

The image of athletes with physical disabilities on Instagram through Neurocommunication

La imagen de las personas deportistas con discapacidad física en Instagram a través de la Neurocomunicación

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ABSTRACT

Introduction: People with disabilities have historically suffered from the stereotype of not reaching the prevailing standard of physical beauty. The rise of the movement known as body positivity on social media has allowed disabled athletes to portray themselves based on an observable disability. **Methodology:** The aim of this research is to determine the cognitive perception of 120 youthful Spanish and Portuguese university students regarding the image displayed by athletes with physical disabilities on Instagram. To this end, two neurocommunication techniques have been used: eye tracking, and galvanic skin response (GSR). **Results:** Overall, athletes attracted more attention to traits that explicitly show their disability than non-athletes with disabilities, as the latter portrayed themselves on Instagram from the perspective of beauty and fashion. Data related to emotional arousal corroborated the data related to attention. **Discussion:** It seems that specific aspects of an athlete's disability continue to attract attention from the stereotypical viewpoint of an athlete's body. The results regarding the focus on beauty and fashion may help to reduce the stigma of social identity perceived by the non-disabled public. **Conclusions:** These findings seem to indicate that self-portrayal on social networks based on beauty and fashion attracts more audience attention than others, due to the fact that such people present themselves as attractive rather than as people with disabilities, even when they specifically display their disabled trait, which is true in all of the cases.

Keywords: Physical disability; Eye tracking; GSR; Personal identity; Body image; Instagram; Neurocommunication.

RESUMEN

Introduction: Las personas con discapacidad han sufrido históricamente el estereotipo de no cumplir con la estética dominante en términos de belleza física. El auge del movimiento de positividad corporal en redes sociales ha permitido que los deportistas con discapacidad promuevan una auto-representación basada en la discapacidad visible. **Metodología:** El objetivo de esta investigación es determinar la percepción cognitiva de 120 jóvenes universitarios españoles y portugueses sobre la imagen que muestran los deportistas con discapacidad física en Instagram. Se emplean dos técnicas de Neurocomunicación: el *eye tracking* y la respuesta galvánica de la piel (GSR). **Resultados:** Los deportistas captaron globalmente una mayor atención sobre los rasgos que muestran explícitamente su discapacidad con respecto a las personas con discapacidad no deportistas, quienes se auto-representaron en Instagram desde el enfoque de la belleza y la moda. Los datos de intensidad emocional corroboraron los de la atención. **Discusión:** Parece que los elementos explícitos de la discapacidad del deportista continúan captando la atención desde la perspectiva estereotipada de los cuerpos de los atletas. Los resultados en cuanto al enfoque de la belleza y la moda pueden contribuir a reducir el estigma de la identidad social percibido por los públicos sin discapacidad. **Conclusiones:** Estos resultados podrían implicar que la auto-representación basada en la belleza y moda en redes sociales capte más la atención de la audiencia al presentarse como personas con atractivo antes que como personas con discapacidad, aun cuando se muestren explícitamente esos rasgos de la discapacidad en todos los casos.

Palabras clave: Discapacidad física; *eye tracking*; GSR; Identidad personal; Imagen corporal; Instagram; Neurocomunicación.

1. Introduction

The representations made by the media of people with disabilities influence both the way they perceive themselves and how they are perceived by society (Cunha and Pinto, 2014), creating a barrier to their ability to relate positively with others (Lucas-Moreno, 2020). The underlying problem consists of a historical underrepresentation of people with disabilities in the media, which has traditionally defined them, first and foremost, by their disability, perpetuating the stereotype that they are different from others (Stewart and Spurgeon, 2020).

1.1. The media's approach to athletes with disabilities

The media has the ability to direct the attention of a large part of the citizens towards certain topics or others (Núñez-Gómez et al., 2020, p.43), largely because the content is presented by the media from a specific perspective or framing among all possible points of view (Sádaba-Garraza, 2004).

The framing of media coverage of mega sports events involving people with disabilities has historically been characterized by a representation focused from a negative and vulnerable perspective (Von-Sikorski and Schierl, 2012). However, the language used to refer to them has been appropriate (Rivarola and Rodríguez-Díaz, 2015). Despite this, athletes with disabilities have been the most cited sources of information, precisely highlighting the approaches related to an optimistic discourse (Kim et al., 2018). As a consequence of this predominantly negative approach, the audience seems to perceive messages about people with disabilities as of little interest or socially inappropriate (Shiome and Ito, 2022). Additionally, female athletes with disabilities receive less visibility than male athletes (Rees et al., 2019).

