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Abstract

The literature suggests that people with invisible disabilities face more social difficulties than those with visible ones. Thus, the visibility criterion can constitute a core factor to understand the stigmatisation of people with disabilities. The main aim of this research is to examine if the “warm but incompetent” stereotype associated with disability varies according to the visibility criterion. A complementary aim is to investigate how taking onset controllability into account can help to understand the stereotyping faced by people with a disability. To do this, we conducted four studies, using between- (pilot study) and within-subject (Studies 1a, 1b, and 2) designs. Our results consistently support the hypothesis that stereotypes associated with disabilities vary according to visibility. Specifically, people with invisible disabilities are perceived to be less warm but more competent than those with visible disabilities. Furthermore, more surprisingly, perceived controllability increases both warmth and competence perceptions. These findings highlight the importance of considering the characteristics of a disability to understand stigmatisation.

Keywords

disability, intergroup relations, stereotypes, stigma, visibility

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According to the World Health Organization (WHO, 2021), almost 15% of the world population have a disability. Despite increasing legal protection of people with a disability (Series, 2019), they are still strongly stigmatised (Angermeyer & Matschinger, 2003; Cahill & Eggleston, 1995; Corrigan, 2014). People with disabilities encounter difficulties in being fully included in society, and face both direct and indirect discrimination. For example, children with disabilities still have less access to regular schools than children with

typical development (e.g., Bastart et al., 2021; Scharf et al., 2017), and adults with disabilities are less employed than those without disabilities (e.g., Bjørnshagen & Ugreninov, 2021; Carr &

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Namkung, 2021). Disability is associated with negative beliefs and feelings, including a low-status stereotype (Aubé et al., 2023; Clément-Guillotin et al., 2018; Granjon, Rohmer & Popa-Roch, 2022; Granjon et al., 2023a; Rohmer & Louvet, 2018). So far, disability has been mainly studied as a homogenous group, yet disability refers to a diversity of situations. Thus, the overarching aim of the present research is to investigate whether the stereotype about people with disabilities fits the diversity of these situations.

The Range of the Disability Stereotype

To investigate the disability stereotype, numerous studies relied on the framework of the stereotype content model (SCM; Fiske & Bai, 2020; Fiske et al., 2002; Rohmer & Louvet, 2018; see also Abele et al., 2021). Accordingly, stereotypes of social groups are underpinned by two fundamental dimensions: warmth (e.g., nice, friendly), which refers to interpersonal relations and aims to estimate the intentions of the target (i.e., positive or negative), and competence (e.g., capable, skilful), which refers to the capacity of the targets to reach their objectives and to transform intentions into actions. In this framework, people with disabilities are consensually broadly judged “warm but incompetent” (e.g., Clément-Guillotin et al., 2018; Louvet et al., 2009; Wu & Fiske, 2019). Therefore, an ambivalent stereotype characterises them. On the one hand, negative judgments of competence justify the person’s low status in the social structure. On the other hand, people with disabilities are judged as warm, in response to the strong normative protection. For example, they are perceived as not fitting well in high responsibility positions, but being really nice and easy-going colleagues (Louvet & Rohmer, 2016). Nevertheless, of most importance, studies showing the “warm but incompetent” stereotype content were mainly conducted with prototypical disability cases, namely people in wheelchairs, considered as representative of all disabilities (e.g., Fritsch, 2013; Rohmer & Louvet, 2009, 2012). Given the diversity of disabilities, a question that remains unanswered is to what extent

the “warm but incompetent” stereotype applies to all disability types.

With more than 1 billion people with disabilities around the world, disability is a highly heterogeneous category covering a wide range of diseases or disorders, such as sensory disabilities (e.g., deafness), autoimmune diseases (e.g., human immunodeficiency virus), chronic diseases and chronic pain (e.g., rheumatoid arthritis), cognitive disorders (e.g., learning disorders), sleep disorders (e.g., sleep apnoea), or psychological disorders (e.g., depression) among others (International Classification of Functioning, Disability, and Health¹). Research assessing stereotypes associated with specific categories of impairments has suggested some variability in the content of the stereotype of different psychological and mental disorders (Aubé et al., 2023; Sadler et al., 2012, 2015). For example, while people with psychotic disabilities (e.g., schizophrenia) are perceived as low on both warmth and competence, people with mood and anxiety disorders are perceived more positively and are rated with average levels of both warmth and competence. Only people with neurocognitive deficits (e.g., people with Alzheimer’s disease) seem to be judged similarly to people with physical disabilities, and are associated with low competence but high warmth. In this line, Canton et al. (2023) recently extended evidence of variations in stereotype content to more diverse categories of impairments, such as sensorial and motor disabilities. These contributions are important as they allow us to understand the variability of stereotypes at the root of stigmatisation experiences (Bourguignon & Herman, 2015; Crocker et al., 1998; Link & Phelan, 2001, 2013). However, previous research either focused on disability through the lens of its prototypical representations or through singular impairments (Aubé et al., 2023), without considering encompassing criteria identified in the literature as factors accounting for stigmatisation (Crocker et al., 1998; Goffman, 1963; Jones et al., 1984). Among them, one has been shown to be particularly relevant: the (in)visibility of the stigma (Crocker et al., 1998; Quinn & Earnshaw, 2011), understudied in the disability field.

A Key Factor in Stigmatisation: The (In) Visibility Criterion

The visibility criterion seems a core factor to understand the stigmatisation of people with disabilities, all the more since 80% of people with disabilities have an invisible impairment (National Institute of Statistics and Economic Studies, French Interministerial Committee on Disability, 2014). Invisible disability is an “umbrella term to refer to disabilities that interfere with day-to-day functioning but do not have a physical manifestation” (Mullins & Preyde, 2013, p. 148). Evidence broadly confirms that people with invisible disabilities face more difficulty with inclusion in their daily life compared to people with visible disabilities (e.g., Mills, 2017; Olkin et al., 2019) both at school (e.g., Cook, 2001; Cook & Semmel, 1999; Jury et al. (2021) and at work (e.g., Colella et al., 2004; Paetzold et al., 2008). For instance, in the work context, accommodations made for employees with an invisible impairment are often perceived as superfluous and more unfair than accommodations made for employees with a visible disability, even when coworkers are aware of the nature of the invisible disability. Colleagues may doubt the authenticity of the disability, believing that the person is faking it to obtain advantages (e.g., flexible working hours; Colella, 2001). In general, it appears easier to challenge the legitimacy of an accommodation when the impairment does not fit the prototypical representation of disability (i.e., a person in a wheelchair; Colella et al., 2004; Paetzold et al., 2008; Santuzzi et al., 2014). Thus, while literature on the stigmatisation of people with invisible disabilities is rare (Granjon, 2021; Granjon, Aubé et al., 2022), existing evidence suggests that invisible disabilities trigger distrust, suspicion, and discriminatory behaviours (Cook, 2001; Cook & Semmel, 1999; Granjon et al., 2023b; Jury et al., 2021; Mills, 2017; Olkin et al., 2019). Thus, the main objective of this research is to examine if the “warm but incompetent” stereotype associated with disability varies according to the visibility criterion.

