



ADHD, stigma and continuum beliefs: A population survey on public attitudes towards children and adults with attention deficit hyperactivity disorder



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ABSTRACT

ADHD is a mental illness of high epidemiological and clinical importance, embedded in a complex socio-cultural context. We estimated the prevalence of attitudes related to ADHD in a representative population survey in Germany ($n = 1008$) after presenting an unlabelled vignette of a child or an adult with ADHD. Relations of personal experience, interpersonal contact and continuum beliefs with emotions and social distance were calculated using path models. About two-thirds of the German public indicated they believe in a continuum of ADHD symptoms, and half stated that they know somebody among family or close friends with a comparable problem. About one-quarter of respondents felt annoyed by the depicted person. While an adult with ADHD was most frequently accepted as a work colleague or neighbor, about one-quarter of the German general population rejected renting a room or giving a job recommendation. Personal Experience (both vignettes) and contact (adult vignette) were related to a higher belief in a continuum of symptoms, while explanation of variance was low. A belief in a continuum of symptoms was related to more pro-social reactions and less social distance. This study indicates that emphasizing aspects of a continuum of symptoms should be considered within the disorder model of ADHD.

1. Introduction

With a worldwide-pooled prevalence of 5.3% among children (Polanczyk et al., 2007) and at least 2.8% among adults (Fayyad et al., 2017), attention deficit hyperactivity disorder (ADHD) is a mental illness of high epidemiological and clinical importance. ADHD begins during childhood and is characterized by the three core-symptoms attention deficit, impulsivity and hyperactivity (Faraone et al., 2015). In about 60% of the patients, the symptoms persist into adulthood (Biederman et al., 2012) and result in detrimental impacts on social, financial and professional functioning of affected patients (Halmøy et al., 2009).

Controversial discussions about diagnostic labels (Moncrieff and Timimi, 2010), etiology (Batstra et al., 2017) and pharmacotherapy (Romanos et al., 2016) indicate complex interactions between this

disorder and its socio-cultural context. Herein, attitudes and beliefs of the public are particularly important, since they not only shape the thoughts and actions of patients, but also influence the advice of caregivers and friends (Angermeyer et al., 1999). The decision to seek professional help for a mental health problem is closely related to prevalent public attitudes and beliefs (Angermeyer et al., 2017; Angermeyer and Schomerus, 2017). A review on stigma in ADHD found that “the existence of stigma and its impact on the diagnosed individual's life is highly under-investigated” and concludes that this is “surprising considering the disorder's vulnerability of eliciting stigmatizing perceptions in the public” (Mueller et al., 2012, p. 102). Nonetheless, with the exception of reports from the U.S. “National Stigma Study-Children” 2002 (Martin et al., 2007; McLeod et al., 2007; Pescosolido et al., 2007, 2008), data from population-based attitude research on ADHD are still scarce. This applies in particular to the adult

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phenotype of ADHD.

Especially in a disorder like ADHD that is surrounded by discussions about diagnostic labeling (Moncrieff and Timimi, 2010) and medicalization (Conrad and Bergoy, 2014), beliefs in a continuum of mental illness symptoms and their relations with stigma measures appear to be of great interest. Recently, continuum beliefs have emerged as a promising approach to tackle public mental illness stigma attached to the perception of differentness (Schomerus et al., 2013b; Corrigan et al., 2015; Schlier et al., 2016). Growing evidence from observational (Schomerus et al., 2013b; Angermeyer et al., 2014; Makowski et al., 2016) and experimental research designs (Schomerus et al., 2016; Wiesjahn et al., 2016; Corrigan et al., 2017; Thibodeau et al., 2018) suggests beneficial effects on stigma related to persons with depression, schizophrenia or alcohol dependence, whereas relations with the stigma of ADHD are currently unknown. Therefore, we aimed to explore the context of conceptualizations like beliefs in a continuum of symptoms or their abnormality by calculating associations with stated experience and familiarity with the depicted symptoms as well as stigmatizing attitudes.