When examining sports with lower reach, such as university wheelchair basketball teams, the media offers very limited coverage, despite these athletes being professionals. In these cases, the media framing does not focus on high physical performance, physical and psychological demands on the athletes, or the epic narrative commonly used in sports broadcasts (Watson, 2020). These differences that people with disabilities experience within competitive sports are present from their childhood involvement in sports (Pearce, 2017). However, school initiatives aimed at raising awareness among people without disabilities contribute to educating the younger generation and developing new perceptions (McKay et al., 2023).

One of the media milestones in the sports involvement of people with disabilities occurred when athlete Oscar Pistorius became the first double amputee to compete in both the Olympic and Paralympic Games with bionic legs. This novelty shifted the media framing from the notion of a "supercrip" or over-adapted individual, where an "achievement syndrome" suggests they achieve extraordinary success despite their disability (Silva and Howe, 2012), to that of a cyborg from science fiction movies (Smith, 2015). This oscillation in the media's approach sometimes led to the ridicule of these athletes, considering them lacking ethics and contrary to the claims made by people with disabilities (Berger, 2008). On the other hand, there were few occasions when the media developed a greater social awareness among the public through progressive ideas. However, it was precisely these instances that led the audience to internalize and normalize the technologically enhanced bodies of people with disabilities (Pullen et al., 2020).

As a result, it seems that sports broadcasts in the media continue to present disability as a problem to be solved or a situation to overcome (Maika and Danylchuk, 2016). Part of this is due to the prevailing medical approach towards people with disabilities regarding their ability to progress in the sports they practice, rather than adopting a social model that shifts the focus from health to social perceptions of disability (Brittain, 2004). These biased representations of people with disabilities are precisely the ones that can negatively impact the attitudinal evaluation made by the audience composed of people without disabilities (Von-Sikorski and Schierl, 2014), while also discouraging some people with disabilities from participating in sports (Brown and Pappous, 2018).

1.2. The representation of physically disabled athletes on social media

Throughout history, people with disabilities have had to live with the stigma of not conforming to the dominant aesthetic standards of physical beauty (Hahn, 1988). This has led to normative forms of cultural perception that view their bodies as a kind of denial (Titchkosky, 2015) and subject them to discrimination based on perceived lack of ability or an imperfect body. This perspective is encompassed within the critical theory of disability and is a consequence of the discrimination that people with disabilities continue to face, known as ableism (Campbell,

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2009). Despite this, disabled athletes often demonstrate better physical and emotional well-being compared to individuals with disabilities who do not engage in sports (Wilhite and Shank, 2009), in terms of happiness and self-confidence (Van-Schie et al., 2022).

In this context, a body positivity movement has emerged among people with physical disabilities on social media, aiming to incorporate this group within conventional beauty standards (Hill, 2022). As a result, people with physical disabilities increasingly represent their lifestyle, showing an interest in beauty and fashion (Shumaker et al., 2017), just like other young individuals, who are more inclined towards visual social media platforms like Instagram. This social network has been hailed as a great showcase for beauty and fashion (Lozano-Blasco et al., 2023), becoming a source of

visual consumption for younger audiences (Muñoz-Gallego et al., 2023). Despite the prevalence of normative representations on Instagram (Arévalo-Iglesias and Martínez-López-de-Castro, 2021), it also serves as a tool to promote social inclusion and challenge dominant discourse through self-representation based on visible disability (Bonilla-del-Río et al., 2022).

Disabled athletes are increasingly sharing their own emotions on social media, which also helps to reduce the stigma associated with their social identity by others (Matson-Barkat et al., 2022). Although there are still few initiatives, as even sports clubs often lack transformative inclusion (Jeanes et al., 2019), the Brazilian Paralympic Committee has used its Instagram profile to showcase disabled athletes without weakness and in their personal lives without hiding their bodily identity, aiming to destigmatize people with disabilities in society (Dos-Santos and Fermino, 2016). The Instagram posts of Paralympic athletes also represent a positive advancement in presenting themselves as elite athletes rather than athletes with disabilities (Mitchell et al., 2023).

The importance of these new representations of disability on social media lies in the fact that personal experience and contact with disability are the greatest predictors for increasing attitudes and empathy towards people with disabilities (Bissell et al., 2022). Based on parasocial theory, exposure to images of disabled athletes could lead to attitude changes during the formation of young people's social identity (Suggs and Guthrie, 2017). However, it is true that the desired image of an athlete rather than a person with a disability, as advocated by the International Paralympic Committee, is still not the image perceived by society as a whole (Hellwege and Hallmann, 2020).