Overview and Hypotheses

Stereotypes play a crucial role in the process of stigmatisation as they contribute to the discrimination experienced by low-status groups (Bourguignon & Herman, 2015; Crocker et al., 1998). Nevertheless, the literature has mainly focused either on the stereotypes concerning the prototypical disability representation (i.e., wheelchair users; Rohmer & Louvet, 2012) or on the ones concerning specific impairments (Aubé et al., 2023), without considering the influence of encompassing stigma criteria. In this line, the (in) visibility of the stigma appears to be particularly important to consider (Crocker et al., 1998; Quinn & Earnshaw, 2011). Thus, the objective of this research is to examine whether the general stereotype of people with disabilities varies according to the visibility criterion. Real settings research suggests that an invisible disability triggers greater social barriers than a visible disability, such as distrust, suspicion, and discriminatory behaviours (Jury et al., 2021; Mills, 2017; Newheiser & Barreto, 2014; Olkin et al., 2019; Paetzold et al., 2008). Based on the SCM (Fiske et al., 2002), we expect that individuals with invisible disabilities may encounter more negative stereotypes, especially on the warmth dimension. Indeed, warmth is closely associated with interpersonal relationships, and a negative perception of this dimension may lead individuals to be reluctant to reduce social distance from members of the target group (Fiske et al., 2002; Rohmer & Louvet, 2018). In addition, warmth tends to exhibit greater variability perception across contexts as it is rooted in subjective aspects, particularly in how interactions are envisioned and comprehended. This is in contrast to the relatively stable competence dimension, which reflects more objective attributes such as power, status, and economic resources (Koch et al., 2021; Yzerbyt & Cambon, 2017).

To test our predictions, one pilot study and three main studies were conducted. The pilot study had two objectives. First, it aimed to explore whether people have distinguishable stereotypes of disabilities as a function of their visibility. To this end, we

measured warmth and competence spontaneous judgments of visible and invisible disability groups using a between-subjects design. Second, it aimed to investigate which disorders lay people associate with each category of disability (i.e., visible and invisible), in order to generate meaningful material (i.e., exemplars for each category) for the subsequent studies. Studies 1a and 1b aimed to examine the stereotypes associated with people with invisible disabilities versus people with visible disabilities, by eliciting explicit intergroup comparison. We employed bidirectional scales contrasting visible and invisible disabilities with only positive attributes in Study 1a, and balanced positive and negative attributes in Study 1b. Bidirectional scales prevent the shifting standards effect and are thus appropriate to measure stereotypes (Biernat, 2003), especially when comparing a less prototypical subgroup (such as invisible disability) to a more prototypical subgroup (such as visible disability) within a given supracategory (here, disability; Smith & Zárate, 1992). However, comparing directly visible and invisible disability has a limitation in the artificial opposition between groups it created. To overcome the issue of comparing directly visible and invisible disability, Study 2 was carried out. In this study, participants were asked to rate a set of disabilities rather than generic groups, to gain more ecological validity. We included different impairments and allowed participants to attribute judgments of visibility on a continuum without creating an artificial opposition between visibility and invisibility. Moreover, Study 2 introduced an additional interesting variable relevant to the stigmatisation process. Based on previous research showing that controllability triggers negative evaluation of illness (e.g., Dijkster & Koomen, 2003), Study 2 aimed to investigate whether considering onset controllability may advance the understanding of the stereotype faced by people with a disability.

Transparent and Ethical Research Practices

The studies were preregistered; preregistrations and all materials concerning these studies are accessible on Open Science Framework (OSF).² Institutional approval of the protocol was

obtained from the University of Strasbourg (accreditation number: CER/ Unistra /2020-11).

Pilot Study

Participants and Design

Based on previous studies using self-report measurements to investigate the stereotype content associated with people with disabilities (Rohmer & Louvet, 2012), we expected a medium effect size ($d=0.50$) with a fixed α -level (.05) and a high statistical power of .90, which requires at least 70 participants in each condition. In all, 259 all comers ($M_{\text{age}} = 26.08$, $SD_{\text{age}} = 10.49$; 210 women) were recruited online via French social media (e.g., Facebook, LinkedIn). In this experiment, we used a mixed design with 2 within-participant conditions (warmth dimension vs. competence dimension) \times 2 between-participant conditions (visible disability vs. invisible disability).

Materials

To assess the perceived competence and warmth of people with disabilities (invisible and visible), participants indicated the extent to which most people associate a series of traits with people with visible or invisible disabilities (depending on the condition) on a 7-point scale (1 = *not at all*, 7 = *absolutely*). Traits were selected based on previous research on stereotypes (Clément-Guillotin et al., 2018): warm, nice, friendly, honest, and well intentioned for the warmth dimension (Cronbach's $\alpha = .84$); competent, intelligent, capable, independent, and efficient (Cronbach's $\alpha = .83$) for the competence dimension.

Procedure

Participants completed the study on an online platform (Qualtrics). The whole experiment was organised in five parts. First, depending on the condition, an invisible or visible disability context was activated through a short text reporting descriptive and factual events (see supplemental material on OSF³). The two texts—one activating the visible disability; the other, the

invisible disability—had exactly the same structure and differed on the same four points to prime the two experimental conditions. The keywords that differed between the two prime texts were “visible disability,” “directly noticeable,” and “20%” for visible disability; and “invisible disability,” “not directly noticeable,” and “80%” for invisible disability.⁴ The priming method via keywords in a text has not only been shown to trigger long-lasting activation (Foss, 1982), but also has proven its effectiveness in activating the concept of disability (Ginsberg et al., 2012). The second part of the experiment checked the effective activation of the invisible or visible disability context by asking participants to recall three to five ideas presented in the text they had just read. Third, participants rated competence and warmth judgments on the 7-point scale. Fourth, a second check was done to ensure that the visible versus invisible disability context was activated during ranking using the scale. The check consisted in listing the types of conditions (i.e., diseases, disabilities) the participants had in mind when ranking with the scale. This step related to a secondary objective of this study: To collect exemplars of the disabilities and diseases participants had in mind after having read the vignette that activated the visible versus invisible disability. These items were then analysed, controlling for seriousness and visibility, and used as material in Studies 1a and 1b (more details are available on OSF). Fifth, demographic data (age, sex, and profession) were collected.

