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German adaptation and validation of the Factors of Online Disinhibition Scale

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ABSTRACT

The Online Disinhibition Effect (ODE; Suler, 2004) describes how characteristics of the internet and psychological processes result in disinhibited thoughts and behaviors when using the internet. As the phenomenon is an increasing topic in cyberpsychology, questionnaires to measure the effect are needed. The present study provides the Factors of Online Disinhibition Scale, a German adaptation of the English Online Disinhibition Scale by Cheung et al. (2020). Using a German-speaking sample of $N = 477$ (188 female), we employed exploratory and confirmatory item response factor analyses based on the Graded Response Model. These analyses suggested a six-factor solution with correlated factors that corresponded to the six dimensions of the ODE. Factor correlations were modest to high, but did not indicate the existence of a general factor. With one exception, reliabilities (McDonald's ω) were high ($\omega \geq 0.8$). The exception was the *solipsistic introjection* subscale, which yielded a reliability of $\omega = 0.58$. FODS was weakly associated with gender and moderately to strongly with age in three subscales (*minimization of authority*, *invisibility*, and *dissociative anonymity*). We encourage researchers to use the Factors of Online Disinhibition Scale presented in this paper as it showed good reliabilities (exception: *solipsistic introjection*) and is a differentiated, validated, and widely applicable measure of six factors that cause online disinhibition.

1. Introduction

Online disinhibition describes behaviors, emotions, and cognitions people show when they act on the internet that are less controlled or more disregarding social norms compared to similar offline situations (Stuart & Scott, 2021). Given the omnipresence of internet facilitated communication in today's society, the phenomenon is an important concept in understanding human interactions. For example, the concept has been employed in the study of current issues such as cyberbullying (Wang et al., 2024) or hate speech (Wachs & Wright, 2019). Considering the importance of such issues, it is not surprising that research has picked up the topic and since 2013 the study of online disinhibition has accelerated across disciplines (psychology, medicine, technology, sociology, and marketing; Dino et al., 2023). With increasing scientific interest in online disinhibition, the need for well-constructed instruments

measuring it arose. Therefore, the present study provides the development and validation of the German Factors of Online Disinhibition Scale (FODS), which builds on a questionnaire developed by Cheung et al. (2020) in English.

1.1. Online disinhibition: theoretical framework and findings

Suler (2004), who first coined the term Online Disinhibition Effect (ODE), suggested six interacting dimensions that drive online disinhibition: (a) *dissociative imagination* describes how the internet is perceived as an independent and imaginary world that has no effect on "real life," (b) *invisibility* refers to the physical *invisibility* when using the internet, as well as the lack of using signs of non-verbal communication to interact adequately, (c) *asynchronicity* describes the possibility to delay responses and reactions, (d) *solipsistic introjection* is a process in which an internet

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user projects a fictitious personality into other users and adapts their behavior accordingly (e.g., a user might imagine that the other is shy and will behave accordingly, although they do not have enough information to know whether the other is shy or not), (e) *minimization of authority* means the felt reduction of differences in status (e.g., felt reduction of police authority) and felt absence of laws and rules in the internet, and (f) *dissociative anonymity* describes the felt anonymity on the internet and the process of dissociating one's online and offline behavior and self. Over the past two decades, Suler's description stimulated empirical (Stuart & Scott, 2021) as well as theoretical investigations (e.g., Pandita et al., 2024). Given that much research employs the ODE as a theoretical framework, empirical investigations require an operationalization of the effect and, therefore, we validated a questionnaire measuring it.

It seems vital to differentiate between disinhibited emotions, thoughts, and behaviors on the internet (in the following referred to as *online disinhibition*) and factors that lead to online disinhibition as described in the ODE. These are characteristics of the internet and psychological processes described in the six dimensions mentioned above that lead to online disinhibition (in the following called *factors of online disinhibition*; Suler, 2004). For example, writing insulting comments online, while being cautious about one's comments offline can be described as online disinhibition, whereas the belief that this online behavior will not affect one's offline self can be described in terms of the ODE as *dissociative imagination*. Further, research suggested that online disinhibition is distinct from perceived anonymity online (Keum & Miller, 2018), a long-discussed issue in the research arena of online interactions (Friedman et al., 2000). Although some studies found that online disinhibition scales strongly correlate ($r = 0.79$) with perceived anonymity online (Barlett & Scott, 2023), other research encouraged measuring online disinhibition as a separate concept (e.g., Lapidot-Lefler & Barak, 2012; Wu et al., 2017).