While other social media platforms, such as Twitter, have perpetuated the stereotypes present in media framing (Rojas-Torrijos and Ramón, 2021), the posts on Instagram by Paralympic athletes focus on showcasing their participation in sports activities, while non-disabled athletes share content about personal aspects and lifestyle. Potentially, these Paralympic athletes may be mitigating disability stereotypes and promoting a more tolerant and inclusive culture (Mitchell et al., 2021).

In conclusion, disabled athletes have started to take pride in their bodies (Galli et al., 2016) and have found in social media an even greater opportunity for self-expression than what traditional sports participation had offered them (Atkinson, 2019). This represents a qualitative leap compared to media narratives, which have often stereotyped them in Paralympic games, relating their athletic bodies to those of injured athletes (Butler and Bissell, 2015) participating instead of competing (Page et al., 2022). However, despite the risk of body dissatisfaction being present in all audiences (Mañas-Viniegra et al., 2020), it has been identified that the physical appearance of people with disabilities influences the reactions of others, but research has not gone beyond self-perception (Shpigelman and HaGani, 2019), and even less so regarding differences in cognitive perception of people with disabilities who present themselves as athletes.

2. Objectives

The overall objective of this research is to determine the cognitive perception of Spanish and Portuguese university students regarding the image presented by athletes with physical disabilities on Instagram.

The specific objectives are as follows:

- Analyze the attention and emotional intensity evoked by athletes with physical disabilities compared to non-athletes.
- Determine possible differences in attention and emotional intensity based on gender.
- Determine possible differences based on the nationality of the participants.

3. Methodology

Neurocommunication (Cuesta-Cambra et al., 2017) is a research technique used to measure the cognitive processing of Spanish and Portuguese university students in response to stimuli presented by athletes with physical disabilities on the social media platform Instagram. It is a combination of Neuroscience, Psychology, and Economics (Madan, 2010). Although still an emerging field (Morin, 2011), its initial scope has extended beyond measuring advertising effectiveness or consumer behavior to address communication issues rather than marketing-specific topics (Lee et al., 2007; Plassman et al., 2012). Unlike conventional methods of quantitative and qualitative research, Neurocommunication records participants' unconscious reactions, eliminating certain biases that may arise when participants do not always consciously know or want to report certain information (Ariely and Berns, 2010).

To address the research objectives, two non-intrusive instruments of Neurocommunication were used to analyze the participants' attention to the stimuli viewed naturally (eye tracking) and the emotional intensity they experienced (Galvanic Skin Response or GSR). This combination of instruments allows for the prediction of behaviors with an efficacy rate of between 70% and 80% (Varan et al., 2015; Plassman and Karmarkar, 2016). Eye tracking biometrically determines the participants' visual attention by recording their eye movements, focusing on specific areas of interest (AOI) in the stimuli presented, while other areas receive only transient glances or are ignored altogether (Duchowski, 2013). GSR or electrodermal activity (EDA) records the phasic changes in sympathetic neural activity by measuring changes in skin electrical conductance, which reflects changes in emotional intensity captured by the GSR device (Critchley, 2002).

A total of 120 university subjects without disabilities participated randomly and voluntarily in the research at the Complutense University of Madrid (Spain's capital) and the Nova University of Lisbon (Portugal's capital). Fifty percent of the participants were of Spanish nationality, and the other fifty percent were of Portuguese nationality. The distribution between men and women was also equal. The cognitive perception of people without disabilities was evaluated, as biased representations of people with disabilities negatively affect the attitudinal evaluation of these people without disabilities (Von-Sikorski and Schierl, 2014). All participants declared prior to their inclusion that they were regular users of Instagram, making them a valid sample for the present study. The sample size is valid for this type of study, with the scientific literature commonly ranging from 15 to 50 subjects as the most typical range of participants (Kerr-Gaffney et al., 2018). The fieldwork was conducted between June and September 2022. All participants provided informed consent, and the guidelines of the Declaration of Helsinki were followed, especially regarding voluntary participation and anonymous contribution to the research results.

The research was carried out using a Gazepoint GP3HD 150 Hz sampling rate eye tracker and a Gazepoint Biometrics GSR, integrated for data collection in the Gazepoint Analysis UX Edition v.5.3.0 software. Statistical analysis of the data was performed using SPSS v.28 software. Significant differences between groups were identified by applying an ANOVA analysis after demonstrating a normal distribution using the Kolmogorov-Smirnov test.





