prescriptive criteria[6]. Sánchez, P. A., Vázquez, F. S., & Serrano, L. A. (2011) also provided an overview about physical environment for ASD[7]. The specific guideline is as following.

Spatial configuration includes rooms (order, function), in wayfinding (navigation: symbols, coordinated colors or distinctive landmarks). First of all, it's more legible to ASD if rooms display order and definition[8]. A single, sequential circulation pattern can reinforce routine and improve focus. For example, Hirasawa, Fujiwara & Yamane (2009) reorganized furniture and materials to give more chance to interact with staff and improve the comprehensibility of task sequence, then they found fewer repetitive behaviors of ASD[9]. So, it may be a best practice for classrooms to organize orderly functional rooms[10].

For the navigation, it's more navigable when the signals include culture and the intended use of the space[5,7]. About

the air quality, escape space, and transition zones, Mostafa (2008,2014) suggests that it's friendly to provide 40 cubic feet per minute of fresh air per person for ASD lived architecture and offer ultraviolet lamps to reduce the spread of illness; it is to provide respite for the autistic user from the over-stimulation found in their environment, and such spaces may include a small partitioned area or crawl space in a quiet section of a room, or throughout a building in the form of quiet corners, and these spaces should provide a neutral sensory environment with minimal stimulation that can be customized by the user to provide the necessary sensory input; at the same time, to facilitate both Spatial Sequencing and Sensory Zoning, the presence of transition zones helps the user recalibrate their senses as they move from one level of stimulus to the next, and such zones can take on a variety of forms and may be anything from a distinct node that indicates a shift in circulation to a full sensory room that allows the user to re-calibrate their sensory stimulation level before transitioning from an area of high-stimulus to one of low-stimulus[5,6]. With the aspect of lighting, there is preference for individual with ASD. First, there is a relationship between exposure to light and mood disorder[11], because the melatonin impacted mood and circadian sleep cycles is partly responsible by the retina. Therefore, Reiter et al.(2009)found that melatonin treatment can improve the situation of ASD's sleep[12]. So, we can modify the lighting to adjust the sleep condition of ASD. Second, the group of ASD are prefer green and blue[13](Gaines, K. S., Curry, Z., Shroyer, J., Amor, C., & Lock, R. H. 2014). About the materials, there is an impact of finishes and furniture to indoor environment. For example, seating, bookshelves and workstations can determine the size and privacy of spaces. Movable furniture can reinforce the social use of space[13]. About the fire safety and evacuation, the evacuation strategy proposed involves insuring the safe and effective movement of the challenged individual from any point in the building under various fire location scenarios (progressive horizontal evacuation), to a safe spot or refuge. This refuge should be secure and located away from the evacuation flow. An appointed faculty or staff member will meet the individual at this assigned refuge and proceed to evacuate him/her. The last one is safety, which refers to the fittings to protect from hot water and an avoidance of sharp edges and corners are examples of some of these considerations.

To deal with ASD's sensory malfunction, medical, therapeutic and educational Interventions are employed. What's more, suitable physical environment, which provides sensory input in a manner designed to accommodate specific autistic needs, can conducive to autistic behavior. For example, there is a research that proved that a well-arranged physical environment was conducive to ASD's desired behavior by a case study[14]. At the same time, another research suggested design guidelines of autism-friendly building based on six autobiographies written by ASD[15]. The ways to solve a lack or overload of sensory stimuli: sensory rooms and escape spaces. As they said that "Sensory rooms offer various multi-sensory experiences through textures, light, colours, sounds, etc." "an escape space, is a safe place where one can retreat from too demanding situations, offering the necessary sense of control and safety" "It can just as well be a small corner inside someone's home." "familiarity offers a hold in the sense that everything remains ordered in the same way" "Space as a carrier of meaning", while avoiding to use a staircase or step for lacking

depth perception of ASD.