Results

Nineteen participants were excluded from analysis due to a scale invariant response style. A principal component analysis (PCA) with varimax rotation was performed, and confirmed the two-factor solution (i.e., warmth and competence), which explained 61.20% of the variance according to the stereotype dimensions. The first factor included the five warmth items: warm, nice, friendly, honest, and well intentioned; the second factor included the five competence items: competent, intelligent, capable, independent, and efficient.

The results showed a main effect of disability category, $F(1, 247) = 5.40$, $p < .010$, $\eta_p^2 = .02$, in favour of an overall higher rating of invisible disability ($M = 4.73$, $SD = 1.21$) than of visible disability ($M = 4.45$, $SD = 1.29$). A significant main effect was also found for the stereotype dimensions, $F(1, 247) = 195.35$, $p < .001$, $\eta_p^2 = .442$, indicating that participants attributed more warmth ($M = 5.12$, $SD = 1.10$) than competence ($M = 4.03$, $SD = 1.17$). More importantly, a mixed ANOVA revealed a significant interaction effect between stereotype dimensions and category of disability, $F(1, 247) = 3.88$, $p = .050$, $\eta_p^2 = .015$. Post hoc analysis revealed that participants attributed higher competence to invisible disability ($M = 4.26$, $SD = 1.16$) than to visible disability ($M = 3.83$, $SD = 1.15$, $p = .018$). No significant difference was found on the warmth dimension, $p = .800$ (invisible disability: $M = 5.19$, $SD = 1.07$; visible disability: $M = 5.06$, $SD = 1.12$).

Discussion

The aim of the pilot study was to explore whether people have distinguishable stereotypes of disabilities as a function of their visibility. Results confirmed the relevance of taking account of this criterion: visible and invisible disability differed in lay people’s perceptions since they rated them differently according to the main dimensions of the stereotype content. Contrary to our hypothesis, no difference was found in warmth attribution, but people with invisible disability were rated rather more positively on the competence dimension than people with visible disability. In other words, people with invisible disabilities are judged warmer than competent, as people with disabilities are usually judged (Clément-Guillot et al., 2018; Fiske et al., 2002; Rohmer & Louvet, 2012). However, they are judged more competent than people with visible disabilities. This result may contrast with field investigations suggesting harsher treatment of people with invisible disabilities (e.g., Mills, 2017; Paetzold et al., 2008). Our results could be explained by the difficulties people may have imagining what an “invisible disability” is. Indeed,

while there is no doubt that visible disability is the prototypical representation of disability (Rohmer & Louvet, 2009), it is hard to grasp the extent to which people understand the exact meaning of invisible disability. Consequently, it may be more difficult to mobilise specific beliefs towards an entity that one may admit exists, but for which no perceptive cues are available. This difficulty was reinforced by the fact that we asked for an evaluation in absolute terms, without introducing a context in which the disability could manifest itself.

To help participants comprehend the invisible disability, in Studies 1a and 1b, we created a context that forced them to consider themselves in a specific situation by having them collaborate with individuals with disabilities rather than directly evaluate a group. Furthermore, we illustrated both disability categories with examples extracted from the pilot study. The aim of Studies 1a and 1b was to replicate the assessments of stereotypes related to the two types of disability using a bidirectional scale. In Study 1a, only positive traits were used, whereas Study 1b included both positive and negative traits in order to demonstrate that the results can be extrapolated beyond the traits generally used to measure stereotypes in the literature (e.g., Fiske et al., 2002). Bidirectional scales are considered to be less sensitive to intragroup comparisons, which is problematic when dealing with the assessment of stereotypes using Likert-type scales (i.e., from the shifting standards model; Biernat, 2003). For instance, in the pilot study, it remains unclear whether participants rated individuals with invisible disabilities relative to those without disabilities (i.e., a nonsocial category according to Rohmer & Louvet, 2018), or to individuals with visible disabilities. Conversely, bidirectional scales are more likely to highlight stereotypes (Biernat, 2003; Gainforth et al., 2013), since explicitly comparing the evaluation of visible versus invisible disabilities can help control for the shifting standards effect. Here, it may be the case since (a) people tend to spontaneously compare a less prototypical subgroup (invisible disability) with a more prototypical subgroup (visible disability) of the supracategory (disability), rather than to

another category (Smith & Zárate, 1992); and (b) people without disability do not represent a standard of comparison, as this label does not reflect a meaningful category (Rohmer & Louvet, 2011, 2018). Finally, in order to rule out the possibility that the results of the pilot study are accountable in terms of participants' familiarity with disability (disability-related knowledge and experience; Corrigan & Nieweglowski, 2019), the subsequent studies controlled for the contribution of the latter.

Study 1a

Participants and Design

Based on the effect size obtained in the pilot study, we expected a low effect size ($\eta^2 = .15$) with a fixed α -level (.05) and a high statistical power of .90, which requires at least 66 participants in all.⁵ We recruited 219 all comers ($M_{\text{age}} = 33.66$, $SD_{\text{age}} = 14.11$; 144 women) through an online platform (PsyToolKit; Stoet, 2010, 2017) via French social media (e.g., Facebook, LinkedIn).

Materials

Participants responded the Stereotype Content Scale. They had to specify the extent to which they would associate a series of traits with people with invisible and visible disability on a 7-point scale (1 = *strongly associated with people with invisible disabilities*, 7 = *strongly associated with people with visible disabilities*), directly opposing visible and invisible disability, with 4 indicating "equally associated with visible and invisible disability" (Clément-Guillotin et al., 2018). We used the same positive traits used in the pilot study: warm, nice, friendly, honest, and well intentioned for warmth (Cronbach's $\alpha = .79$); competent, intelligent, capable, independent, and efficient for competence (Cronbach's $\alpha = .80$).

Procedure

The study comprised several separate stages.⁶ First, a short text describing definitions of both

invisible and visible disability was displayed, as well as exemplars of each disability type extracted from the pilot study (see pilot study and supplemental material on OSF). The two conditions of disability were presented to each participant. Second, to give more sense and to contextualise the experimental situation, an interdependent situation was introduced as remote working cooperation. We assumed that in this specific interaction, disability (especially invisible disability) makes sense. Indeed, attitudes toward disability are likely to be activated in real contexts and during interpersonal encounters (Fiske & Bai, 2020). Using these means, all the participants were obliged to focus on the same goal. To this end, participants were informed that they had to cooperate with a work colleague with a disability located abroad, in order to create and submit a work project before a deadline. Successful cooperation with this colleague would lead to promotion (see supplemental material on OSF). Third, participants were instructed to categorise disabilities into two groups: visible (including wheelchair, hemiplegic, malformed, amputee, paralyzed, tetraplegic, trisomic, hunchback, one-legged, myopathic, and dwarf) and invisible categories (including autism, intellectual disability, cystic fibrosis, diabetes, hemophilia, muteness, schizophrenia, asthma, dyslexia, and depression), using a computer interface.⁷ This step ensures that participants are able to differentiate between different impairments on the basis of their visibility. Fourth, participants responded the Stereotype Content Scale. Fifth, participants provided sociodemographic information. Finally, participants were asked to state whether they considered themselves to be familiar with the disability issue.