Against this backdrop, the present study uses data from the first population-based survey on public attitudes towards children and adults with symptoms of ADHD conducted in a European country to address the following questions:

- How common are continuum beliefs, personal experiences and interpersonal contacts with regard to symptoms of ADHD among the German general population?
- What emotional reactions towards the depicted persons are reported and how much is an adult with symptoms of ADHD accepted in different social situations?
- Are personal experience or previous interpersonal contacts related to specific conceptualizations of the depicted symptoms and stigmatizing attitudes? Do concepts of the symptoms mediate these relationship?
- Do disorder-related attitudes differ regarding the age of the person depicted with ADHD?

2. Methods

2.1. Participants

A representative population survey of German-speaking adults (> 18 years) was conducted in Germany between March and May 2017. Fieldwork was done by USUMA (Berlin), a company specialized in market and social research. A total of 1008 persons completed the interview, reflecting a response rate of 20.1%. Reasons for non-response were: partial interviews ($N = 21$), refusal or termination of interview by the survey respondent ($N = 1859$), no contact with eligible household and answering machine ($N = 1154$), other communication difficulties due to problems of language or understanding ($N = 432$). Participants did not receive an incentive. Although non-responder bias has to be considered to be important (de Winter et al., 2005), ethical considerations prohibited the collection of any detailed information on non-respondents. The sample contained slightly more women, more elderly people and a higher average level of educational attainment in comparison to the German general population (supplementary Table 1).

2.2. Interview and case vignettes

After training the interviewers and conducting a field pre-test to evaluate the comprehensibility and internal consistency of the interview, a computer-assisted telephone interview (CATI) was conducted using real-time monitoring by trained supervisors. The interview started with the playing of a previously recorded unlabeled case-vignette of a child ($N = 505$) or an adult ($N = 503$) with all core symptoms of ADHD according to DSM-V (e.g. “careless mistakes in schoolwork”,

“does not follow through on instructions”, “easily distracted by extraneous stimuli”, “loses things”, “leaves his place in the classroom or when sitting at the dining table”, “on the go”, “interfere with functioning in school and negative impact on relationships”). During and after hearing the vignette we controlled for respondent attentiveness by asking for comprehension problems. The two vignette conditions differed only with regard to age (12y/35y) and contextual factors (e.g. school/work). The gender of the person described in the vignette (Anne/Robert) varied at random. The wording of the vignettes had undergone validation by five blinded experts with experience in general or child/adolescence psychiatry and has been published elsewhere (Speerforck et al., 2019).

2.3. Measures

2.3.1. Conceptualizations of symptoms

We asked respondents to indicate their agreement with the following two statements: 1. “Basically, we are all sometimes like this person. It’s just a question of how pronounced this state is.” 2. “All in all the problems of Robert / Anne are abnormal.” While the first item was also used in earlier surveys (Schomerus et al., 2013b), we aimed to measure another aspect of disorder conceptualization by introducing the adjective “abnormal”. Answers had to be given on a five-point Likert-scale, with “1” indicating strong agreement and “5” indicating strong disagreement with the statement. We reversed the scores for our analysis and used it as a continuous variable with higher scores indicating stronger agreement with the respective statement.

2.3.2. Personal experience and interpersonal contact

We elicited personal experience with the problem depicted in the vignette by asking respondents whether they ever had a problem like this, and measured previous interpersonal contact by inquiring whether somebody among their family or close friends ever had to deal with such a problem. Answers for these measures were coded as “0” = “no” and “1” = “yes”.

2.3.3. Emotional reactions

Following the stigma concept of Link and Phelan (2001), negative emotional reactions are an important consequence of negative stereotypes, leading to separation, discrimination and status loss. To investigate emotional reactions towards the person with depicted symptoms, we used the “Emotional Reactions to the Mentally Ill Scale (ERMIS)” (Angermeyer and Matschinger, 2003). We presented possible emotional reactions, asking the respondents to indicate how they would react to the person described in the vignette. Answers were given on five-point Likert-scales anchored with 1 “applies completely” and 5 “does not apply at all”.