While online disinhibition has been most commonly discussed with regard to online interactions (e.g., cyberbullying; Wang et al., 2024), the effect does also apply to online behavior without direct peer-to-peer interaction, such as the consumption of sexual or violent media (Malamuth et al., 2013). Steel et al. (2020) found that in individuals who consume child sexual abuse material (so-called child pornography), the belief that watching such media does not affect the "real" world is quite common. This indicates that offensive-supportive attitudes, also called cognitive distortions, found in users of online child sexual abuse material mirror specific dimensions of the Online Disinhibition Effect (ODE). Similarly, Pandita et al. (2024) argued that the effect of online disinhibition (in combination with the factors of disembodiment and accountability) affects not only peer-to-peer interactions but broader online environments, such as the spread of misinformation on X (formerly Twitter).

Authors have differentiated between benign and toxic consequences of online disinhibition (Arkowitz & Vess, 2003; Barak et al., 2008; Suler, 2004), as implications of online disinhibition can either be positive or negative. Examples of benign disinhibition are prosocial behaviors, such as generosity and helping others, or self-disclosure, such as sharing emotional experiences with others, processes which have been assumed to enhance well-being (Clark-Gordon et al., 2019; Gorissen, 2024; Ko & Kuo, 2009; Lapidot-Lefler & Barak, 2015; Varnali & Tokar, 2015). Toxic disinhibition, which was studied more frequently than benign disinhibition, has been linked with cyberbullying (Maftei et al., 2024; Udris, 2014; Wang et al., 2024; Wright et al., 2019), flaming, trolling (Buckels et al., 2014; Liao et al., 2024; Mao & Hu, 2024), hate speech (Wachs & Wright, 2019), online sexual abuse and cybergrooming (Gunnoo et al., 2024; Peschka et al., 2022; Sánchez-Hernández et al., 2024), online racism (Barlett & Scott, 2023), dark personality traits (Gunnoo et al., 2024; Kurek et al., 2019), and other problematic internet uses (Morahan-Martin & Schumacher, 2000). Although the distinction between benign and toxic online disinhibition seems straightforward and has been included in one popular questionnaire (Udris, 2014), it is far

from being well-defined. Moreover, ODE may in some cases have both positive and negative consequences. For example, the consequences of online disinhibition in people with social anxiety can partly be positive (e.g., more easily finding friends online than offline) and partly be negative (e.g., avoiding social experiences offline as social needs are met online). As the distinction between benign and toxic online disinhibition is not always clear, we refrain from using it and developed a questionnaire that avoids such normative claims.

Online disinhibition and the factors causing it differ between countries and cultures. For example, research found that privacy concerns are higher in countries with lower internet penetration (Engström et al., 2023) and in another study online behavior more generally seemed to differ between cultures (Recabarren et al., 2008). Given that research on online disinhibition originates from several countries (Dino et al., 2023), it is pivotal to provide validated questionnaires in different languages.

1.2. Measuring the factors of online disinhibition

The following questionnaires are currently available for measuring online disinhibition: the Measure of Online Disinhibition (Stuart & Scott, 2021), Udris' Online Disinhibition Scale (Udris, 2014), and a scale by Kurek et al. (2019). The scale developed by Cheung et al. (2020) measures the factors that facilitate online disinhibition. Its items refer to beliefs and attitudes towards online behavior. In contrast, all other instruments measure the occurrence of online disinhibition and only some of the items refer to attitudes and beliefs that potentially cause online disinhibition. This is mirrored in the latent factor structures. Udris' Online Disinhibition Scale (2014) measures benign and toxic online disinhibition with a two-factor instrument (toxic and benign online disinhibition), whereas Stuart and Scott' (2021) as well as Kurek et al.'s (2019) measures are one-dimensional online disinhibition scales. Cheung et al. (2020) found a six-factor solution, with each factor representing one of the six factors facilitating online disinhibition as described in the ODE.

In this study, we focus on measuring the factors of online disinhibition and, therefore, on Cheung et al.'s (2020) instrument. A measure for the factors of online disinhibition allows researchers to differentiate between the six dimensions that drive online disinhibition. This seems important, as research found that different disinhibited thoughts, emotions, and behaviors are related to specific factors of online disinhibition. For example, Mueller-Coyne et al. (2022) found that especially the dimensions *dissociative anonymity*, *invisibility*, and *solipsistic introjection* are associated with loneliness. Wu et al.'s (2017) suggested that especially *dissociative anonymity*, *asynchronicity*, and *dissociative imagination* are related to toxic online disinhibition which might indicate that specific dimensions of the ODE are more prone to driving toxic online disinhibition than are others.