Regarding the selection of stimuli, it was considered that athletes with physical disabilities are the most active on social media (Teixeira et al., 2020) and express their dissatisfaction with football's dominance as a sport (Rodrigues-Marques et al., 2015). Therefore, four stimuli were presented, comparing two social media posts of individuals with physical disabilities in wheelchairs (one athlete and one non-athlete, highlighting elements related to beauty and fashion) and two individuals with physical disabilities focusing on lower limb amputation (one athlete and one non-athlete), excluding football as the displayed sport. The stimuli were presented naturally and interleaved with others unrelated to this research. The maximum duration of each stimulus was limited to 10 seconds, with 3 seconds of separation between stimuli, to prioritize areas of interest (AOI) that capture the most attention and emotion (Añaños-Carrasco, 2015). Participants could omit stimuli they were not interested in at any time. (Figure 1).

The independent variables were the nationality and gender of the participants, with a similar sociocultural profile in all cases. The dependent variables were the levels of recorded attention and peaks of emotional intensity in response to the visualized stimuli. The quantitative analysis of the data was carried out using three units of measurement: the seconds elapsed from the appearance of the stimulus to the first fixation or time from fixation (TFF), the number of eye fixations or fixation count (FC), and the total seconds of attention to each Area of Interest or total fixation duration (TFD), as well as the peaks of GSR –which may occur up to 3 seconds after the start of emotional activation– for each minimum-maximum pair to determine emotional intensity. The qualitative evaluation was based on heat maps of the attention recorded by the eye tracker.

4. Results

85.83% of the participants chose to pay attention to these stimuli compared to the total of stimuli from different themes presented to them. Therefore, 14.17% of the subjects were not interested in viewing the self-representation of people with disabilities showing explicit physical features of their disability, but they were interested in other types of posts on the social media platform Instagram, which were unrelated to this research.

Figure 1: Areas of Interest (AOI) of the stimuli

(a) Stimulus 1 (S1)	(b) Stimulus 2 (S2)
 <p>11.692 Me gusta abcnews_au Dylan Alcott is now an 11-time grand slam champion 🏆🎉 ... más</p>	 <p>650 Me gusta federicomartelloofficial 10 minuti e si va in scena ❤️ #nonastilistino #federicomartello #teatroNovecento #wheelchairman... más Ver los 54 comentarios irinapopova317 Good luck 🍀❤️❤️❤️ alexandra.stepanenko2004 @federicomartelloofficial aspettiamo il video! 3 se occlude... Ver traducción</p>
AOI 1- Image; AOI 2- Bust; AOI 3- Wheelchair and legs; AOI 4- Complete stimulus.	AOI 1- Image; AOI 2- Bust; AOI 3- Wheelchair and legs; AOI 4- Complete stimulus.
(c) Stimulus 3 (S3)	(d) Stimulus 4 (S4)
 <p>739 Me gusta lindi.marcusen You are one small adjustment away from making your life work. #wonderwomanmindset Ver los 24 comentarios gelo5_vincere Message @vincerewears for a collab 🤝👏 boutiquecentral_official 🙌🙌🙌🙌</p>	 <p>1236 Me gusta julius_palace Free video online ● Watch on #YOUTUBE ● Link in BIO... más</p>
AOI 1- Image; AOI 2- Bust; AOI 3- Disabled leg; AOI 4- Non-disabled leg; AOI 5- Complete stimulus.	AOI 1- Image; AOI 2- Bust; AOI 3- Disabled leg; AOI 4- Non-disabled leg; AOI 5- Complete stimulus.

Source: Elaboration based on Instagram (2022).

Figure 2: Heat maps of the stimuli



Source: Elaboration based on GazePoint Analysis software

The heat maps (Figure 2) revealed, in the initial analysis, that the self-representation of athletes on Instagram attracted more overall attention to explicit physical features of their disability (wheelchair and legs; bionic leg) than in the case of people with disabilities at home, who highlighted beauty and fashion aspects over their sports-related aspect.

The overall attention –profile, image, text, and interactions– received by all four stimuli together (Table 1) only showed significant differences in the time elapsed from the appearance of the stimulus to the first eye fixation. This time was significantly shorter (TFF=0.134; $p=0.027$) for stimulus 3, in which the athlete showed her bionic leg. Similarly, it also had the longest viewing time (TFD=6.919; $p=0.106$) and the highest number of eye fixations (FC=18.56; $p=0.533$). When analyzing gender differences among the participants, stimulus 3 showing the bionic leg received a quicker first fixation from men compared to women (TFF=0.062 vs. 0.162; $p=0.038$), although men had a shorter fixation duration than women (TFD=6.072 vs. 7.226; $p=0.024$).

The two stimuli featuring women, whether athletes or not, attracted a quicker first attention (TFF=0.134 and 0.592, respectively) compared to stimuli featuring men (TFF=0.982 and 0.741, respectively).