Results

We excluded 28 participants with an invariant response style through the scale, and five participants who did not complete the scale. A PCA with varimax rotation was performed and confirmed the two-factor solution (i.e., warmth and competence), which explained 58.6% of the variance according to the stereotype dimensions.

We conducted confirmatory analyses to assess whether there is a significant difference in mean scores on the scale between the visible and invisible disability conditions. As mentioned above, the scale was bidirectional, meaning that the lower the score, the more the trait is attributed to an invisible disability; and the higher the score, the more the trait is attributed to a visible disability. First, a one-way ANOVA confirmed that warmth was preferentially attributed to people with visible disabilities, while competence was preferentially attributed to people with invisible disabilities, $F(184) = 75.10$, $p < .001$, $\eta_p^2 = .29$. The result remained consistent even when incorporating familiarity into the statistical model, as there was no interaction between the familiarity variable and the judgement variable, $F(1, 184) = 0.85$, $p = .359$, $\eta_p^2 = .01$. Furthermore, one-sample t tests relative to the midpoint of the scale (i.e., 4) revealed that warmth traits were preferentially rated in favour of visible disability, $t(185) = 6.07$, $p < .001$, $d = 0.44$, 95% CI [0.29, 0.59], while competence traits were preferentially rated in favour of invisible disability, $t(185) = -5.88$, $p < .001$, $d = -0.43$, 95% CI [-0.58, -0.28]. Descriptive statistics are presented in Table 1.

Study 1b

Participants and Design

Based on the effect size obtained in the pilot study, we expected a low effect size ($\eta^2 = .15$) with a fixed α -level (.05) and a high statistical power of .90, which requires a total of at least 66 participants (see Endnote 5). We recruited 234 all comers ($M_{\text{age}} = 35.25$, $SD_{\text{age}} = 13.39$; 210 women) through an online platform (PsyToolKit; Stoet, 2010, 2017) via French social media (e.g., Facebook, LinkedIn). In this study, we used a within-participant design with 2 (positive vs. negative valence) \times 2 (visible disability vs. invisible disability) conditions.

Materials

Participants used the same 7-point bidirectional scale as in Study 1a. Like in Study 1a, they were

Table 1. Mean scores and standard deviations in the Stereotype Content Scale according to stereotype dimension and valence: Studies 1a and 1b.

	Warmth		Competence	
	<i>M</i> (<i>SD</i>)	<i>t</i> test	<i>M</i> (<i>SD</i>)	<i>t</i> test
Study 1a				
Positive attributes	4.49 (1.12)	6.07***	3.45 (1.28)	-5.88***
Study 1b				
Positive attributes	4.43 (1.05)	5.75***	3.72 (1.28)	-3.30***
Negative attributes	3.52 (1.01)	-6.61***	4.37 (1.23)	4.23***

Note. Study 1a: $N = 187$; Study 1b: $N = 198$; *t* tests were computed against 4 (i.e., midpoint); when the mean is above 4, it indicates the attribute has been preferentially ascribed to visible disability. When the mean is below 4, the attribute has been preferentially ascribed to invisible disability.

***Significant *t* tests ($p < .001$).

required to specify the extent to which they associated traits with people with invisible and visible disability. Unlike in Study 1a, eight positive and eight negative traits were selected to represent the dimensions of the beliefs (Rohmer & Louvet, 2012): agreeable, kind, nice, and warm for warmth positive traits (Cronbach's $\alpha = .80$); hypocrite, liar, nasty, and selfish for warmth negative traits (Cronbach's $\alpha = .79$); capable, efficient, intelligent, and competent for competence positive traits (Cronbach's $\alpha = .80$); and incapable, inefficient, disorganised, and incompetent for competence negative traits (Cronbach's $\alpha = .77$).

Procedure

The procedure used for this study was identical to that used in Study 1a.

Results

Thirty-six participants were excluded from the analysis because of an invariant response style through the scale. The PCA with varimax rotation identified four factors that explained 63.8% of total variance and corresponded to the positive and negative valence of the two stereotype dimensions.

Data were analysed in the same way as in Study 1a (see Table 1 for descriptive statistics). No main effect of valence, $F(1, 196) = 1.09$, $p = .297$, $\eta_p^2 = .01$, or of dimension was

significant, $F(1, 196) = 1.86$, $p = .174$, $\eta_p^2 = .01$. A significant interaction was identified between dimension and valence, $F(1, 196) = 79.20$, $p < .001$, $\eta_p^2 = .29$, indicating that positive warmth-related qualities and negative competence-related qualities are more closely linked to visible disabilities (as indicated by the top of the scale), whereas negative warmth-related qualities and positive competence-related qualities are more closely linked to invisible disabilities (as indicated by the bottom of the scale; all p s $< .001$). To assess whether the two dimensions were rated differently depending on category of disability, we compared the scores against the scale midpoint (i.e., 4) using one-sample *t* tests. Positive warmth traits were preferentially attributed to visible disability, $t(197) = 5.75$, $p < .001$, $d = 0.41$, 95% CI [0.26, 0.55], and negative ones were attributed to invisible disability, $t(197) = -6.61$, $p < .001$, $d = -0.47$, 95% CI [-0.62, -0.32]. Conversely, positive competence traits were preferentially attributed to invisible disability, $t(197) = -3.31$, $p < .001$, $d = -0.23$, 95% CI [-0.38, -0.09], and negative ones were attributed to visible disability, $t(197) = 4.23$, $p < .001$, $d = 0.30$, 95% CI [0.16, 0.44]. As in Study 1a, these results remained unchanged when familiarity was incorporated in the statistical model, and familiarity did not moderate any of the effects, all F s(1, 196) < 1.66 , all p s $> .200$, and all $\eta_p^2 < .008$.

Discussion

The aim of Studies 1a and 1b was to examine the stereotypes associated with people with invisible disabilities in contrast to those associated with visible disabilities, using an experimental design variation. This was achieved by eliciting explicit intergroup comparisons. As in the pilot study, the results of Studies 1a and 1b confirmed that competence is more associated with invisible disability than with visible disability. However, contrary to the pilot study, where no difference was found on the warmth dimension, the results of Studies 1a and 1b show that the pattern concerning warmth is the opposite to the pattern concerning competence, with warmth more attributed to visible disabilities than to invisible disabilities. The change in the way of measuring may explain this result since the scale of Studies 1a and 1b explicitly opposed visible and invisible disability, which is thought to better capture stereotypical beliefs (Biernat, 2003). Using a within-participant design, our results confirmed the different beliefs regarding the two categories, with judgments of invisible disability approaching those of people without disabilities (i.e., more competent but less warm).