The Kaiser–Meyer–Olkin measure of sampling adequacy for all items was 0.73, making the scale eligible for factor analysis. We entered all responses into an exploratory principal-component factor analysis, yielding three factors with an Eigenvalue > 1. We performed varimax rotation of the three factors, resulting in three uncorrelated factor scores. Table 1 shows items, rotated factor loadings, Eigenvalues and the explained variance of the three factors. As previously (Angermeyer and Matschinger, 2003; Speerforck et al., 2014, 2017), we termed the first factor “anger”, the second “fear”, and the third “pro-social reactions”. Scores were reversed for our analyses, with higher scores indicating stronger emotional reactions.

2.3.5. Social distance

The desire for social distance scale is a widely used measure of individual discrimination of adults with mental illness and thus represents the final stage of the stigma process (Link and Phelan, 2001). Respondents in the adult ADHD vignette condition were asked how willing they would be to accept the person described in the vignette in seven social situations (Link et al., 1987). Since the scale is not

Table 1
Rotated factor loadings of emotional reactions ($n = 966$).

	Factor 1 "Anger"	Factor 2 "Fear"	Factor 3 "Pro-social"
I feel annoyed	0.82	0.01	-0.06
I react angrily	0.78	0.12	-0.03
Provokes my incomprehension	0.50	0.36	-0.24
I feel uncomfortable	0.51	0.52	0.10
Provokes fear	0.04	0.82	-0.06
Makes me feel insecure	0.10	0.77	0.07
I feel the need to help	-0.07	-0.05	0.75
I feel pity	0.12	0.08	0.70
I feel sympathy	-0.20	0.00	0.70
Eigenvalue	2.50	1.63	1.05
Cumulative explained variance (%)	27.8	45.8	57.5

Rotated factor loadings with a loading >0.5 are highlighted.

validated for use in children, it was only used in the adult vignette condition. To ensure that the identical parts of the two interviews were comparable, we placed the scale at the end of the 'adult' interview after mentioning the label "ADHD". With the help of 5-point Likert scales, respondents could indicate to what extent they were willing or unwilling to engage in the proposed relationships. We used the mean value of all seven items for our analyses, with higher scores indicating a greater desire for social distance towards the described person.

2.4. Statistical analysis

To allow statements to be representative of the German-speaking general population, all results were calculated using sampling weights. To illustrate prevalences of public attitudes, respondents who endorsed the two points on either side of the mid-point of the five-point scales (values 1 + 2 and 4 + 5) were grouped together into the categories "agree" and "disagree" (emotional reactions) resp. "accept" and "reject" (social distance). Differences in responses for the two vignette conditions were tested for statistical significance using Fisher's exact test.

To investigate relationships of conceptualizations of symptoms, we computed fully saturated path models with maximum likelihood estimation using sampling weights. The hypothesized basic model comprised personal experience, previous interpersonal contacts, gender, age and educational attainment as exogenous variables, the belief in a continuum of symptoms as hypothesized mediating variable (endogenous) as well as pro-social emotions (factor score) and desire for

social distance (mean value, adult vignette) as endogenous dependent variables with the largest expected coefficients (Schomerus et al., 2013a). In a second step, the belief that the problems are abnormal (as an additional mediating variable) and anger and fear (as additional dependent variables) were added to the model while checking indicators of model fit. Model fit was assessed using Chi-Square Statistics to test the hypothesis that the covariance matrix of the observed data differs from the expected covariances of the hypothesized model (cut off: $p > 0.05$) and to check the general model fit for the baseline model (cut off: $p \leq 0.05$). Further, we assessed absolute fit indices (Root Mean Square Error Of Approximation, RMSEA, cut off: <0.06 ; standardized root mean squared residual, SRMR, cut off: <0.08) and an incremental fit index (Comparative fit index, CFI, cut off: >0.95). Direct effects, specific indirect effects, and total effects and total indirect effects of these potential multiple mediator path models were estimated by computing the respective products and sums of products separately for each of the 2 vignettes (Alwin and Hauser, 1975; Preacher and Hayes, 2008; Fairchild and MacKinnon, 2009). Assumptions for linear regression analyses (underlying principle of the used path model) such as normality distribution from residuals, heteroscedasticity and multicollinearity were tested and met. Observations with one or more missing variables (continuum belief: $N = 10$; familiarity: $N = 16$; emotional reactions $N = 42$) were excluded from the analyses. Within the social distance scale, observations with more than one missing variable ($N = 10$) were excluded from the analyses in which the mean value was applied.

