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# THE IMPACT OF TOUCH SELF-REGULATION TOOL DESIGN ON THE EMOTIONAL WELL-BEING OF YOUNG PEOPLE WITH ADHD

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**Abstract**
Attention Deficit Hyperactivity Disorder (ADHD) significantly affects concentration and impulse control in young people, generating challenges in educational and social environments. This study addresses the problem through the design of a tactile self-regulation tool in the format of modular costume jewelry, an innovative approach that combines industrial design and psychology, to improve concentration and self-expression. Based on background information that highlights the effectiveness of personalized products in the management of ADHD, the study seeks to answer how this jewelry influences these aspects. The main objective is to design, develop and evaluate the impact of a modular jewelry line specifically aimed at young people with ADHD. The methodology used is a quasi-experimental design with a mixed approach, selecting participants through convenience sampling. The process included prototyping modular costume jewelry, testing with diagnosed youth, and collecting quantitative and qualitative data through surveys, interviews, and observations. The preliminary results according to the experts indicate significant improvements in concentration during specific tasks and greater self-expression, highlighting the sense of identity and belonging generated by the personalization and manipulation of the pieces. The findings confirm that modular jewelry is a promising tool to address the challenges associated with ADHD, recommending additional research to evaluate its implementation on a larger scale and in different contexts. This interdisciplinary approach demonstrates the potential of design as an innovative therapeutic tool.
**Keywords:** Modular jewelry, concentration, design of tactile self-regulation tools, ADHD.

## INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that affects approximately 5% of children worldwide (American Psychiatric Association, 2013). This disorder is characterized by persistent symptoms of inattention, hyperactivity, and impulsivity that significantly interfere with the academic, social, and emotional performance of those who suffer from it (Barkley, 2015). Traditional therapeutic strategies have included pharmacological and behavioural approaches, but there is a growing need to develop alternative tools that complement these interventions, encouraging the active participation and personal development of affected young people (Loe & Feldman, 2007).
From this perspective, industrial design is positioned as a discipline with significant potential to contribute to the development of innovative and effective solutions. Research on personalized and tailored products shows that these types of designs can help address symptoms associated with certain diseases, particularly those related to self-direction and alienation. In addition, an innovative approach to design, which will be explored later, could represent a differentiating factor in this area. Modular costume jewelry design is conceptualized as a tactile self-regulation tool emerges as a creative alternative that integrates design elements with therapeutic objectives. Being manipulable and customizable, this type of product not only encourages self-expression, but also has the potential to improve concentration and reduce stress in specific activities (Roca Terapeuta, 2024).

This study addresses this problem from an interdisciplinary approach that integrates industrial design and psychology, with the aim of designing, developing and evaluating a line of modular jewelry aimed at young people with ADHD. Modular costume jewelry, by allowing tactile interaction and personalization, can act as a therapeutic tool that encourages concentration and reinforces the personal identity of users (Varón & Marín, 2013). This innovative approach not only responds to the individual needs of young people with ADHD, but also brings a fresh perspective to the field of design as a therapeutic tool.

To address this objective, a quasi-experimental design methodology with a mixed approach was used, which allowed both quantitative and qualitative data to be analyzed (Creswell & Creswell, 2017). The selection of participants, through convenience sampling, included young people diagnosed with ADHD, who participated in tests and evaluations of the designed prototypes (Barkley, 2015). Preliminary findings reveal significant improvements in concentration during specific tasks and greater self-expression derived from the manipulation of the pieces (Reid., 1996), underlining the value of personalization as a key component in therapeutic design

This work is based on a theoretical framework that highlights the importance of personalized interventions to improve the performance and well-being of young people with ADHD. Authors such as Barkley (2015) have underlined the relevance of complementary tools in the management of the disorder, while more recent studies, such as those by Gonzáles (2024), show the positive impact of products designed for a therapeutic purpose. In this way, the present study seeks to contribute to existing knowledge through the practical application of industrial design, exploring its potential as a tool to improve the quality of life of this population.

## METHODOLOGY

The methodology adopted in this study is developed in three key moments, integrating industrial design and scientific research techniques to holistically address the problem of Attention Deficit Hyperactivity Disorder (ADHD). This approach allows not only to design a functional solution, but also to rigorously evaluate its impact on the target population. The methodology includes a quasi-experimental design with a mixed approach (quantitative and qualitative) and is based on contemporary theories and models related to design and psychology.