For the development of the scale, Cheung et al. (2020) initially formulated 50 items that capture important aspects of the ODE. Using card-sorting techniques, the authors selected 38 items that were evaluated in a pilot study. In the next step, an exploratory factor analysis followed by a confirmatory factor analysis were conducted. Among five tested models two models (Model 3 and 4) showed good model fit. These assumed five correlated first-order factors (*asynchronicity*, *solipsistic introjection*, *dissociative imagination*, *minimization of authority*, and *anonymity*). *Dissociative anonymity* and *invisibility* items loaded on the common factor *anonymity*. The two models differ as Model 4 assumed a general online disinhibition factor whereas Model 3 did not. Both models showed good model fit. Cronbach's alphas of the subscales indicated acceptable to excellent reliabilities (Cronbach's alpha between 0.77 and 0.96). To measure the validity of the scale, Cheung et al. (2020) measured the ability of the instrument to predict online harassment using the scale's sum score ($\beta = 0.25, p < .001$). This finding was confirmed by other research showing a significant positive relationship between the instrument and cyber racism perpetration (Barlett & Scott, 2023).

1.3. Aim of the study

The present study validates the FODS, which is a German adaptation of the Online Disinhibition Scale by Cheung et al. (2020). Such an adaptation is important as no German instrument for assessing factors leading to online disinhibition exists so far. This seems striking as Dino et al. (2023) showed that much research investigating the ODE takes place in Germany. Therefore, we translated the Online Disinhibition Scale developed by Cheung et al. (2020) from English to German. To validate the adapted instrument, we collected data from 477 German-speaking participants and analyzed the factor structure using exploratory followed by confirmatory item response theory (IRT) models. Further, we assessed the reliability and age and gender differences of the adapted instrument. The leading research questions are the following.

1. How can the latent structure of the FODS best be described using an IRT approach?
2. Do FODS scores differ between different age groups and gender?

2. Methods

2.1. Participants

The present sample was collected between November 28 and December 14, 2023, via clickworker.de, a well-known crowdsourcing provider. While crowdsourcing samples have been criticized due to potential biases and potentially insufficient data quality (Agle et al., 2022), they as well bring advantages, for example, such samples seem to be more diverse than other online pools and student samples (Behrend et al., 2011; Jia et al., 2017). Lastly, validating a questionnaire regarding online behavior requires participants who use the internet regularly. This is ensured using a crowdsourcing sample. As some authors have questioned the data quality of crowdsourcing providers, we used an attention question (“What is three plus seven?”) to ensure data quality (Agle et al., 2022). Participants who answered this question incorrectly were excluded from the analyses. This applied to 10.5 % of the original sample ($N = 533$). In interpreting this number, one should take into account that incorrect answers may not only be due to lack of attention but also due to the involvement of automatic answering machines or bots. Participants remained anonymous and received compensation in accordance with the applicable minimum wage in Germany. We used LimeSurvey to implement the survey. For the final sample ($N = 477$) we additionally assessed the response times and found that all participants showed plausible response behavior (the minimum response time was 1.08 s per item).¹ The demographic data of the participants are shown in Table 1.

2.2. Translation

The Online Disinhibition Scale (Cheung et al., 2020) was translated from English to German by two fluent speakers of both languages who were not otherwise involved in the present study. In the following, the items were translated back by this study’s first and last author who are as well fluent in English and German. Disagreements in the translation were discussed in detail until a satisfactory solution was found. Only minor disagreements occurred. To allow the scale to not merely measure

¹ The determination of the required minimum sample size for factor and IRT models is a complex issue that is not resolved yet. Thus, no stringent justification for a specific sample size can be given. However, the sample size of the present study is higher than suggested by rules of thumbs often presented in the literature (e.g., $N > 200$ or $N > 300$; see Kyriazos, 2018; MacCallum et al., 1999). The same is true for the ratio of sample size to variables/items (e.g., 10:1) which is $477/25 = 19:1$ in the current study.

Table 1
Demographics.

	Male (n = 284)		Female (n = 188)	
	M	SD	M	SD
Age	42.7	12.8	40.6	12.0
Education	N	%	N	%
Completed studies	139	49	74	39
University entrance qualification	85	30	55	29
Secondary school without Abitur (intermediate school leaving certificate)	46	16	44	23
Middle school or elementary school	10	4	6	3
Graduation from the general polytechnic secondary school in the former GDR	3	1	6	3
Marital Status				
Single	94	33	50	27
Unmarried in a relationship	65	23	48	26
Married	108	38	78	41
Divorced	14	5	11	6
Widowed	3	1	1	1

online interactions, such as peer-to-peer chats, but online behavior more generally, such as the consumption of online videos, we formulated the items to apply to both internet usages. The final translations can be found in Table 2.

2.3. Additional items

The original subscales of the instrument were somewhat unbalanced concerning the numbers of their items. In particular, the *asynchronicity* and *solipsistic introjection* scales contained only three items, whereas the other scales had four to five items. To achieve a more balanced representation of the scales, the first and last author formulated two additional items and we added one item to each of the subscales (*asynchronicity*: “Online I decide when to continue”; *solipsistic introjection*: “It feels like the person who I am texting with/seeing online is very familiar”). This measure should improve the reliability and validity of the respective scales. Unfortunately, the item pool used in the development of the English Online Disinhibition Scale by Cheung et al. (2020) was not available.