Table 2

Conceptualization of symptoms, personal experience and previous contact as weighted response frequencies of the German-speaking general population, sorted by vignette.

	ADHD child ($N = 503$)	ADHD adult ($N = 505$)	F test ^b (df 1, 1007)
Conceptualization of symptoms			
Basically, we are all sometimes like this person. It's just a question how pronounced this state is.			
Agree ^a	63	70	$F = 1.82, p = 0.177$
Disagree ^a	15	15	$F = 0.00, p = 0.996$
<i>All in all, the problems of Robert / Anne are abnormal.</i>			
Agree ^a	33	25	$F = 4.98, p = 0.026$
Disagree ^a	40	45	$F = 1.35, p = 0.246$
Personal experience			
<i>Have you ever had a problem like this?</i>			
Yes ^a	23	28	$F = 2.28, p = 0.131$
No ^a	77	71	$F = 2.93, p = 0.087$
Previous interpersonal contact			
<i>Does or did somebody among your family or close friends ever have to deal with a problem like this?</i>			
Yes ^a	47	47	$F = 0.01, p = 0.937$
No ^a	52	52	$F = 0.00, p = 0.986$

Due to rounding, percentages do not add up to 100%.

^a Values are weighted percentages including missing observations.

^b F-statistics after weighted logistic regression analysis with vignette condition (exposure) and the related response category as outcome testing the hypothesis that estimates differ between vignette conditions.

Table 3

Emotional reactions to a child or an adult with depicted symptoms of ADHD as weighted response frequencies of the German-speaking general population, sorted by vignette.

Emotions	ADHD child (N = 503) "Agree" (%) ^a	ADHD adult (N = 505)	F test ² (df 1, 1007)	ADHD child (N = 503) "Disagree" (%) ^a	ADHD adult (N = 505)	F test ^b (df 1, 1007)
I feel the need to help her / him	70	56	$F = 11.44, p = 0.001$	11	14	$F = 0.69, p = 0.406$
I feel pity for her / him	61	50	$F = 7.13, p = 0.008$	14	23	$F = 6.84, p = 0.009$
I feel sympathy for her / him	44	42	$F = 0.29, p = 0.593$	19	19	$F = 0.06, p = 0.814$
I feel annoyed by her / him	23	24	$F = 0.06, p = 0.804$	46	49	$F = 0.34, p = 0.558$
I feel uncomfortable	19	17	$F = 0.49, p = 0.486$	57	61	$F = 1.13, p = 0.287$
I react angrily	16	13	$F = 0.67, p = 0.414$	62	66	$F = 0.94, p = 0.331$
She / he provokes my incomprehension	15	14	$F = 0.03, p = 0.870$	72	67	$F = 1.21, p = 0.272$
She / he makes me feel insecure	13	16	$F = 1.07, p = 0.302$	71	67	$F = 1.24, p = 0.265$
She / he provokes fear	11	6	$F = 4.96, p = 0.026$	77	84	$F = 3.68, p = 0.055$

^a Values are weighted percentages including missing observations.

^b F-statistics after weighted logistic regression analysis with vignette condition (exposure) and the related response category as outcome testing the hypothesis that estimates differ between vignette conditions.

The statistical analyses were carried out using Stata 13.1 MP (StataCorp, 2013) and Mplus 8 (Muthen and Muthen, 1998–2017).

More detailed information on the method section is available in the online supplement.

