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AND AUTISM.  
SENSORY  
PERCEPTION  
AND  
INDEPENDENT  
LIVING

PROCEEDINGS OF THE INTERNATIONAL WORKSHOP  
TRIESTE, 20th APRIL 2021



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SENS  
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ARCHITECTURE AND AUTISM  
SENSORY PERCEPTION AND INDEPENDENT LIVING

International workshop  
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in the frame of  
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<https://senshome.projects.unibz.it/>

9:30     Giuseppina Scavuzzo (University of Trieste)  
WELCOME AND INTRODUCTION

9:45     Marco Caniato (Free University of Bozen-Bolzano)  
RECENT ADVANCES ON INDOOR COMFORT FOR IMPAIRED INDIVIDUALS: THE SENSHOME PROJECT

SESSION 1 – DESIGN PROCESSES: THE ISSUE OF INCLUSIVITY

10:00    Ann Heylighen (KU Leuven)  
BEYOND PREVAILING WAYS OF UNDERSTANDING AND DESIGNING SPACE: LEARNING FROM THE AUTISM SPECTRUM

10:30    Federica Bettarello, Anna Dordolin, Paola Limoncin (University of Trieste)  
CURRENT STATUS OF LIVING ENVIRONMENTS FOR AUTISTIC PEOPLE: THE SIGNIFICANT ASPECTS OF DESIGN

11:00-11:15 – COFFEE BREAK

11:15    Matteo Bianchin (University of Milano-Bicocca)  
DESIGN JUSTICE: DELIBERATIVE TOOLS FOR INCLUSIVE DESIGN PRACTICE

11:45    Philip Scharf (Carinthia University of Applied Sciences)  
PARTICIPATION OF USERS IN RESEARCH: HUMAN-CENTRED DESIGN IN THE PROJECT SENSHOME

12:15 – DISCUSSION AND OPEN QUESTIONS  
*send questions to [senshome@units.it](mailto:senshome@units.it)*

13:00-14:30 – LUNCH BREAK

SESSION 2 – DESIGN PRACTICES: INTEGRATING SENSORY PERCEPTION WITH INDEPENDENT LIVING

14:30 Francesca Giofrè (Sapienza University of Rome)

AUTISM SPECTRUM DISORDERS: BUILDINGS REQUIREMENTS ON EVIDENCED BASED RESEARCH AND ITALIAN CASE STUDIES

15:00 Javier Sánchez Merina (University of Alicante)

THE PICTOGRAM HOUSE

15:30 Phuong Lan Nguyen (KU Leuven)

DETAIL MATTERS: EXPLORING SENSORY PREFERENCES IN HOUSING DESIGN FOR AUTISTIC PEOPLE

16:00 Anna Dordolin, Paola Limoncin (University of Trieste)

SENSHOME STRATEGIC APPROACH FOR A HOUSE “AS NORMAL AS POSSIBLE, AS SPECIAL AS NECESSARY”

16:30 – DISCUSSION AND OPEN QUESTIONS

*send questions to [senshome@units.it](mailto:senshome@units.it)*

17:00 – CONCLUSION AND GREETINGS

# AUTISM SPECTRUM DISORDER: BUILDING REQUIREMENTS ON EVIDENCE-BASED RESEARCH AND ITALIAN FACILITIES

Francesca Giofrè

## *abstract*

The paper discusses the typologies of facilities for young and adults with Autism Spectrum Disorder within Italian context, the methodology applied by Sapienza University team in this field of research, and in conclusion, it shows a “best practice” to aid the transition of autistic young adults into the labour market. The paper underlines the importance of the research in this specific field, with the aim to identify the building requirements based on the users’ needs.

## *keywords*

Autism Spectrum Disorder; Young; Adults; Facilities; Building Requirements.

In Italy, the Autism Spectrum Disorder – ASD – occurs in one of every 77 children aged 7-9 years old (Italian Ministry of Health, 2021). There is a lack of precise data on the young and adult population because the medical competencies in the childhood period are greater than in other life’ phases (Vivanti, 2010). An autistic person has a high life expectancy with different levels of autonomy; hence, the need for a set of treatments and services dedicated to people without family support – so-called “After Us”. Despite the strategic role played by parent associations like the National Association of parents of people with Autism and the National Autism Observatory, founded by the Italian National Institute of Health, a housing solution for ASD adults is not a much-debated topic in both of its main aspects in Italy; on one hand, public medical care and social assistance, and on the other hand, the specific architectural solutions. In fact, there is a lack of residential solutions designed to meet the needs of these users, and there are different facilities that host people with various disabilities (Giofrè, 2010).