2.4. Statistical analysis

To analyze the data, we used R 4.2.3 (R Core Team, 2022). The item factor analyses were conducted with the R package mirt (Multidimensional Item Response Theory; version 1.4.1; Chalmers, 2012). To increase the transparency of the analysis, we provided the dataset and the R scripts of the analyses in the data repository (<https://osf.io/mb4es/>).

2.5. Item response model

We used the MH-RM algorithm for the item factor analyses, which is one of the preferred methods for analyzing high-dimensional tests. The analyses were based on the Graded Response Model (Samejima, 1969, 1997), which is one of the most popular item response models for tests involving ordered-category items. This model describes responses with the help of item discrimination and category threshold parameters. The item discriminations can be transformed to (standardized) factor loadings, which yields a more familiar metric for evaluating the items.

To assess the model fit, we relied on a variant of the Root Mean Square Error of Approximation (RMSEA₂) introduced by Maydeu-Olivares and Joe (2014), which is based on the M_2 statistic (Maydeu-Olivares & Joe, 2005, 2006). M_2 substitutes classical full-information fit statistics for item response models (log-likelihood ratio G^2 , Pearson’s χ^2). Classical fit statistics are based on multivariate cross-tabulations of the possible item responses. In more complex models (models with many items and/or many response categories),

Table 2
FODS Items and Reliabilities (McDonald’s ω) of the Scales.

Items	McDonald’s ω
DA1 Ich habe das Gefühl, dass ich in der Online-Welt anonym bin [I feel I am anonymous in the online environment]	0.81
DA2 Ich glaube, dass meine persönliche Identität in der Online-Welt für andere unbekannt bleibt [I believe that my personal identity remains unknown to others in the online environment]	
DA3 Ich habe das Gefühl, dass ich meine Identität online verbergen kann [I feel that I can hide my identity online]	
DA4 Meine Handlungen sind in der Online-Welt nicht auf mich zurückzuführen [My actions are not identifiable in the online environment]	
IN1 Ich fühle mich in der Online-Welt unsichtbar [I feel like invisible in the online environment]	0.89
IN2 Ich habe das Gefühl, dass die Online-Welt andere davon abhält, etwas von mir zu sehen [I feel that online environment averts others from seeing any of me]	
IN3 Ich bin online unsichtbar [I am invisible online]	
IN4 Andere sehen mich in der Online-Welt nicht [Others do not see me in the online environment]	
IN5 Meine Handlungen sind in der Online-Welt unsichtbar [My actions are invisible in the online environment]	0.83
AS1 Ich muss anderen in der Online-Welt nicht sofort antworten [I do not need to reply others immediately in the online environment]	
AS2 Ich kann in der Online-Umgebung aufschieben zu reagieren beziehungsweise anderen zu antworten [I can postpone replying others in the online environment]	
AS3 Ich kann meine Rückmeldung in der Online-Welt aufschieben [I can delay my feedback to others in the online environment]	
AS4 ^a Online bestimme ich wann es weiter geht [Online I decide when to continue]	0.58
SI1 Ich weise der Person, die ich online sehe/mit der ich kommuniziere, eine Persönlichkeit zu [I assign a character to that person I am communicating with online]	
SI2 Ich interpretiere die Nachrichten anderer mithilfe meiner Erwartung während der Online-Nutzung [I interpret others’ messages with my expectation during online communication]	
SI3 Ich erkenne, wie andere Personen in der Online-Welt wirken wollen [I perceive how that person’s intended to talk about in the online environment]	
SI4 ^a Es fühlt sich an, als wäre mir die Person, mit der ich online schreibe/die ich online sehe, sehr vertraut [It feels like the person who I am texting with/seeing online is very familiar]	0.80
DI1 Ich habe das Gefühl, dass die Menschen online nur imaginär sind und keine Verbindung zur Realität haben [I feel like people in the online space are just imaginary with no connection to reality]	
DI2 Es fühlt sich an, als wäre die Online-Welt eine imaginäre Welt [The online environment is an imaginary world]	
DI3 Es fühlt sich an, als hätte die Online-Welt keine Verbindung zur Realität [The online environment has no connection to reality]	
DI4 Die Online-Welt fühlt sich von der Offline-Welt getrennt an [The online environment is separated from the offline world]	0.81
MA1 Ich bin in der Online-Welt weit entfernt von Autoritäten aus dem realen Leben [I am away from real life authorities in the online environment]	
MA2 In der Online-Welt habe ich weniger Angst vor Offline-Autoritäten [I feel less fear of offline authorities in the online environment]	
MA3 Ich fühle mich in der Online-Welt frei von Autoritäten aus dem realen Leben [I feel free from real life authorities in the online environment]	
MA4 Ich habe das Gefühl, dass Offline-Autoritäten in der Online-Welt nicht vorkommen [I feel that offline authorities are absent in the online environment]	