Overall, the pilot study, as well as these two studies, confirmed that the stereotype associated with disability, in its prototypical form, differs based on the (in)visibility nature of the disability, which can have varying implications for stigmatisation. To broaden the analysis of the stereotypes and to overcome the visible/invisible opposition constraint, in Study 2, participants were allowed to rate the visibility of different impairments on a continuum, without imposing an (in)visibility mindset.

A complementary aim of Study 2 was to investigate how taking onset controllability into account can help to understand the stereotyping faced by people with a disability. Indeed, onset controllability has been shown as another core stigma criterion of interest (Jones et al., 1984). The controllability criterion, although relevant, has been even less investigated than visibility in disability stereotype literature. It makes reference to the extent to which the causes of the stigma are

perceived as having been under the person's control (Dooley, 1995; Schwarzer & Weiner, 1991). High onset controllability tends to elicit more negative reactions (Dijker & Koomen, 2003; Lyons et al., 2017) than low onset controllability. For instance, Lyons et al. (2017) showed that participants exhibited lower levels of pity and reduced hiring intention towards individuals who were perceived to have had more control over the onset of their disability. In line with this research, we expect that people with disability onset perceived as having been controllable would be associated with a more negative stereotype on both warmth and competence dimensions.

Study 2

Participants and Design

Guidelines concerning cluster analysis (Dalmajer et al., 2022) advise recruiting at least 20 participants per target group. As we also wanted to analyse the influence of visibility and controllability on stereotypes, we aimed to recruit 300 participants. In practice, we recruited 442 all comers ($M_{\text{age}} = 52.99$, $SD_{\text{age}} = 16.53$; 244 women) from Bilendi, a French online platform (see <https://www.bilendi.fr/>).

Material

In this study, we selected impairments based on the WHO categories of disability, rather than on lay beliefs. Fifteen disabilities were selected: (a) depression, bipolarity, schizophrenia (psychological disabilities); (b) trisomy 21, dyslexia, ADHD (mental disabilities); (c) deafness, blindness, pares-thesis (sensorial disabilities); (d) hemiplegia, disfigurement, paralysis (physical disabilities); and (e) HIV (AIDS), cancer, diabetes (chronic disabilities). Participants rated each disability presented in random order. To avoid participants being exposed to unknown disabilities, each disability was defined before the questionnaire was presented.

Stigma perception. Stigma characteristics were measured by two items rated on visual analogical

scales (0 = *not at all*, 100 = *absolutely*). For each disability, participants were asked to indicate the perceived visibility (“To what extent do you think this disability is visible?”) and the perceived controllability (“To what extent do you think this disability is controllable?”).

Stereotype Content Scale. Social evaluation was assessed by means of four items based on previous research (Carrier et al., 2014; Clément-Guillet et al., 2018) rated on visual analogical scales (0 = *not at all*, 100 = *absolutely*). For each disability, participants were asked to indicate to what extent different traits stigmatise people with [targeted disability]: friendly and honest for the warmth dimension ($.60 < r_s < .93$); competent and self-confident for the competence dimension ($.16 < r_s < .69$).

Procedure

First, short definitions of each of the 15 disabilities were displayed (see pilot study and supplemental material on OSF). Second, participants responded the Stereotype Content Scale and completed the stigma perception task for each disability. Third, participants were asked to report whether they considered themselves familiar with the disability issue. Finally, participants were asked to provide their sociodemographic data.

Results

We excluded four participants with a quasi-invariant response style (variance < 1). Two types of analyses were conducted: (a) cluster analyses based on stigma characteristics (i.e., visibility and controllability) and stereotypes (i.e., warmth and competence, and their respective facets: sociability, morality, ability, assertiveness); and (b) multilevel analyses to analyse the influence of stigma characteristics on stereotypes. Descriptive statistics for each of the 15 disabilities are presented in the supplemental material on OSF. In a first step, cluster analyses were run to identify groups of disabilities that shared (a) similar stigma characteristics (i.e., perceived visibility and controllability) and

(b) similar stereotype characteristics (i.e., warmth and competence attributions). The optimal number of clusters was obtained using the elbow method. Characteristics associated with each cluster were extracted for descriptive purposes. In a second step, multilevel regression models were computed to examine the influence of visibility and controllability perception (i.e., stigma characteristics) on warmth and competence attributions (i.e., stereotypes) while taking into account the nested nature of data in participants and groups.

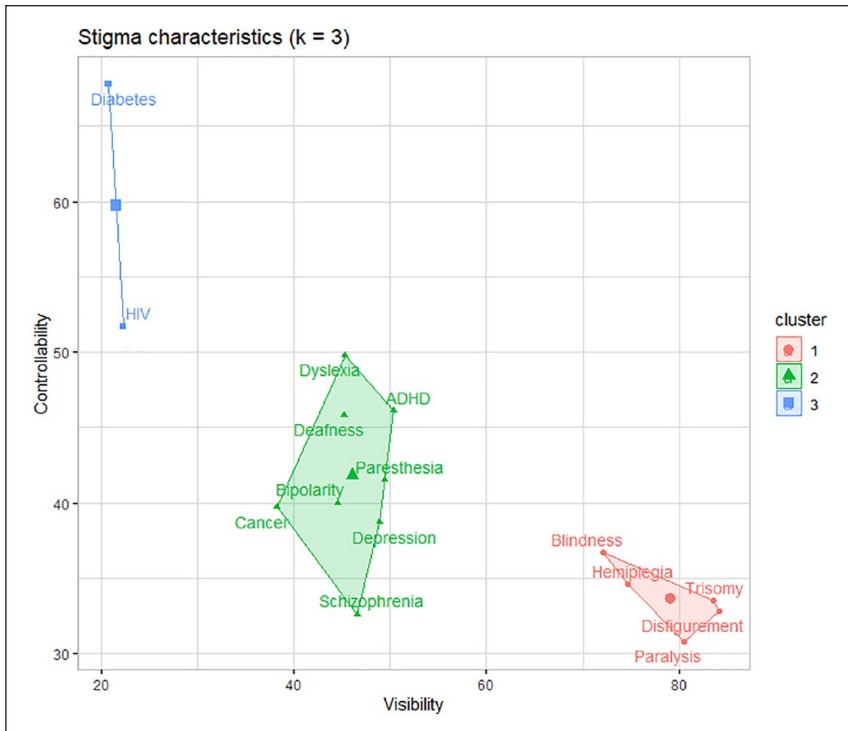
Cluster analyses

Stigma characteristics. For stigma characteristics, the optimal solution corresponds to a three-cluster solution; this number was confirmed using the elbow method. The composition and distribution of the clusters are presented in Figure 1. Descriptive statistics and comparisons between and within clusters are available on the supplemental material on OSF.