Regarding the significant differences observed in the attention of Spanish participants compared to Portuguese participants, the duration of total fixation time and the number of fixations were both longer and higher ($p=0.001$) for Spanish participants in all cases. However, the time until the first fixation was shorter for Portuguese participants compared to Spanish participants in the two stimuli without athletes (TFF E2=0.116 vs. 0.029; $p=0.003$. TFF E4=0.831 vs. 0.335; $p=0.040$).

Table 1: Significant differences between the global AOI of the stimuli.

Fixation	S1-AOI 4	S2-AOI 4	S3-AOI 5	S4-AOI 5	p-value
Mean TFF	0,982	0,741	0,134	0,592	*0,027
Mean TFD	6,596	6,754	6,919	6,162	0,106
Mean FC	17,56	18,02	18,56	17,40	0,533

Source: Author's own work.

When analyzing the results of the images of self-representation of people with disabilities on Instagram (Table 2), there were significant differences in the total duration of eye fixation and the number of fixations ($p < 0.001$ in both cases) –with inconclusive data when comparing athletes vs. non-athletes with disabilities– but there were no significant differences in the time until the first fixation ($p = 0.076$), although it was shorter in the case of the two images of non-athletes oriented towards beauty and fashion.

Regarding the statistically significant differences between Spanish and Portuguese participants, the Spanish participants showed a longer total duration of attention (TFD S1=6.291 vs. 3.652; $p < 0.001$. TFD S2=3.676 vs. 2.422; $p < 0.001$. TFD S3=3.490 vs. 2.653; $p = 0.011$. TFD S4=5.758 vs. 3.285; $p < 0.001$) and a higher number of eye fixations (FC S1=17.12 vs. 10.85; $p < 0.001$. FC S2=10.77 vs. 8.18; $p = 0.001$. FC S4=16.27 vs. 10.77; $p < 0.001$) in the images of almost all stimuli.

The only significant differences between male and female participants occurred in a higher number of fixations towards the third stimulus, in which the female athlete with a bionic leg appeared (FC=11.00 vs. 8.36; $p = 0.007$), and a slower first fixation towards the fourth stimulus, in which the non-athlete woman appeared (TFF=0.185 vs. 0.107; $p = 0.043$).

Table 2: Significant differences between the AOI of the image in the stimuli.

Fixation	S1-AOI 1	S2-AOI 1	S3-AOI 1	S4-AOI 1	p-value
Mean TFF	0,135	0,102	0,227	0,128	0,076
Mean TFD	4,972	3,049	3,071	4,521	*<0,001
Mean FC	13,98	9,48	9,07	13,52	*<0,001

Source: Author's own work.

When comparing the bust of both women in stimuli 3 and 4 (Table 3), it is observed that the non-athlete, with a self-representation based on beauty and fashion, captured attention more quickly (TFF=0.328 vs. 0.429; $p = 0.120$) and significantly ($p < 0.001$) with a longer total duration (TFD=2.224 vs. 1.560) and a higher number of fixations (FC=6.43 vs. 5.03). Spanish participants dedicated a significantly longer total fixation duration compared to Portuguese participants in both cases (TFD S3-AOI 2=1.901 vs. 1.219; $p < 0.001$. TFD S4-AOI 2=2.895 vs. 1.554; $p < 0.001$). Furthermore, men showed a significantly higher number of eye fixations in both stimuli (FC S3-AOI 2=6.47 vs. 4.50; $p < 0.001$. FC S4-AOI 2=8.13 vs. 5.82; $p = 0.001$).

Table 3: Significant differences between the AOI of the bust in the stimuli.

Fixation	S3-AOI 2	S4-AOI 2	p-value
Mean TFF	0,429	0,328	0,120
Mean TFD	1,560	2,224	*<0,001
Mean FC	5,03	6,43	*<0,001

Source: Author's own work.

When comparing the attention registered on the woman athlete's bionic leg with the absence of a leg in the non-athlete woman (Table 4), it was found that the bionic leg captured attention significantly earlier ($p=0.013$), but it also held attention significantly longer (TFD=0.839 vs. 0.602; $p=0.018$) and with a higher number of eye fixations, although without significant differences (FC=2.92 vs. 2.50; $p=0.165$). Spanish participants paid attention to the absence of a leg in the non-athlete woman for a longer duration (TFD=2.402 vs. 3.170; $p<0.001$) and with a higher number of fixations (FC=3.50 vs. 1.50; $p<0.001$) than Portuguese participants, both with statistically significant differences. On the other hand, men were the ones who significantly fixed their attention earlier on the bionic leg compared to the absence of a leg (TFF=3.477 vs. 2.392; $p=0.033$).