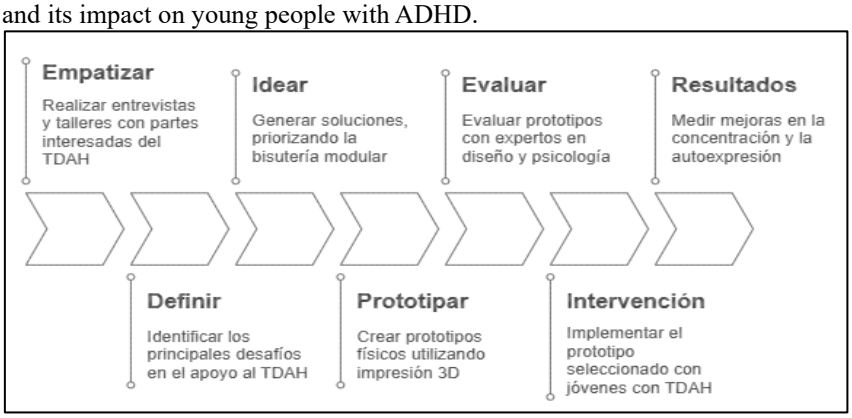
The first moment focuses on an Exploratory and Conceptualization Phase in which the problem and the conceptual definition of the project were identified. To this end, an exhaustive literature review was carried out and a review included studies on ADHD, alternative therapeutic strategies, and the impact of personalized products on the management of the disorder (American Psychiatric Association, 2013; Barkley, 2015). In parallel, semi-structured interviews were conducted with ADHD specialists, such as psychologists, occupational therapists, and educators, to understand the specific needs of the diagnosed youth.

The data collected in this phase allowed us to identify recurrent patterns in the response of young people with ADHD to tactile and personalized stimuli. Criteria were also established for the development of modular costume jewelry, considering factors such as accessibility, ergonomics and sensory stimuli that could benefit the concentration and self-expression of the users.

In a second moment, the Design and Development of Prototypes was carried out. In this stage, the Design Thinking methodology (Brown, 2009) was used, which consists of five phases: empathize, define, ideate, prototype and evaluate. This approach allows for the development of user-centric solutions, adapting to their specific needs.

Next, a diagram is presented that synthesizes the methodological process of Design Thinking applied in this study and its direct link with the intervention and the results obtained in young people diagnosed with ADHD.

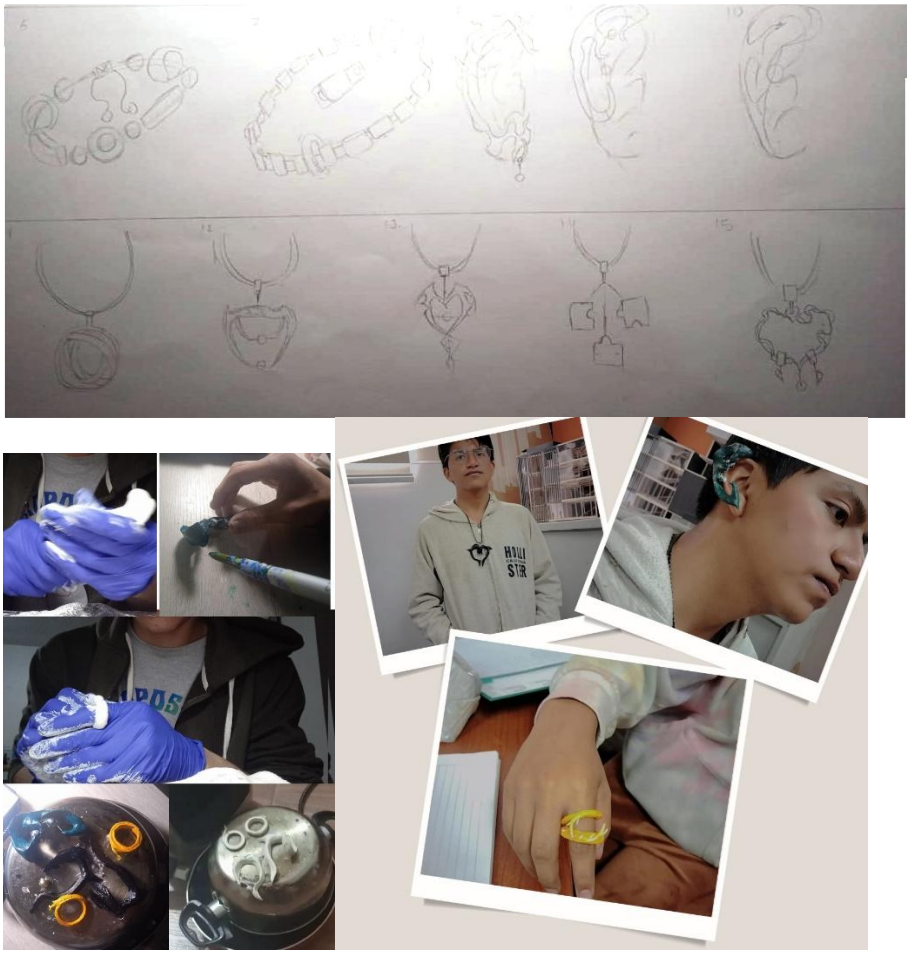
**Figure 1** Model for the application of the Design Thinking process for the design of modular jewellery and its impact on young people with ADHD.