Cluster 1 included hemiplegia, disfigurement, and paralysis (physical disabilities), as well as blindness and trisomy 21. This first cluster was stigmatisation by high visibility ($M = 78.98$, $SD = 15.04$), but low controllability ($M = 33.67$, $SD = 21.12$). Cluster 2 included depression, bipolarity, and schizophrenia (psychological disabilities); deafness and paraesthesia (sensorial disabilities); dyslexia and ADHD (mental disabilities); and cancer. This second cluster was stigmatisation by average visibility ($M = 46.08$, $SD = 16.34$) and controllability ($M = 41.78$, $SD = 16.03$). Finally, Cluster 3 grouped HIV and diabetes (chronic diseases) and corresponded to disabilities perceived as low on visibility ($M = 21.56$, $SD = 21.68$), but high on controllability ($M = 59.74$, $SD = 22.88$).

Stereotypes. We extracted clusters based on the main dimensions of the SCM, namely warmth and competence (Fiske et al., 2002). The results of supplementary cluster analysis with facets of social judgments (i.e., sociability, morality, ability, and assertiveness; Abele et al., 2021) are reported in the supplemental material.

Figure 1. Visual representation of clusters based on stigma characteristics: Study 2.



Note. N=438.

The proposed optimal solution corresponds to a three-cluster solution; this number was confirmed using the elbow method. The composition and distribution of the clusters are presented in Figure 2. Descriptive statistics and between- and within-cluster comparisons are presented in Table S4 in the supplemental material.

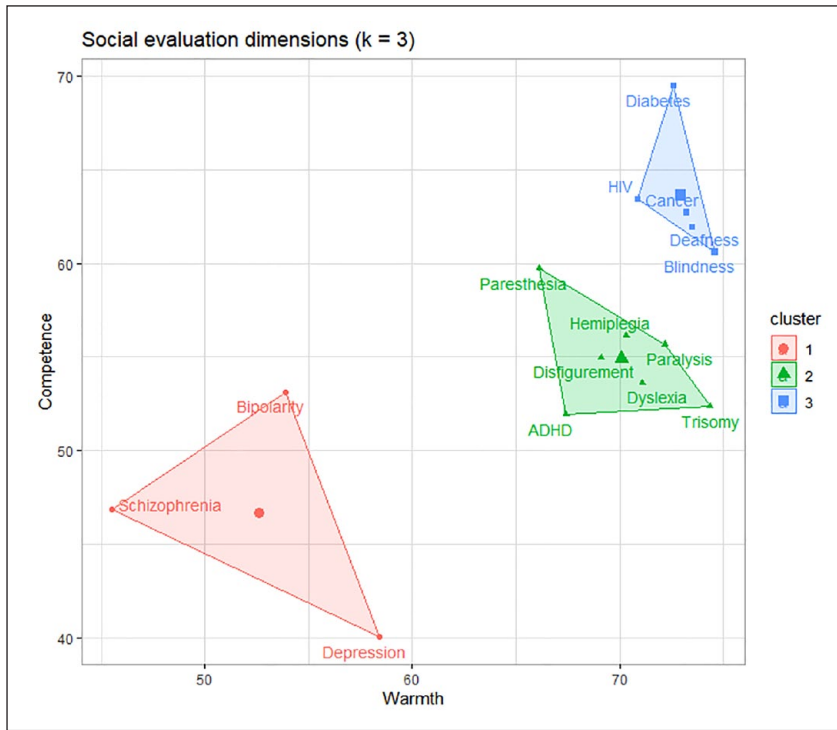
Cluster 1 included all three psychological disabilities (schizophrenia, bipolarity, and depression), and was stigmatisation by average warmth ($M = 52.61, SD = 18.97$) and competence ($M = 46.69, SD = 14.84$). Cluster 2 included all three mental disabilities (ADHD, dyslexia, and trisomy), as well as all three physical disabilities (disfigurement, hemiplegia, and paralysis) and paraesthesia. Cluster 2 was stigmatisation by high warmth ($M = 70.09, SD = 19.23$) and average competence ($M = 54.92, SD = 15.18$). Finally, Cluster 3 included all three chronic disabilities (cancer, diabetes, and HIV), as well as blindness

and deafness, and was stigmatisation by high warmth ($M = 72.95, SD = 19.81$) and high competence ($M = 63.61, SD = 17.29$).

Regressions models. To analyse the influence of perceived visibility and controllability on stereotypes, multilevel models were computed. Participants and group levels were considered, and random intercepts for these levels were included in the statistical models.

Warmth. The intraclass coefficient (ICC) for the warmth model was .68 (.13 related to group variability, and .55 related to participant variability), and design effect (DEFF) was 10.53, confirming the need to include group and participant levels in our model. Results are presented in Table 2.

Confirming the effects obtained in Studies 1a and 1b, visibility had a positive influence on

Figure 2. Visual representation of clusters based on stereotype dimensions: Study 2.

Note. $N = 438$.

warmth attribution, such that the higher the perceived visibility, the higher the attributed warmth. Furthermore, contrary to our hypothesis, controllability had a positive influence on warmth attribution, such that the higher the perceived controllability, the higher the attributed warmth.⁸

Competence. ICC for the competence model was .55 (.11 related to group variability, and .43 related to participant variability) and DEFF = 8.69, confirming the need to include group and participant levels in our model. Results are presented in Table 3.

Confirming the results obtained in Studies 1a and 1b, visibility had a negative influence on competence attribution, namely the higher the perceived visibility, the lower the attributed competence. Further, contrary to our hypothesis, controllability had a positive influence on competence attribution, that is to say, the higher the

perceived controllability, the higher the attributed competence (see Endnote 8).

Discussion

Study 2 had three objectives. First, it aimed to analyse stereotypes linked to multiple disabilities using cluster analysis. Our findings support that the disability stereotypes are contingent upon specific types of impairments, exhibiting a distinguishable pattern. More precisely, three clusters of disability as a function of the warmth and competence dimensions were observed. Consistent with the WHO classification, Cluster 1 encompasses psychological disabilities (schizophrenia, bipolar disorder, and depression), and Cluster 3 integrates chronic disabilities (cancer, diabetes, and HIV). In line with previous research, psychological disabilities (Cluster 1) were more negatively evaluated

Table 2. Multilevel regression model for warmth: Study 2.