^a Items were added in the present study and were not used in Cheung et al. (2020). Abbreviations: DA = Dissociative Anonymity, IN = Invisibility, AS = Asynchronicity, SI = Solipsistic Introjection, DI = Dissociative Imagination, MA = Minimization of Authority.

there is a large number of possible response patterns. This means that the expected values of many cells in these tables become very small, so the fit statistics are no longer approximately χ^2 -distributed and can lead to incorrect conclusions. The M_2 (and the $RMSEA_2$) avoids this problem by using information from the bivariate marginal distributions of the items only. M_2 is therefore referred to as a limited-information statistic: although it only uses a limited part of the information contained in the response patterns, it uses this part correctly. The statistic can be used with more complex models and smaller samples.

Maydeu-Olivares and Joe (2014) specify threshold values of 0.089 for an acceptable fit and 0.05 for a good fit for the $RMSEA_2$ as a guideline. Following the authors’ suggestion, the Standardized Root Mean Squared Residual (SRMSR) was also used, here with threshold values of 0.05 and 0.027. To compare competing models, we used information criteria (AIC, sample-size adjusted BIC).

2.6. Ethics

Participants received information about data protection and the purpose of the study at the beginning of the survey and gave informed consent. The present study received a clearance certificate from the Ethics Council of the University of Bamberg (protocol #2022-07/30).

3. Results

3.1. Item factor analyses (graded response models)

We first checked whether the assumption of six dimensions is justified. For this purpose, we conducted exploratory item factor analyses using graded response models with 1–8 dimensions. In exploratory models, there are no *a priori* restrictions for the items’ loadings, so the loadings of each item on each factor are estimated. These analyses supplemented the confirmatory analysis described below and served as an additional and more specific test of the dimensionality of the FODS. Notice that the term “exploratory” for these analyses refers to the fact that we estimated the loadings of each item on each factor. In the present context, however, the procedure is actually confirmatory because the analyses were conducted to test the assumption of six underlying factors. Table 3 shows AIC and sample-size-adjusted BIC values for increasingly complex models. Both criteria suggest the six-factor model.

Therefore, we proceeded with fitting the hypothesized confirmatory item response model. We specified a so-called independent-cluster structure (McDonald, 1999), where each item loads on only one factor, and the factors are allowed to correlate with each other. The M_2 statistic for this model is significant, indicating that an exact fit was not achieved. However, the $RMSEA_2$ suggests an acceptable fit ($RMSEA = 0.058$, 95 % CI between 0.051 and 0.066). The SRMSR was 0.076, which is slightly above the threshold for a good fit (0.05). As can be seen in Fig. 1, the factor loadings were relatively high and generally above 0.40. There were moderate to high factor correlations between the *dissociative anonymity*, *dissociative imagination*, *minimization of authority*, and *invisibility* scales, as shown in Table 4. The correlations involving other scales were modest so the assumption of a general factor is not warranted.

The reliabilities of the sum scores of the scales, estimated via

Table 3
AIC and BIC for exploratory IRT models with 1–8 dimensions.

No. Of Dimensions	AIC	BIC
1	36,561.82	36735.71
2	35,628.14	35825.88
3	35,171.06	35391.65
4	34,965.86	35208.31
5	34,954.81	35218.13
6	34,885.47	35168.66
7	34,936.98	35239.04
8	34,948.58	35268.53