There are various types of autism and for that reason, the suitable term is “Autism Spectrum Condition”.

The paper starts with the question: “How can we design a space that reduces discomfort and helps young and adults with autism to cope with their needs?”. The paper discusses within the Italian context the facilities dedicated to an autistic person, and the methodology applied in some research developed starting from the first Italian book that explores the relationship between an autistic person and architecture, through an interdisciplinary approach (Giofrè, 2010). In conclusion, one Italian case study is described and assumed as best practice for the opportunity of social inclusion offered to autistic adults.

Residential typologies for adults with Autism Spectrum Disorders: the Italian framework  
Structures that can host a person with ASD are described in two Law Decrees – L.D.:

23/11/2016 issued by the Italian Ministry of Labour and Social Policies and the L.D. n. 308/2001 issued by the Minister of Social solidarity. (1) (2) Both of Law Decrees' subject is identified "people with different disabilities". The L.D. 23/11/2016 is aimed at supporting people severely disabled in general and the same group of disabled that cannot have the support of their parents for different reasons – e.g. both parents are dead or they are not able to provide aptly a support –, and the L.D. n. 308/2001 is aimed at a different type of users, which is possible to include persons with ASD.

The L.Ds provide indications for the localization of each residential typology solution, based on their characteristics and users.

The dwellings, apartment groups, or co-housing solutions that reproduce housing and relational conditions of the family home, and provide, where possible, the use of their objects and furniture; they should be close to family homes and open to the surrounding community, near leisure areas, and employment opportunities, shops and health services – 15 minutes walking. Houses with private gardens are recommended, also houses in rural areas within social agriculture projects such as farm communities. These community structures and protected residential structures should be in inhabited areas, easily accessible by public transport, allowing users to participate in social life, and facilitating visits.

The research proceeded to identify the Functional Areas – FA – and the related Environmental Units – EU – that constitute these facilities, according to a homogenous group of activities that take place, applying a consolidated methodology, already used to investigate other architectural facilities such as hospitals, services for the elderly, etc. (3) This functional breakdown aims to obtain a map of each part of the building, to subsequently categorise the requirements that each of them should have to match the users' needs.

The main functional areas of the dwellings, apartment groups, or co-housing solutions and their environmental unit are:

- collective/recreational area: units for aggregative, recreational-cultural, free time activities, and dining unit;
- residential area: sleeping rooms with maximum 10 beds – 2 modules x 5 beds –, some single rooms, and bed for emergencies and/or relief.

These facilities have to reproduce the sense of home, and provide the use of domestic objects and furniture.

The main functional areas of community structure and their environmental unit are:

- collective/recreational area: units for aggregative and recreational-cultural activities, dining unit;
- residential area: sleeping rooms with double or single rooms with 7-10 beds – for emergency too –, the rooms' dimension must be adequate for daily activities, one toilet for every four non-self-sufficient guests;
- caregivers' area: space for health services according to the specific needs of the hosted users.

These facilities have to promote the guest's autonomy, and usability:

The protected Residential Structure is articulated in:

- collective/recreational areas: units for aggregative and recreational-cultural activities, dining unit;
- residential area: sleeping rooms with double or single rooms, maximum 20 beds, with dedicated furniture bells close to each bed. One toilet for the disabled for each double room and one toilet for the disabled every two single rooms, and the toilets must be connected with the sleeping room;
- caregivers area: 1 room for educator and 1 ambulatory with toilet;

– therapeutic, educational, and occupational area: occupational laboratories and gym space. The facility's complexity changes according to the conditions of autonomy and state of health. One of the environmental units not listed above, apart from the therapeutic area, is the multi-sensory room – Snoezelen room –, a space designed to experience a sensory environment. It aims to reduce hyperactivity and distraction, improve focus, increase mental alertness, reduce depression, encourage socialization and promote creativity. (4)

Methodology of research: performance requirement approach.

The researchers developed by the Sapienza' university team, after the identification of FA applied different methods:

- scientific evidence;
- expert' interviews;
- case studies/observation on site;
- post occupancy evaluation studies.