But, it's necessary to avoid "green house" effect. According to foregoing content, physical safety of school has been discussed. Except to the physical safety, there are other aspects of school safety. For example, anti-bullying policies can promote safety[16] because disabled people are more to be victimized[17]. Firstly, they lack the related skills and experiences. Secondly, there's no chance to be trained to protect themselves in dangerous situations. Thirdly, they can't communicate about harmful things effectively through traditional means for their severe deficits. The last reason is a limited social environment, increased volume and nature of "touch"contact , poor or nonexistent sex education, as well as disempowerment of the disability population. For solving the situation, it's important to train for individuals with disabilities from a behavioral, cognitive, and psychoeducational perspective with AAC devices. Stephanie Hughes(2014)conducted a review of the scholarly literature in education, psychology,child and adolescent development, and speech-language pathology, and found that students with communication disorder have high risk for being bullied by peers for the impairments in social skills that draw the attention of bullies[18]. So, speech-language pathologists (SLPs) can and should help to create an inclusive environment for all students while addressing bullying of students with communication disorders via therapeutic activities.

2.2. Home safety

Gwynnyth Llewellyn, David McConnell, Anne Honey, Rachel Mayes, and Domenica Russo(2003) conducted a comparison between the intervention which called Home Learning Program(HLP) and three alternative conditions on 63 adults with intellectual disability to evaluate the efficacy of a home-based intervention and found that the intervention was effective[19]. They suggested home safe environment includes there are possible dangers to be avoided in and around the home related to the fire, electrical, cooking, poisons, inappropriate edibles, suffocation, heavy and sharp objects, firearms, clutter, dangerous toys, animals, outside and general dangers. What's more, one research conducted an online survey from 168 caregivers and interviews from professionals(architects, occupational therapists) about home environment(detached houses, attached houses, and apartments)of ASD's families across Canada and the United States[20]. There is a unique manner to assimilate senses of ASD owing to their sensory dysfunction, so it's different to perceive the world. Houses are prefer to accommodate the needs of ASD, rather than apartments. In addition, another research conducted a survey among parents and caregivers of people with autism to evaluate autism's sensitivity to thermal, visual, acoustic and indoor air quality stimuli[21]. For a residential context, there are two risk factors: environmental risks, leading to discomfort and dangerous response for people with autism; and accidental risks, deriving from unpredictable events, even more dangerous for people with special perceptual disorders. There are 146 pieces of questionnaires collected. They found that the most problematic stimuli were high noises from inside and adjacent environments, other risks: high illuminance, heat exposure,high contrast and glare, particular light sources or phenomena and odors. In kitchen or bathroom,there is a higher probability of temperature and humidity variations or presence of odors. Living room and bedroom presents sounds,

drafts and noises due to window openings. Corridor and storage room might have higher light discomfort (flicker, prevalence of artificial light, fluorescent light bulbs). Fires, electrical and so on are risky for them since they might not be able to react properly or not recognize the presence of a risk to hyposensitivity. Such as other events, falls of objects, presence of bulky objects, objects not in the right place. From unease behaviours to yelling or even self-harm. In kitchen, bathroom and storage room, probability and severity of accidental risks are high. There are three measures to overcome environmental and accidental risks: risk prevention through architectural or technological solutions, such as avoidance of the use of stairs, open spaces with solid furniture, thermostats and thermal regulation of environments; risk detection through technological solutions, mainly sensors, such as sound pressure sensors, fire sensors; risk communication and reaction, for instance sending an early warning to parents or caregivers (smartphones, tablets, alarms)

2.3. Community safety

About this subject, there is a few researches. There is an existing research which conducted a secondary analysis of 2016-2017 among children aged 6-17 with and without ASD combined NSCH, and found that children with ASD can improve their physical activity ability in safe neighborhood[22].

3. Conclusion

To summarize, the safe environment of individuals with disability is not thorough. First, lacking of traffic safety and drug safety. The research area is not perfect. Second, the research depth is not enough. Physical safety has some guidelines but there isn't specific criteria which need to customize. About the drug safety, evidence on efficacy, dosage and safety is scarce and derived mostly from naturalistic studies or case reports, with a main focus on identification of side effects and discontinuation rate[23]. Therefore, it's necessary to further research about the physical safety for individual with disability.

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