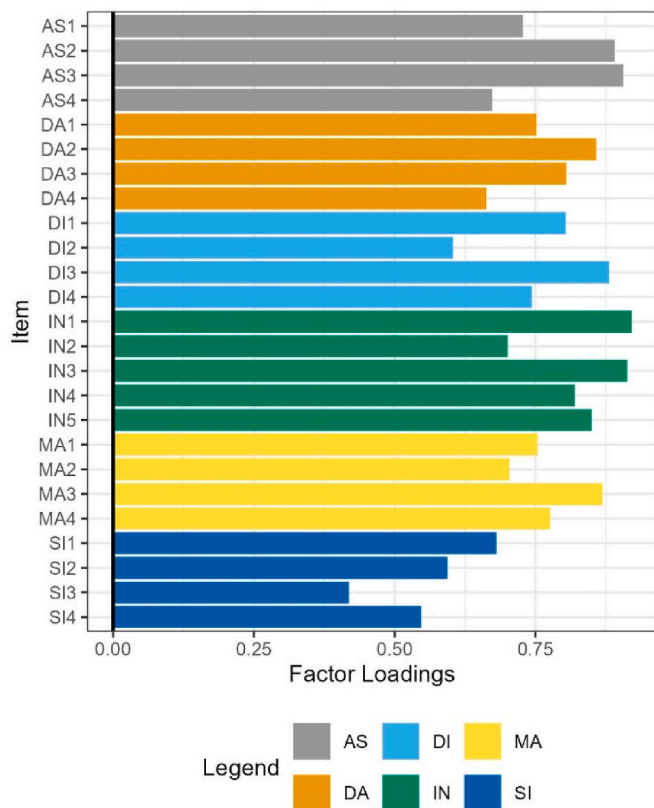


Fig. 1. Factor loadings of the confirmatory graded response model. Abbreviations: DA = Dissociative Anonymity, IN = Invisibility, AS = Asynchronicity, SI = Solipsistic Introjection, DI = Dissociative Imagination, MA = Minimization of Authority.

Table 4
Factor correlations for a six-factor confirmatory graded response model.

	DA	DI	AS	MA	IN
DI	0.534				
AS	0.223	0.094			
MA	0.708	0.686	0.309		
IN	0.852	0.598	0.087	0.743	
SI	0.291	0.203	0.574	0.396	0.232

McDonald's ω (Cho, 2016, 2021; McDonald, 1999; Sijtsma & Pfadt, 2021), were generally good (at or above 0.80, see Table 2). An exception was the *solipsistic introjection* scale, for which ω was only 0.58.

Interestingly, a traditional factor analysis yielded a similar pattern of loadings (see data repository for detailed results of the exploratory factor analysis: <https://osf.io/mb4es/>).

3.2. Gender and age differences

We calculated multivariate ANOVAs to analyze age and gender differences. Gender was significantly related with *dissociative anonymity*, *minimization of authority* and *invisibility* ratings. Men scored significantly higher compared to women. However, the effect sizes were small (*dissociative anonymity*: $F(1, 467) = 5.86, p = .027, d = 0.18$; *minimization of authority*: $F(1, 467) = 14.04, p = .001, d = 0.29$; *invisibility*: $F(1, 467) = 8.63, p = .013, d = 0.21$; Cohen, 1992). No significant differences were found in the other subscales.

For the analysis of age and Factors of Online Disinhibition subscales, we categorized age into four groups (18–25, 26–45, 46–65, and >65 years). We found significant age differences in *dissociative anonymity* ($F(3, 467) = 15.43, p = .005$), *minimization of authority* ($F(3, 467) = 16.34,$

$p = .005$), and *invisibility* ($F(3, 467) = 16.92, p = .008$) ratings. Post-hoc analyses with Holm correction suggested significant differences between participants aged between 18 and 25 years and participants aged 66 years and older ($p < .05$). Additionally, a significant difference was found between participants aged 18–25 years and 26–45 years in the *invisibility* subscale. The younger groups scored higher than the older groups. Cohen's d effect sizes indicated large (*dissociative anonymity*: $d = 1.09$; *minimization of authority*: $d = 0.91$) to moderate effects (*invisibility*: $d = 0.78$ for 18–25 versus >66 and $d = 0.53$ for 18–25 versus 26–45).

Table 5 displays the mean and SD scores of the subscales grouped by gender. The complete R script with detailed results is provided in the data repository (<https://osf.io/mb4es/>).

4. Discussion

The present study presents the Factors of Online Disinhibition Scale, a German adaptation and validation of the Online Disinhibition Scale by Cheung et al. (2020). The scale measures six factors that are assumed to cause online disinhibition (Suler, 2004). Similar to Cheung et al. (2020), our results suggested, a six-factor solution with each factor representing one dimension of the ODE. A confirmatory IRT model showed a good fit. In addition reliabilities of five of the six scales scores were good. Only for the subscale *solipsistic introjection* we found a weak reliability ($\omega = 0.58$). The analysis indicated no general factor for the scale; therefore, researchers are advised to calculate mean or sum scores for each subscale instead of scores for the total scale. The associations between the instrument and age and gender of the participants were assessed, indicating slightly higher scores in men as compared to women in the subscales *minimization of authority*, *dissociative anonymity*, and *invisibility* and slightly higher scores in younger as compared to older participants in the subscales *dissociative anonymity*, *invisibility*, and *minimization of authority*.

The reliabilities of the scales found in the present study are slightly lower in *dissociative anonymity*, *invisibility*, *dissociative imagination*, and *minimization of authority* than the respective coefficients reported in the English version (Cheung et al., 2020) and slightly higher in the *asynchronicity* subscale. The reliability of the *solipsistic introjection* subscale is much lower in the present than in the Cheung et al. (2020) study ($\omega = 0.58$ compared to Cronbach's $\alpha = .84$; α is a lower bound for the reliability of a factorially homogenous test and, thus, should be somewhat lower or equal, but not higher than ω ; see McDonald, 1999). As the FODS and Cheung et al.'s (2020) scale measure the dimensions of the ODE instead of online disinhibition, the comparison with other instruments seems inadequate (Kurek et al., 2019; Stuart & Scott, 2021; Udris, 2014).