The main goals were to identify the users' needs and provide design guidelines for entities responsible for renovating or building new facilities for autistic persons.

Scholars identified specific needs for autistic persons that have to be translated into architectural solutions for each functional area identified. These general needs are:

- assure proxemics;
- avoid situations of impoverishment or sensory hyper stimulation and environmental stress;
- neutralize the stimuli of disorientation ;
- stimulate perceptual skills;
- ensuring multi-sensory systems able of helping the use of space autonomously;
- ensure safety conditions for users and operators;
- promote both privacy and socialization;
- allow, where possible, the freedom of choice;
- recreate familiar atmospheres as much as possible.

Turning the general needs into basic design indications, it is possible to identify different spatial and organizational requirements that must be considered:

- clarity in space geometry and organisation;
- preference for curvilinear design;
- basic spatial organisation, few stimuli, sequence-based organisation;
- intimate space used also for therapy – i.e. sensory rooms;
- signposts for spatial boundaries;
- materials and finishes with neutral and mat colours;
- steady furniture, also specially coloured to signal specific activities;
- need to signal the depth of space;
- micro-climate factors control;
- lighting control;
- noise control;
- safety;
- customization of bedroom;
- accessibility.

A further step of the research is the PhD research by Porro (2018). This research focused on facilities for autistic adults, it built a chart organized according to four classes of needs – aspect/shape, usability, wellbeing, and safety – and for each class, it defined the requirements, and the connected design indications – total 80 –, in relation with the FA. Two Italian case studies were investigated; the House Sebastiano and Home special home (Porro, 2018; Porro & Giofrè, 2019).

## Italian case study: Luna Blu

This part of the paper briefly discusses an Italian case study, called Luna Blu located near the La Spezia Migliarina station in Liguria, built in 2018 by the private foundation AUT AUT, which was established in 2017 with the aim “aid the transition of autistic young adults into labour market, with a focus on the tourism sector, to foster an inclusive model that – starting out from work situations – can offer concrete and innovative answers to needs linked to pervasive developmental disorders”. (5) (6)

Luna Blu is managed by Fondazione il Domani dell’Autismo – “I ragazzi della Luna”. It is a new three-story building built over an area of 2.300 sqm, including 700 sqm of parking; the covered surface is 795 sqm and the green surface 1.500 sqm. It offers several services to support autistic persons and their families. There is the holiday house – 290 sqm – which has ten double ensuite bedrooms, and one that can accommodate people with disabilities. The restaurant – 180 sqm – is open to Luna Blu guests and to external customers. In the laboratories – 55 sqm – autistic people are trained by educators and they learn how to make baked goods. In Luna Blu there is an “apartment for autonomy” with six bedrooms – five single and one double rooms – a kitchen, a dining room, a common area, and a laundry room. (image 1) (image 2)

Autistic persons can have an independent life in these apartments for up to one year. During this period of stay, they participate in occupational activities in the laboratory and other services necessary for running the facility, such as the hotel reception and the accommodation management. Luna Blu also includes five rooms to foster the path foreseen by the Italian Law n. 112/ 2016 “After Us”, hosting people with autism who had to face family separations, assisted by staff and in close collaboration with the local health authority. (7) (8) The room and housing spaces reserved for ASD persons and their families occupied 405 sqm. The design project takes into consideration the needs of autistic people. In fact, the geometrical shape of the building is simple and clear, within a residential area, colours are neutral, and each room door is marked by an easily identifiable colour.

## Conclusion.

The role of the architectural and technological research in this topic is crucial, with the support of an interdisciplinary vision. Identifying the needs of users and designing an environment that can cope with these needs is an operation that requires competence and receptiveness. Facilities and spaces where autistic people live have to be designed to be respectful and inclusive, especially given the role they play in supporting the residual abilities and adequately stimulating them. Therefore, it is essential to involve stakeholders, such as families, associations, operators, and educators, from the early planning stages of the intervention. The architectural and technological project has to respond to the requirement of flexibility, thus allowing from time to time an adequate solution to the complexity and variety of needs and expectations of people with ASD (Porro & Giofrè, 2019).

### *notes*

(1) L.D. 23/11/2016. Ministero del lavoro e delle politiche sociali. Requisiti per l'accesso alle misure di assistenza, cura e protezione a carico del Fondo per l'assistenza alle persone con disabilità grave prive del sostegno familiare, nonché ripartizione alle Regioni delle risorse per l'anno 2016. (GU n.45, 23-2-2017).