Table 4: Significant differences between the AOI of the disabled leg in the stimuli.

Fixation	S3-AOI 3	S4-AOI 3	p-value
Mean TFF	3,667	2,714	*0,013
Mean TFD	0,839	0,602	*0,018
Mean FC	2,92	2,50	0,165

Source: Author's own work.

Regarding the attention registered on the non-disabled leg of the female athlete compared to the non-athlete female (Table 5), it was the non-disabled leg that significantly captured attention faster (TFF=2.657 vs 1.761; $p=0.021$), for a longer duration (TFD=0.207 vs 0.897; $p<0.001$), and with a higher number of eye fixations (FC=1.08 vs 3.70; $p<0.001$). In this case, there were no significant differences between Spanish and Portuguese participants, but there were differences based on gender. Men fixated their attention significantly earlier than women on the non-disabled legs of both stimuli (TFF S3-AOI 4=0.919 vs 3.388; $p=0.006$. TFF S4-AOI 4=1.179 vs 1.968; $p=0.043$). However, they only did so for a significantly longer total duration in the case of the non-disabled leg of the non-athlete female (TFD S4-AOI 4=1.099 vs 0.8223; $p=0.039$).

Table 5: Significant differences between the AOI of the non-disabled leg of the stimuli.

Fixation	S3-AOI 4	S4-AOI 4	p-value
Mean TFF	2,657	1,761	*0,021
Mean TFD	0,207	0,897	*<0,001
Mean FC	1,08	3,70	*<0,001

Source: Author's own work.

Specifically within the third stimulus, the non-disabled leg of the athlete captured the first attention before the bionic leg (Table 6) significantly ($p=0.047$). However, the bionic leg significantly ($p<0.001$) captured a longer duration of attention and a higher number of eye fixations. There were no significant differences between Spanish and Portuguese participants, but there were gender differences. Male participants directed their first attention earlier (TFF S3-AOI 4=0.919 vs 3.389; $p=0.006$) and had a higher number of fixations (FC S3-AOI 4=1.59 vs 0.89; $p=0.015$) on the non-disabled leg.

In the fourth stimulus, the non-disabled leg of the non-athlete woman (Table 6) also captured the first attention significantly faster than the disabled leg ($p < 0.001$). Additionally, it registered significantly ($p < 0.001$) longer total attention duration and a higher number of fixations compared to the disabled leg, as well as in the overall areas of interest formed by legs with and without disabilities. Spanish participants directed their attention to the disabled leg earlier (TFF S4-AOI 3=2.402 vs 3.170; $p < 0.001$), but Portuguese participants did so with a higher number of fixations (FC S4-AOI 3=3.50 vs 1.50; $p < 0.001$), both significantly.

Male participants, on the other hand, viewed the disabled leg later than females significantly (TFF S4-AOI 3=3.477 vs 2.392; $p = 0.033$). However, they directed their first attention to the non-disabled leg significantly earlier (TFF S4-AOI 4=1.179 vs 1.968; $p = 0.043$), and also showed a significantly longer total fixation duration on the non-disabled leg compared to females (TFD S4-AOI 4=1.099 vs 0.823; $p = 0.039$).

Table 6: Significant differences between the AOI of the leg with disability vs. the leg without disability of the stimuli.

Fixation	S3-AOI 3	S3-AOI 4	p-value	S4-AOI 3	S4-AOI 4	p-value
Mean TFF	3,667	2,657	*0,047	2,714	1,761	*<0,001
Mean TFD	0,839	0,207	*<0,001	0,602	0,897	*<0,001
Mean FC	2,92	1,08	*<0,001	2,50	3,70	*<0,001

Source: Author's own work.

The male athlete captured the first fixation on the area of interest formed by the legs integrated in the wheelchair (Table 7) before it was registered by the non-athlete male stimulus (TFF=1.179 vs. 2.301), with a longer total duration (TFD=1.451 vs. 0.540) and a higher number of ocular fixations (FC=4.57 vs. 2.43), all of which were statistically significant ($p < 0.001$).

Regarding the bust (Table 7), it was the bust of the non-athlete male that captured a faster first attention (TFF=2.445 vs. 0.375), with a longer total duration (TFD=2.134 vs. 1.548) and a higher number of ocular fixations (FC=6.71 vs. 4.85) compared to the male athlete, in all cases with statistically significant differences ($p < 0.001$).

Although there were several significant differences between Spanish and Portuguese participants in these areas of interest, with some of them being disparate, it was noteworthy that the second stimulus (non-athlete male) showed significant differences with a longer attention duration (TFD S2-AOI 3=0.727 vs. 0.353; $p < 0.001$) and a higher number of fixations (FC S2-AOI 3=2.90 vs. 1.97; $p = 0.002$) from Spanish participants compared to Portuguese participants, focusing on the wheelchair and legs area.