The FODS measures six factors that are assumed to facilitate online disinhibition. These factors concern psychological processes and constructs such as attitudes and perceptions. As Suler (2004) noted these factors may not encompass all influences. Instead, research might find that other factors are involved as well. When considering non-psychological factors, several influences, for example legal regulations and law enforcement, can facilitate or reduce online disinhibition. Such influences are not subject of the FODS as the instrument focusses on the psychological processes of online disinhibition.

Suler (2004) stated that rarely a single factor causes online

Table 5
Means and SDs of the factors of online disinhibition scale by gender.

Subscales	Number of Items	Male		Female	
		M	SD	M	SD
Dissociative Anonymity	4	3.77	1.5	3.57	1.44
Dissociative Imagination	4	3.71	1.50	3.54	1.54
Asynchronicity	4	5.11	1.25	5.13	1.25
Minimization of Authority	4	4.07	1.48	3.75	1.43
Invisibility	5	3.52	1.49	3.27	1.46
Solipsistic Introjection	4	4.60	1.16	4.64	1.19

Items are measured on a 1 to 7 scale.

disinhibition but that the factors interact and supplement each other. This is mirrored in the instrument's factor structure, as no general factor for all subscales could be found. Instead, *asynchronicity* and *solipsistic introjection* had only low correlations with the other factors. The factors *dissociative anonymity*, *dissociative imagination*, *minimization of authority*, and *invisibility* were moderately to highly associated, indicating that these four dimensions of the ODE are more closely entangled. *Asynchronicity* and *solipsistic introjection* could be less strongly correlated as these factors rather refer to direct interactions, while the factors mentioned before describe how users perceive the Internet generally. Future research should carefully distinguish between these different forms of online disinhibition and the pattern of factors causing it. For example, research could employ network analysis to study how the factors interact in a given context (Borsboom et al., 2021).

As the dimension *solipsistic introjection* describes complex processes and projections, it is arguably the most complex construct of the ODE. This is reflected in items that can be difficult to comprehend (e.g., "I perceive how that person's intended to talk about in the online environment"). Further, as *solipsistic introjection* is considered a mostly unconscious process, explicit self-report measures might not be adequate to capture it. This could cause the low-reliability scores of the subscale. Although we added a new more comprehensible item to the subscale to address these issues, future research should further investigate how the construct can be measured more adequately.

Aside these methodical issues, the factor *solipsistic introjection* does not correlate with other factors, indicating that it describes an independent and unique cause of online disinhibition. The process is more likely to evolve when interacting with a stranger than when interacting with somebody that one knows offline, as more detailed information about the person exists that prevents strong projections. Accordingly, research indicated that the factor is more prominent in individuals reporting loneliness (Mueller-Coyne et al., 2022). It could be that in more specific context (e.g., chats with strangers) the subscale might be more comprehensible for participants and consequently be more reliable.

4.1. Gender differences

Similar to other studies that found lower online disinhibition scores in females (Kurek et al., 2019), in the present study, female participants scored slightly lower in the *dissociative anonymity*, *minimization of authority*, and *invisibility* subscales. This difference between genders is in accordance with studies suggesting higher prevalence of pathological internet use (Morahan-Martin & Schumacher, 2000), cyber dating abuse (Sánchez-Hernández et al., 2024; Zweig et al., 2013), and trolling (Buckels et al., 2014) in males. These behaviors are considered to stem at least partly from online disinhibition (such as in Barlett & Scott, 2023; Keum & Miller, 2018) and, thus, be explained by the gender differences in *dissociative anonymity*, *minimization of authority* and *invisibility*. For example, in their study on cyber aggression Sánchez-Hernández et al. (2024) found a three-way interaction between gender, online disinhibition, and hostile sexism: in men with high hostile sexism online disinhibition predicted moral disengagement. The authors, however, do not differentiate between the dimensions of the ODE. Considering our findings *dissociative anonymity*, *minimization of authority* and *invisibility* are likely the relevant factors of the ODE as they were more pronounced in men. These and similar gender differences in online behavior are widely assumed to be due to gender-specific socialization (Sánchez-Hernández et al., 2024).

However, the effect sizes were small and significant gender differences were merely present in two subscales of the FODS. We did not detect any gender differences in *dissociative imagination*, *asynchronicity* and *solipsistic introjection*. This may partly be due to the sampling strategy: As all participants were recruited via crowdsourcing, the sample's online behavior (e.g., working for a crowdsourcing provider) may be rather homogenous and could mask gender differences present in the

general population.