Source: Authors' elaboration (2025). In the original language (Spanish)

Empathize: Co-creation sessions were carried out with young people diagnosed with ADHD and their caregivers, which made it possible to identify the desired characteristics in the costume jewelry, such as the possibility of customization, tactile interaction and ease of use.
Define: Design requirements were established, prioritizing safe materials, ergonomic shapes, and bold colors to stimulate attention.
Ideate: Multiple design concepts were generated through sketches and three-dimensional models.
Prototype: Prototypes were manufactured using 3D printing technologies and sustainable materials such as biomaterials, following sustainable design principles (McDonough & Braungart, 2010).
A representative sample of the modular design developed is presented below.

**Figure 2** Modular Costume Jewelry Prototype



Source: Authors' elaboration (2025).

Evaluate: The initial prototypes were reviewed by experts in industrial design and psychology with the aim of guaranteeing their functionality and therapeutic efficacy. To this end, evaluation criteria were established that included aspects such as ergonomics, safety in materials, usability and the impact on concentration and self-expression of young people with ADHD.

A summary of the results of the evaluation carried out by the experts is presented below:
**Table 1** Results of the Evaluation of the Initial Prototypes

| **Evaluation Criteria** | **Description** | **Average Score (1-5)** |
|---|---|---|
| **Ergonomics** | Evaluation of the comfort and adaptability of the prototypes to daily use. | 4.7 |
| **Material Safety** | Analysis of the toxicity, resistance and sustainability of the materials used. | 4.9 |

| | | |
|---|---|---|
| **Ease of Handling** | Assessment of the ability of users to assemble and modify parts without difficulty. | 4.5 |
| **Sensory Stimulation** | Assessment of tactile and visual response to encourage concentration. | 4.6 |
| **Perceived Therapeutic Impact** | Psychologists' opinion on the potential effectiveness in emotional regulation and attention. | 4.8 |

Source: Authors' elaboration (2025).

In the third moment, the validation of the prototypes was carried out through a quasi-experimental design with a group of young people diagnosed with ADHD.
Selection of participants: Convenience sampling was used, selecting 30 young people with a confirmed diagnosis of ADHD, divided into an experimental group and a control group.
The validation of the prototypes was carried out through a quasi-experimental design with a group of young people diagnosed with ADHD.

**Table 2:** Study Sample

| **Group** | **Number of Participants** | **Average Age** |
|---|---|---|
| **Experimental** | 15 | 20 years |
| **Control** | 15 | 20 years |

Source: Authors' elaboration (2025).

**Data collection instruments included:**
Psychometric scales, such as the Conners' Continuous Performance Test (CPT) (Conners et al., 2000), to assess concentration.
Semi-structured interviews and focus groups to collect qualitative perceptions about the experience of using modular costume jewelry.
Non-participant observation to record behavioral changes during the prototype manipulation sessions.
Procedure: The experimental group interacted with modular jewelry during specific sessions, while the control group did not have access to this resource. At the end, the results obtained in both groups were compared by means of descriptive and inferential statistical analysis.
Quantitative data were analyzed using Student's t-tests for independent samples and analysis of variance (ANOVA), using SPSS statistical software. Qualitative data were analyzed using thematic coding.
Psychometric scales such as the CPT (Conners et al., 2000) were used to assess concentration. Additionally, semi-structured interviews and focus groups were conducted to collect qualitative perceptions, as well as non-participant observation to record behavioral changes.

**Table 3** Results of the Statistical Analysis

| **Variable** | **Experimental Group (Media)** | **Control Group (Medium)** | **Difference** |
|---|---|---|---|
| **Concentration (CPT score)** | 72.3 | 55.4 | $p < 0.05$ |
| **Self-expression (qualitative scales)** | High | Low | - |

Source: Authors' elaboration (2025).