Regarding gender, two statistically significant differences were observed: males directed their first attention earlier to the area of interest formed by the wheelchair and legs of the non-athlete male (TFF S2-AOI 3=0.961 vs. 2.778; $p = 0.004$), and they showed a shorter attention duration towards the bust of the male athlete (TFD S1-AOI 2=1.175 vs. 1.684; $p = 0.026$) compared to females.

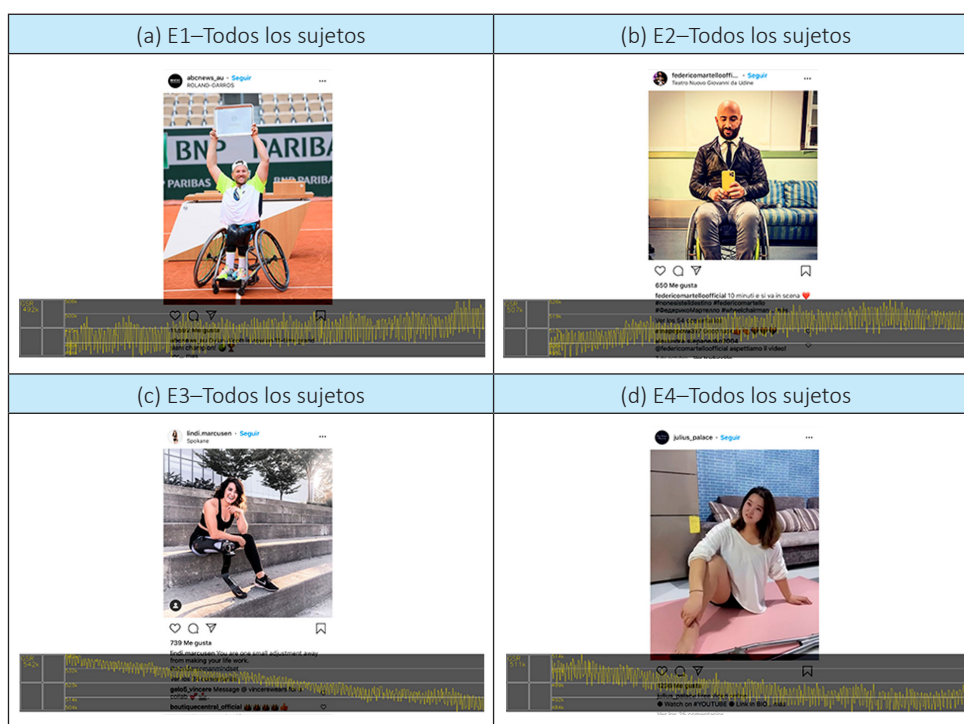
Table 7: Significant differences between the AOI of the wheelchair/legs and the bust of the stimuli.

Fixation	S1-AOI 3	S2-AOI 3	p-value	S1-AOI 2	S2-AOI 2	p-value
Mean TFF	1,179	2,301	*0,047	0,375	0,2445	*<0,001
Mean TFD	1,451	0,540	*<0,001	1,548	2,134	*<0,001
Mean FC	4,57	2,43	*<0,001	4,85	6,71	*<0,001

Source: Author's own work.

The data of emotional intensity (Figure 3) did not show statistically significant differences. However, while the visualization of people with disabilities in wheelchairs triggered stable levels of emotion, with a minimal increase throughout the visualization, the woman with the bionic leg and the woman with the amputated leg registered a decline in emotional intensity as seconds passed from the start of their visualization. These findings corroborate and are consistent with the attention records analyzed earlier.

Figure 3: GSR peaks of the stimuli.



Source: The data from the GazePoint Analysis software were used for this analysis.

5. Discussion and Conclusions

Given that the participants volunteered for this study, it is worth noting that nearly 15% of the subjects chose not to pay attention to the stimuli featuring individuals with explicit characteristics that reveal their disability, whether they were athletes or not. This finding may be a result of the media's lack of interest in visualizing disability without stereotypes (Shioume and Ito, 2022) and the associated stigma of not conforming to societal standards of physical beauty (Hahn, 1988), which could have influenced the attention of some of these young Spanish and Portuguese university students.

Considering all the Instagram posts as a whole –including profile, image, text, and interactions– the woman athlete displaying her bionic leg received the fastest initial attention, the longest duration of attention, and the highest number of eye fixations among all the stimuli, with statistically significant differences. Her Instagram post itself represents a tendency of self-expression and pride in the displayed body (Galli et al., 2016; 2019).