4.2. Age differences

Looking at age in relation to the subscales of the instrument, *dissociative anonymity*, *invisibility*, and *minimization of authority* were associated with the participants' age. Younger individuals (18–25 years) reported higher scores on these scales than older individuals (66 years and older and 26–45 years), while the other age groups did not differ significantly (26–45 and 46–65 years). This is in line with Ioannidis et al. (2018), who found small age differences and argued that the relationship between age and problematic internet use depends on the specific online behavior. Accordingly, findings from studies investigating age differences and online disinhibition remain inconclusive. For example, while problematic internet use was found to be more present in young participants, Antoniadou et al. (2019) found low online disinhibition in a rather young sample.

These inconclusive findings could stem from the cross-sectional design of most of the studies investigating age differences and online disinhibition. Such study design cannot account for generation specific effects, which are likely present as over the past decades the time spent online increased drastically in Germany and worldwide (Federal Statistical Office of Germany, 2020). Further, the internet itself and the way how it interacts with the offline world changed as well. For example, the way how child sexual abuse material (so-called "child pornography") is distributed through the internet changed over the decades and while such offenses were mostly without legal consequences at the beginning of the internet era, they are more often prosecuted nowadays (Seto, 2013). Such changes in law enforcement in the internet are likely to affect the generation-specific perception of authority online as measured with the FODS' *minimization of authority* subscale.

In addition to differences in gender and age, cultural differences exist, which stress the importance of validated instruments being available in different languages. Although the internet is a global network, in several instances, websites and online services are not accessible globally either due to political restrictions (Freedom House, 2022) or due to legal issues (British Broadcasting Corporation, 2018). This indicates that the experiences of people using the Internet vary across countries. Compared to nations worldwide, Germany is among the countries with the most liberal internet regulations, allowing users to access information freely. At the same time, Germany, as a part of the European Union, implemented the General Data Protection Regulation (GDPR), which is considered the most consequential law concerning data privacy (Hoofnagle et al., 2019). These country specifics likely play a part in the formation of online disinhibition. For example, living in a country with strong data privacy laws might increase the perceived anonymity online. Consequently, differences between countries should be considered when investigating online communications, and providing a translated instrument for measuring online behavior and cognition is an essential step in doing so.

4.3. Limitations

The following limitations of the present study should be noted: The results of the item factor analyses should be cross-validated with a new, more diverse sample. The item formulations originated from Cheung et al. (2020) were often homogenous (for example, "I am invisible online" and "others do not see me in the online environment"). While we already added two new items to increase heterogeneity, future adaptations should further aim for more heterogeneous items that still consistently measure the same latent construct. The *solipsistic introjection* subscale had a low reliability. Thus, researchers who employ the instrument should be cautious when interpreting results from this subscale as the low reliability may bias its association with other variables in downward direction. We could not assess the association of the Factors of Online Disinhibition Scale presented in this study with other related

constructs and were not able to determine the convergent validity of the scale. Although Cheung et al. (2020) found their scale to correlate with related measures, future research should investigate the association between the instrument and other measures related to online disinhibition, such as cyberbullying (Wright et al., 2019) or online racism (Barlett & Scott, 2023). Further, to test the convergent validity, the scale should be compared with other instruments measuring online disinhibition (such as Kurek et al., 2019; Stuart & Scott, 2021; Udris, 2014). Finally, the sample used in this study was a convenience sample of individuals registered at the crowdsourcing platform clickworker.de. Therefore, although we aimed at collecting a balanced sample in regard to age and gender, the results cannot be generalized to the entire German-speaking population. For example, persons working for crowdsourcing providers are likely homogenous in their level of internet literacy and usage. Future research should validate the findings in samples recruited in other contexts.

5. Outlook

The Factors of Online Disinhibition Scale presented in this paper allows researchers to differentiate between six facilitating factors of online disinhibition. Except for the *solipsistic introjection* subscale, the FODS showed good reliabilities. As the scale does not measure specific types of online disinhibition (e.g., trolling, hate speech, etc.) but factors causing such behavior, it is a widely applicable measure.

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CRedit authorship contribution statement

Lasse Peschka: Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Michael Hock:** Writing – review & editing, Validation, Supervision, Resources, Methodology, Formal analysis, Data curation. **Claus-Christian Carbon:** Writing – review & editing, Validation, Supervision, Resources, Project administration, Conceptualization. **Göran Hajak:** Resources, Project administration, Funding acquisition. **Ralf Bergner-Köther:** Writing – review & editing, Validation, Supervision, Resources, Project administration, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data and R script is provided in the data repository: <https://osf.io/mb4es/>

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