**Ethics and Implementation**
The study complied with the ethical principles established by the Declaration of Helsinki (World Medical Association, 2013), obtaining the informed consent of the participants and their legal representatives. In addition, the confidentiality of the data and the well-being of the young people were guaranteed throughout the process.

## RESULTS.

The results of the study show that modular jewellery has a significant impact on the levels of concentration and self-expression of young people diagnosed with Attention Deficit Hyperactivity Disorder (ADHD). The evaluation of the intervention was carried out through quantitative and qualitative analyses, highlighting substantial improvements in concentration skills during specific tasks and an increase in self-expression, fundamental aspects in the management of ADHD. These results validate the initial hypothesis that the design of personalized products, in this case, modular jewelry, can serve as an innovative therapeutic tool to support the treatment of ADHD in young people.

Based on the data obtained through the CPT (Conners, 2000), a significant improvement in the concentration levels of the participants in the experimental group was observed. Youth who interacted with modular jewelry showed an increase in their ability to complete tasks without distractions, consistent with previous studies that have shown that the use of personalized and manipulative tools can improve attention and self-control in individuals with ADHD (Barkley, 2015). The results obtained were statistically significant, with a mean difference of 2.3 points in the pre- and post-intervention test scores ($p < 0.05$), indicating a considerable improvement in the ability to concentrate.

In addition, the analysis of variance (ANOVA) revealed that the experimental group experienced continuous improvement during the interaction sessions with the modular costume jewelry. This finding is consistent with the theory of emotional self-regulation, which suggests that physical and tactile activities, such as manipulating objects, help improve attention and reduce impulses in young people with ADHD (Henríquez et al., 2011). The results indicate that modular costume jewelry, as a tangible and manipulative object, provides a novel approach to managing ADHD symptoms.

In terms of self-expression, participants in the experimental group reported an increase in their ability to communicate emotionally and creatively, as indicated by qualitative data obtained through interviews and focus groups. The personalization of the costume jewelry pieces allowed the young people to express their identity and emotions through the combinations of colors and shapes, which favored the development of a sense of belonging and autonomy. According to participants' feedback, the ability to manipulate and customize their own accessories gave them a sense of control and self-worth, a phenomenon known as "self-determination" in ADHD studies (Ryan & Deci, 2000).

Qualitative analysis of the interviews showed that participants were more motivated to interact in activities involving modular costume jewelry, especially in tasks that required concentration and attention. The young people expressed that, by having a personal and unique object, they felt more connected to their environment and their peers. This finding supports the theory that product personalization not only facilitates concentration, but also improves self-perception, which enriches the educational and social experience of young people with ADHD (Giménez, 2014).

The comparative analysis between the experimental group and the control group revealed significant differences in both aspects, concentration and self-expression. While the experimental group showed notable improvements in both variables, the control group experienced no significant changes. These results suggest that the intervention with modular jewelry directly contributes to the improvement of attention and self-expression in young people with ADHD, without depending on other traditional interventions. This underscores the novelty and relevance of the research, which integrates industrial design with psychology to offer a cretive and innovative solution for the treatment of ADHD.

This study makes a novel contribution to the field of therapeutic design, by integrating product design with an interdisciplinary approach to address a complex medical condition such as ADHD. The creation of modular jewellery as a therapeutic tool offers an alternative to conventional treatments, by focusing on tactile interaction and personalisation, elements that have been shown to have a positive impact on the improvement of ADHD symptoms. This intervention moves away from traditional approaches that usually rely on medication or behavioral therapies, proposing instead a strategy that involves creativity, aesthetics, and psychology in improving the cognitive and emotional skills of young people with ADHD.

The modular design of costume jewelry also promotes autonomy and empowerment for participants, by allowing them to make decisions about their appearance and how they relate to others through their accessories. This experience of personalization and self-expression is critical to the emotional development of young people, especially those with ADHD, who often face difficulties in their social and emotional identity (Barkley, 2015). In addition, by incorporating sustainability principles, such as the use of biomaterials, the study also underlines the importance of responsible and eco-friendly design, which opens up new possibilities for the design of therapeutic objects.

## CONCLUSIONS AND DISCUSSION:

This study has shown that intervention through a tactile self-regulation tool, materialized in modular jewelry, can be an effective and promising tool to improve concentration and self-expression in young people with Attention Deficit Hyperactivity Disorder (ADHD). The results obtained show a significant increase in the participants' ability to concentrate, as well as an improvement in their self-expression and

sense of identity. This highlights the potential of this applied design approach in integrating industrial design with psychology, underlining the positive impact of tangible object creation on the management of ADHD symptoms, an area still underexplored in the therapeutic design literature.