Predictors	Estimates	CI	<i>p</i>
(Intercept)	-3.74	[-8.23, 0.74]	.102
Visibility	0.02	[0.01, 0.04]	.002
Controllability	0.06	[0.05, 0.08]	< .001
Random effects			
σ^2		178.54	
τ_{00Part}		306.71	
$\tau_{00Group}$		63.42	
ICC		.67	
N_{Group}		15	
N_{Part}		438	
Observations		6,570	
Marginal R^2 / Conditional R^2		.006 / .676	

Note. $N = 438$. Significant *p*-values were indicated in bold entries.

Table 3. Multilevel regression model for competence: Study 2.

Predictors	Estimates	CI	<i>p</i>
(Intercept)	-2.65	[-6.29, 0.99]	.154
Visibility	-0.03	[-0.05, -0.02]	< .001
Controllability	0.10	[0.09, 0.12]	< .001
Random effects			
σ^2		196.65	
τ_{00Part}		183.27	
$\tau_{00Group}$		40.46	
ICC		.53	
N_{Group}		15	
N_{Part}		438	
Observations		6,570	
Marginal R^2 / Conditional R^2		.024 / .543	

Note. $N = 438$. Significant *p*-values were indicated in bold entries.

on both warmth and competence, while chronic disabilities were evaluated more positively on both dimensions (Canton et al., 2023). Cluster 2 includes both mental (ADHD, dyslexia, and trisomy) and physical disabilities (disfigurement, hemiplegia, paralysis, and paraesthesia). It was evaluated as warmer than competent, which is

in line with the disability stereotype (Clément-Guillotin et al., 2015; Fiske et al., 2002; Rohmer & Louvet, 2012). This result is important because it highlights that the same cluster can include both mental and physical disabilities, contradicting the usual distinction between the two types of disability (Jury et al., 2021; Rohmer & Louvet, 2011). Second, we aimed to replicate the outcomes of Studies 1a and 1b regarding the impact of visibility on disability stereotypes, without framing disability according to a provided criteria (visible vs. invisible dichotomy). Showing that the more a disability is perceived as visible, the greater the attributed warmth, but the lower the competence; the current results are in line with the findings from Studies 1a and 1b, while also expanding on them. We replicated the pattern of stereotypes without constraining the comparisons. Third, Study 2 aimed to analyse the influence of another stigma criterion, onset controllability, on stereotypes. Our results contradicted our hypotheses, as the higher the perceived controllability, the higher the warmth and competence attributions. To account for, one may consider that our measure of controllability did not differentiate between onset controllability and offset controllability. While onset responsibility is associated with negative reactions (Lyons et al., 2017; Weiner et al., 1988), offset controllability is linked to more positive reactions due to lower unpredictability (Askevis-Leherpeux et al., 2013). This might explain why controllability was associated with higher warmth and competence ratings.

General Discussion

The WHO's (2021) estimates indicate that 1 in 3 persons will be impacted by disability at least once in their lifetime, directly or indirectly through their close relatives. Therefore, it is crucial to broaden the study of social perceptions of disability beyond its prototypical forms, and to take other criteria into account, particularly those relating to stigmatisation. The present research broadens the spectrum of disability research by focusing on the stereotype as a component of the

stigmatisation process and by centrally considering its (in)visibility and, more peripherally, its onset (un)controllability. Although most studies on the social inclusion of people with disabilities have focused on its visible and prototypical form (very often, a person in a wheelchair; Granjon, 2021), a growing number of studies have begun to highlight the importance of considering the (in)visibility of disability (Colella et al., 2004; Cook, 2001; Santuzzi et al., 2014). Indeed, while invisible disabilities represent around 80% of all disabilities, and seem to involve different inclusion issues, the social psychology literature has rarely addressed them (Mills, 2017; Newheiser & Barreto, 2014; Paetzold et al., 2008). We aimed to help fill this knowledge gap. Our reasoning was based on field observations in the education and work contexts, and the fact that people with an invisible disability face more negative outcomes than people with a visible disability. One of the main difficulties experienced by individuals with invisible disabilities is that they may look like other people, but not necessarily act like them (Cook, 2001). Thus, the main objective of our research was to analyse stereotypes associated with (in)visible disabilities using an accumulative and reproducible research process. While the pilot study explored the stereotype linked to visible disability compared with invisible disability through an intersubject design, Studies 1a and 1b examined the stereotypes of the two types of disability in a within-subject design using a bidirectional scale, and positive and negative attributes. Finally, Study 2 analysed the relationship between the perceived visibility of 15 different disabilities and the stereotypes associated with them. Furthermore, Study 2 focused more directly on stigma phenomena by considering another key component of stigma, namely onset controllability (Jones et al., 1984).

Consistent with our hypothesis, the findings demonstrate a discrepancy between stereotypes of individuals with invisible disabilities and the prevailing disability stereotype. Notably, the stereotype linked with invisible disabilities contrasts with the one attributed to individuals with visible disabilities, as the former are seen as more

competent but less warm. A similar pattern of results was found when people with disabilities were judged in comparison with people with no disability (Clément-Guillot et al., 2018; Rohmer & Louvet, 2012, 2018). Recent advances on the facets of social judgment dimensions offer an insightful explanation for the perception of individuals with invisible disabilities as less warm compared to those with visible disabilities (for a synthesis, see Abele et al., 2021; Yzerbyt et al., 2022). Regarding warmth, authors distinguished two facets, namely morality (relating to trust, reliability, and honesty) and sociability (referring to benevolence, agreeability, and likeability). Both of these facets—morality and sociability—are important for promoting harmonious relationships, but their relative importance may vary depending on the context or the group being evaluated. Morality seems to be at the core of issues related to invisible disabilities, to the extent that people tend to question the authenticity of the disability and believe that symptoms can be faked to obtain desired benefits (Colella et al., 2004; Paetzold et al., 2008; Santuzzi et al., 2014). Yet, judgments of morality—especially negative ones (Mende-Siedlecki et al., 2013)—play a primary and dominant role in information gathering about others compared to judgments of sociality or competence (Brambilla et al., 2011, 2019). This is particularly true when people judge an individual (as suggested in Studies 1a and 1b) rather than a social group (Abele et al., 2021; Koch et al., 2021). To further investigate the mechanisms that could explain social behaviours towards people with invisible disabilities, future research should focus on clearly differentiating the respective contribution of both the warmth and competence facets, to better understand the stereotypes related to invisible disability.

Additionally, findings concerning warmth varied between the pilot study and the main studies, which may be explained by the fact that the warmth dimension tends to vary across different contexts and situations, in contrast to the competence dimension, which is more stable (Yzerbyt & Cambon, 2017). The absence of cues of specific disability in the pilot study might have conferred

a sense of artificiality or a lack of tangibility to this category. Interestingly, Studies 1a, 1b, and 2 consistently showed that individuals with invisible disabilities were perceived as less warm compared to those with visible disabilities.