However, it is essential to question whether these results are consistent with the negative perceptions identified in the scientific literature regarding the concepts of "supercrip" and "cyborg," which have sometimes led to the ridicule of successful athletes with technological prostheses (Berger, 2008; Silva & Howe, 2012; Smith, 2015), hindering the audiences' acceptance of such bodies (Pullen et al., 2020). In the results obtained for the stimulus of the non-athlete woman, the non-disabled leg captured attention earlier, with a longer duration of attention and a higher number of eye fixations compared to the disabled leg, all with statistically significant differences. When analyzing the stimulus of the female athlete with a bionic leg, the non-disabled leg also received the first attention, but subsequently, the disabled (bionic) leg presented a longer total duration of attention and a higher number of eye fixations, again with significant differences. The bionic leg also received more attention, in terms of both duration and number of fixations, than the absence of the leg in the non-athlete woman's stimulus, with significant differences. These attention-related findings align with a decreasing emotional intensity observed during the visualization of the stimuli. Therefore, it appears that the stigmas associated with the "supercrip" and "cyborg" designations are still present.

Considering a more conventional physical disability, from the perspective of representations often seen in the media, the area of interest formed by the wheelchair and legs of the male athlete received faster initial attention, longer duration of attention, and a higher number of eye fixations than the non-athlete male, with statistically significant differences in all cases. These data are consistent with a stable, minimally increasing emotional intensity. It appears that the explicit elements of the athlete's disability continue to capture attention from the stereotyped perspective of athletes being equated with injured athletes (Butler & Bissell, 2015).

In contrast, the bust of the non-athlete male received attention from a perspective of beauty and fashion, detached from explicit disability traits present in the image. It registered faster time until the first fixation, longer duration of attention, and a higher number of eye fixations compared to the athlete's bust, with statistically significant differences in all three analyzed variables. This finding was also corroborated by a more pronounced increasing emotional intensity. The same occurred in the stimulus featuring the non-athlete woman, capturing faster initial attention, longer duration of attention, and more eye fixations.

Furthermore, when the self-representation on Instagram involved women, there was a greater opportunity to attract faster initial attention in all presented stimuli. This aspect could signify a qualitative shift in the traditional invisibility of female athletes (Rees et al., 2019).

Spanish participants in the study exhibited longer attention duration and more eye fixations across all stimuli, both in the global analysis and when considering images as areas of interest. Conversely, Portuguese

"Neurocommunication is a research technique used to measure the cognitive processing of Spanish and Portuguese university students in response to stimuli presented by athletes with physical disabilities on the social media platform Instagram"

participants were quicker to direct their first attention, particularly when athletes were not present. This suggests that Portuguese participants might be more drawn to representations of beauty and fashion than explicit physical disability, possibly reflecting a lower normalization of such images in the stimuli they encounter in their daily lives. These results align with the fact that exposure to Paralympic sports in Portugal is still limited, although it is growing (Rodrigues-Marques et al., 2015). Nevertheless, it should not be overlooked that the situation of Spanish Paralympic athletes in news media has been described as concerning, with their representation often being stereotyped and lacking full social participation (Kolotouchkina et al., 2021).

In conclusion, athletes, overall, captured more attention regarding features explicitly showing their disability compared to non-athlete individuals with disabilities, who self-represented on visual social media like Instagram from the perspective of beauty and fashion. However, attention to the details of all image elements is necessary since the results were not conclusive in all cases. These findings might imply that self-representation based on beauty and fashion in social media captures more audience attention and emotional intensity when presented as attractive individuals than when displaying explicit exterior traits of disability, even in all cases. Nevertheless, this could lead to a reduction of the perceived athletic status by the audience and, consequently, the generation of a new stereotype. Despite this, these conclusions would shift the focus from the medical approach to people with disabilities who practice sports to the social model, centered on social perceptions (Brittain, 2004) from their self-representation on social media. This could help reduce the stigma of social identity perceived by non-disabled audiences (Matson-Barkat et al., 2022), change attitudes from the formation of social identity in young people (Suggs & Guthrie, 2017), and enhance empathy (Bissell et al., 2022) toward this community.

The main limitation of this study is the lack of representativeness of the convenience sample used compared to the entire population. However, its selection is justified by the scientific literature for the purpose of this research. Future lines of investigation include expanding the cognitive perception of Spanish and Portuguese university students towards the self-representation of people with disabilities on social media from the perspective of beauty and fashion, encompassing various disability types. Further research will also be required to delve into the content and narrative of the self-representation of people with disabilities on social media.

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