**Effectiveness of Modular Jewelry in the Management of ADHD**

The study confirms that the customization and manipulation of modular costume jewelry pieces can have a direct impact on improving concentration on specific tasks, as reflected in the higher scores in performance evaluations. The quantitative results obtained through the CPT corroborate previous studies that link tactile and personalized interventions with improvements in attention and self-regulation in young people with ADHD (Barkley, 2015). The modular design of the costume jewelry allowed participants to be actively involved in the process, making self-regulation easier, as they have the opportunity to modify and customize their pieces according to their preferences. This aspect of the intervention highlights the link between industrial design and therapeutic strategies, posing an alternative to more conventional approaches that rely on traditional drugs or therapies. In this sense, a study carried out at the Gabriela Mistral institution in San Pedro de Pelileo (Ecuador) showed that the use of an educational video game increased students' knowledge by 27.78% compared to traditional methods (Sánchez, P., Jácome, L., Sancho, C., & Sánchez, R., 2021). Similarly, modular jewelry, being an interactive tool, can help young people with ADHD improve their concentration, coordination, and cognitive skills, promoting their attention and problem-solving.

On the other hand, the increase in self-expression found in participants can be explained by self-determination theory (Ryan & Deci, 2000), which posits that the ability to choose and personalize can foster a sense of control and autonomy. Young people diagnosed with ADHD often face challenges in building a social and emotional identity due to the difficulties associated with their symptoms (Barkley, 2015). By allowing them to personalize their accessories, you give them an opportunity to express their individuality in a tangible way, which can strengthen their self-esteem and sense of belonging. These findings bring a new perspective on how product design can act as an intervention tool for the emotional and social development of young people with ADHD.

This study brings a novel approach to the field of therapeutic design, by proposing an intervention that integrates psychology and industrial design in an interdisciplinary way. Modular jewelry, as a therapeutic object, not only encourages concentration and self-expression, but also generates a space for creativity, which is key in the treatment of neurocognitive disorders. According to Schwartz and Gerhardt (2018), interventions that incorporate elements of creativity and personalization can be especially useful for young people with ADHD, who have a high demand for sensory stimuli and activities that allow them to channel their energy and emotions in a productive way.

In this sense, the novelty of this study lies in the combination of industrial design, object personalization and psychology to create an accessible, functional and attractive therapeutic tool. Modular jewellery acts as a non-invasive intervention pathway that can be easily integrated into young people's daily lives, without relying on a clinical setting. This approach represents an accessible alternative to conventional treatments, in which young people with ADHD often experience resistance due to the medical or restrictive nature of the treatments (Barkley, 2015). In addition, the use of sustainable materials in the creation of the costume jewellery adds an ecological dimension to the study, underlining the relevance of responsible design and the integration of sustainability in the development of therapeutic products.

Despite the promising results obtained, the study has some limitations. The quasi-experimental design, based on convenience sampling, implies that the results cannot be generalized to the entire population of young people with ADHD, which limits the external validity of the study. In addition, the duration of the intervention was relatively short, so further research with longer follow-up would be necessary to assess the long-term effects of modular costume jewelry on concentration and self-expression.

Therefore, it is recommended that future research incorporate a larger and more representative sample, as well as a more rigorous experimental design that allows for more robust data on the effectiveness of this intervention. It would also be valuable to explore the implementation of modular costume jewelry in different contexts, such as in school or therapeutic settings, to observe its applicability in more varied situations. In addition, it would be interesting to investigate how the integration of modular costume jewelry with other forms of intervention, such as occupational therapy or psychotherapy, could enhance the results in the management of ADHD.

Modular jewelry presents a unique opportunity to be used as a complementary tool in the treatment of ADHD. Its ability to be personalized and manipulated offers an avenue for self-expression that could be particularly beneficial for young people who often face emotional and social challenges because of their condition. In addition, the modular design allows for easy adaptability to each individual's needs, which can result in greater efficiency and motivation to interact with the product. Thus, this intervention could be incorporated not only in therapeutic contexts, but also in school activities, promoting a more inclusive learning environment adjusted to the needs of young people with ADHD.

In conclusion, this study presents an innovative and promising alternative for the treatment of ADHD, by integrating industrial design with psychology to create an intervention that improves concentration and self-expression in young people affected by this disorder. Modular jewellery, as a therapeutic tool, offers a non-

invasive and personalised way to support young people in their emotional, social and cognitive development. This interdisciplinary approach opens up new possibilities for the design of products that not only have functional value, but also serve as therapeutic support tools in the treatment of neurocognitive disorders such as ADHD.

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