Importantly, our results provide insights into how lay people represent the (in)visible disability categories and associate these categories with stereotypes. On one hand, when asked to spontaneously recall examples of the two types of disabilities (cf. pilot study), people mentioned both physical and mental impairments. On the other hand, the cluster analysis conducted in Study 2 showed that the perception of disability goes beyond the opposition between physical and mental impairments frequently reported in the literature (e.g., Coleman *et al.*, 2015; Granello & Wheaton, 2001). Indeed, both physical and mental impairments were included both in the most visible cluster and in the least visible one. All in all, these elements support the hypothesis that (in)visible disability is a heterogeneous category encompassing a wide range of situations and impairments (Santuzzi *et al.*, 2014), and underlines the importance of accounting for this heterogeneity in future research. Thus, we posit that visible disability is not synonymous with physical disability, and invisible disability is not only limited to mental disability.

Some caveats need to be discussed here. Although the four studies used diverse measurements, and the samples were relatively large, some limitations need to be addressed in future work. First, although invisible disability is functional in specific social contexts, it is not clear how people represent it and what attributes are associated with it. Our results highlighted the significant heterogeneity of invisible disability. Yet, some authors who investigated the stereotype content of a heterogeneous group, such as immigrants (Lee & Fiske, 2006), or more recently, older people (Boudjemadi *et al.*, 2023), showed that the supracategory stereotype is not the average of the subcategory stereotypes. For instance, if immigrants are generally judged low in both competence and warmth, the majority of subgroups of immigrants (differentiated according to their

country of origin) are attributed an ambivalent stereotype, high on one dimension and low on another. Canton *et al.* (2023) took the first step in tackling this question by investigating stereotypes associated with mental, psychological, sensorial, and motor disabilities, confirming various patterns of stereotypes. Study 2 is another insightful step towards a more precise analysis of stereotypes associated with multiple (in)visible disabilities, but more research is needed to fully understand the heterogeneity of disability stereotypes.

Second, one should draw conclusions on controllability with caution due to potential confusion in participants' understanding of the items assessing it. Based on previous studies (e.g., Lyons *et al.*, 2017; Weiner *et al.*, 1988), we hypothesised that high controllability is associated with more negative stereotypes. Our results did not support this hypothesis; controllability was found to be associated with higher warmth and competence attributions. This unexpected result might be explained by the understanding of controllability. Indeed, literature differentiates onset controllability (also known as state responsibility in some research), which corresponds to the perceived controllability of disability state; and offset controllability (also known as act responsibility; see Askevis-Leherpeux *et al.*, 2013), which corresponds to the perceived controllability of the consequences of disability (e.g., behaviours). While onset (state) responsibility is associated with negative reactions (Dooley, 1995; Schwarzer & Weiner, 1991), act responsibility is associated with more positive reactions, notably because it activates unpredictability to a lesser extent (e.g., for mental illness; Askevis-Leherpeux *et al.*, 2013). In our study, our measure of controllability did not indicate which type of controllability was targeted, and might not have been sufficiently precise and explicit to ensure that we measured onset controllability and not offset controllability. Future studies should thus more precisely analyse onset/offset controllability effects on stereotypes associated with disability, as this stigma characteristic is associated with negative daily life outcomes (e.g., affective reactions and behavioural

intention; Dooley, 1995). Specifically, further studies should assess both, onset controllability by inquiring whether a person with a disability was in control of the development of the disability, and offset controllability by examining whether he/she is able to manage the manifestations of their disability. By distinguishing the two sides of controllability, researchers would be able to conduct more precise investigations, that is, to compare the impact of the two types of controllability, to confirm the contrasted relations of the onset versus offset controllability and the perception of the groups.

Third, a further limitation of our study is the absence of a control group comprising people without disabilities. Although including such a group is problematic as it hardly corresponds to reality (persons without disability do not represent a meaningful social category; Rohmer & Louvet, 2011), omitting this control group may hinder our ability to draw accurate conclusions about the social perception of people with (in)visible disabilities in general. In absence of a comparison group, uncertainty remains about whether our results were influenced by the shifting standards effect (Biernat, 2003) or by the direct comparisons between subgroups (i.e., visible vs. invisible disabilities). To address these limitations and better understand how people perceive invisible disabilities, future research should consider what a meaningful control group could be. However, it is crucial to consider the contexts that allow comparisons between groups with and without disabilities. For instance, one could compare workers with disabilities to workers in general (i.e., without disabilities), or students with disabilities to students in general (without disabilities (see for example, Louvet et al., 2009).

In conclusion, our findings highlight the critical need for future research to deepen the complexity of the disability perception by adopting comprehensive criteria well described in the stigmatisation literature. It is crucial to identify the fine mechanisms behind different levels of stigmatisation of people with disabilities. Moreover, existing theoretical models in social and cognitive psychology should be enriched to adequately

account for unique challenges faced by individuals with invisible disabilities in their daily lives. By revealing these dynamics, future studies can play a vital role in fostering the inclusion of individuals with disabilities in society.

Data availability

The studies reported in this article are preregistered on the Open Science Framework, where all supplementary materials and data for this research are available (https://osf.io/43yjc/?view_only=66665a8c73c446e099756ee5cf4fda24).

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Supplemental material

Supplemental material for this article is available online.

Notes

1. See <https://icd.who.int/dev11/1-icf/en>
2. For the pilot study and Study 1a, see https://osf.io/yh72k?view_only=ac0c6cd4a67a43b2ad9bd269ac53ee90 (respectively, Studies 1 and 3 in the preregistration). For Study 1b, see https://osf.io/vfh9z/?view_only=495ee69c41374e7e95694bc44985237d. For Study 2, see https://osf.io/5mxd4?view_only=ca9a34e4b1d84ea88d189917979d2012
3. OSF project: https://osf.io/43yjc/?view_only=66665a8c73c446e099756ee5cf4fda24
4. Extract of the invisible disability vignette: “for most of them, the disability is not directly perceptible: while we imagine people with disability in wheelchairs or with a white cane, 80% are invisible disabilities.”; and the corresponding extract

of the visible disability vignette: “it is no longer rare to meet people with disability in wheelchairs or with a white cane: 20% of people with disability have an immediately noticeable disability” (see the entire vignettes on OSF).

5. The initial calculation of the a priori sample size was based on the effect size of another task—simulated as being the task with the smallest effect size within the same protocol (see OSF project).
6. This study includes measures aimed to respond to another research objective. Details can be found in the OSF project.
7. The items were carefully selected and grouped to ensure that the visible and invisible categories of disabilities/diseases had an equal level of severity. Furthermore, it was found that the items in the visible category were significantly more conspicuous compared to those in the invisible category.
8. These effects remained unchanged when age, gender, familiarity, and contact with people with disability were included as covariates (see supplemental material on OSF).

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