(2) L.D. 21/05/2001, n. 308. Presidenza del Consiglio dei Ministri - Ministro per la Solidarietà Sociale. Regolamento concernente "Requisiti minimi strutturali e organizzativi per l'autorizzazione all'esercizio dei servizi e delle strutture a ciclo residenziale e semiresidenziale, a norma dell'art. 11, L. 8/11/2000, n. 328". (GU n.174, 28-07-2001).

(3) A functional area is an area of the building that carries out homogenous activities/service, and it is divided into different environmental units.

(4) For references on Multi-Sensory room see the article: Katy L. Unwin, Georgina Powell, Catherine R.G. Jones (2021). The use of Multi-Sensory Environments with autistic children: Exploring the effect of having control of sensory changes. Available at: <https://journals.sagepub.com/doi/pdf/10.1177/13623613211050176>

(5) Fondazione AUT AUT – Autonomia Autismo consists in Fondazione Carispezia, AGAPO Onlus and Fondazione Il Domani dell'Autismo. <http://www.aut-aut.eu/en/>

(6) Retrieved from <http://www.aut-aut.eu/en/>

(7) Law 22/06/2016 n. 112 "Disposizioni in materia di assistenza in favore delle persone con disabilità grave prive del sostegno familiare". (GU n. 146, 24-06-2016).

(8) For more details about Luna Blu see the video <https://www.youtube.com/watch?v=g0T9d-GSrUA> and <https://www.cittadellaspezia.com/2019/05/03/luna-blu-ristorante-e-camere-per-linclusione-attraverso-lautonomia-285225/>

### *references*

Fondazione Censis. (2012). La dimensione nascosta delle disabilità. La domanda di cura e di assistenza delle persone affette da Sclerosi Multipla, da Disturbi dello spettro Autistico e delle loro famiglie [Report on research issue]. <https://www.quotidianosanita.it/allegati/allegato8873799.pdf>

Giofrè, F. (Ed.). (2010). 'Autismo, Protezione sociale e architettura'. Alinea.

Giofrè, F. (2010). Rethinking the home space and autism spectrum disorder in Italy: Architectural design guidelines towards discomfort reduction, 'IX International Congress Autism-Europe'. <https://www.youtube.com/watch?v=a5vheYiqJD0>

Giofrè, F. (2014, April 2). Autismo: La Costruzione dello Spazio abilitante per il "non standard". '(h)ortus'. Retrieved April 18, 2021, from [http://www.vg-hortus.it/index.php?id=1677%3Autismo-la-costruzione-dello-spazio-abilitante-per-il-non-standard&format=phocapdf&option=com\\_content](http://www.vg-hortus.it/index.php?id=1677%3Autismo-la-costruzione-dello-spazio-abilitante-per-il-non-standard&format=phocapdf&option=com_content)

Italian Ministry of Health. (2021). Autismo. Retrieved April 18, 2021, from: <https://www.salute.gov.it/portale/saluteMentale/dettaglioContenutiSaluteMentale.jsp?lingua=italiano&id=5613&area=salute%20mentale&menu=vuoto>

Porro, L. (2018). 'Strutture per le persone con disturbi dello spettro autistico. Indirizzi per la progettazione e la valutazione della qualità edilizia' [Unpublished doctoral dissertation]. Department of Civil, Building

and Environmental Engineering, Sapienza University of Rome.

Porro, L., & Giofrè, F. (2019). Strategie per la residenza di adulti con disturbi dello spettro autistico in Italia: casi di studio. Strategies for Housing of Adults with Autism Spectrum Disorders in Italy: Case Studies. In F. Adolfo, L. Baratta, C. Conti, & V. Tatano (Eds.), 'Abitare inclusivo / Inclusive living – Il progetto per una vita autonoma e indipendente / Design for an autonomous and independent living' (pp.284–293). Antefirma.

Vivanti, G. (2010). 'La Mente Autistica, Le risposte della ricerca scientifica al mistero dell'autismo'. OMEGA Edizioni.

(image 1) Luna Blu: Main entrance. Retrieved from <http://www.aut-aut.eu/en/>

(image 2) Luna Blu: Apartments' façade. Retrieved from <http://www.aut-aut.eu/en/>