3. Results

Table 2 shows the prevalence of the investigated conceptualizations of symptoms and the rated familiarity with them. For both vignettes, about two-thirds of respondents agreed with the statement that we are all sometimes like this person. 33% of respondents considered the problems depicted in the child vignette as abnormal; this percentage was significantly higher than the 25% of participants agreeing to the respective statement in the adult vignette condition. Following both vignettes, about one-quarter of respondents stated that they had ever had a problem like that, and about half indicated that a close friend or a family member had such a problem.

Table 3 summarizes the emotional reactions to Robert and Anne as depicted in the vignette. The three most frequently endorsed emotional reactions after hearing the vignettes were pro-social reactions like “need to help”, “feel pity” and “feel sympathy”. The first two emotional reactions were endorsed significantly more frequently after the child vignette. About a quarter of participants stated that they felt annoyed by the depicted persons. Fear was the least frequently present emotional reaction, but was endorsed significantly more after the child vignette.

Fig. 1 shows the social acceptance of adults depicted with symptoms of ADHD in seven hypothetical social situations. Whereas 74% of respondents would accept Anne or Robert as a co-worker, only 34% would recommend the depicted person for a job. As expected, the highest desire for social distance was indicated when asked whether they would let the depicted person take care of their own children (41%). The mean value for all seven items was 2.5 (SD 0.9). The detailed percentages and weighted means with standard deviation of 5-

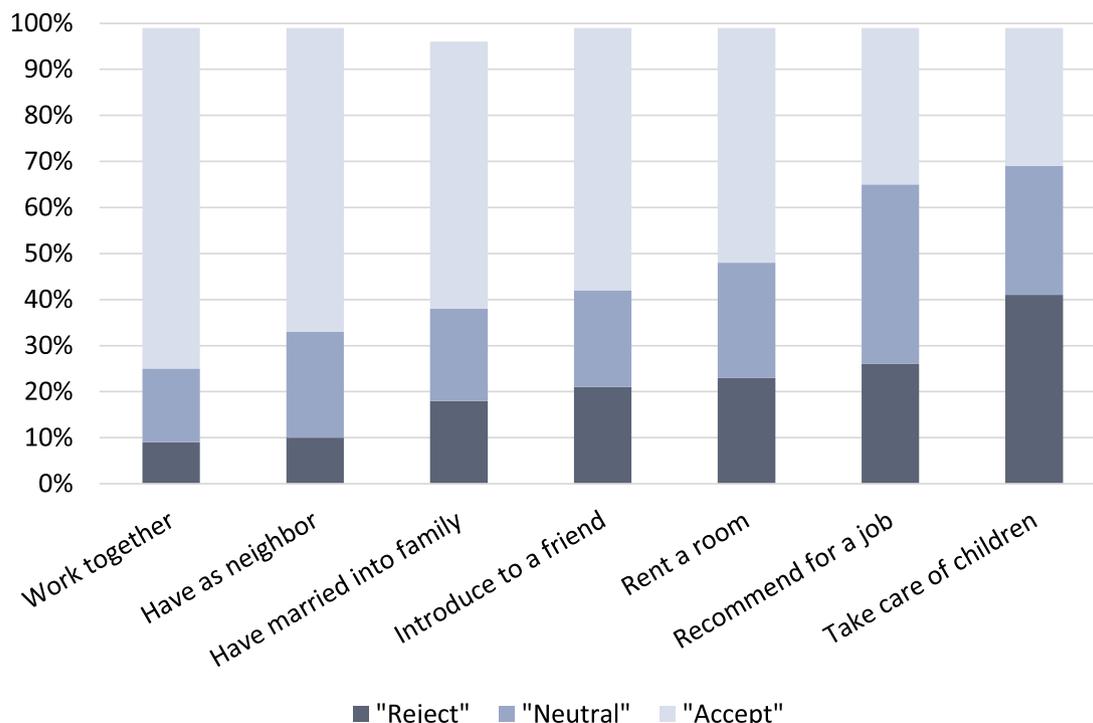


Fig. 1. Social acceptance in various social relationships after presentation of an adult with ADHD as weighted response frequencies of the German-speaking general population including missing observations.

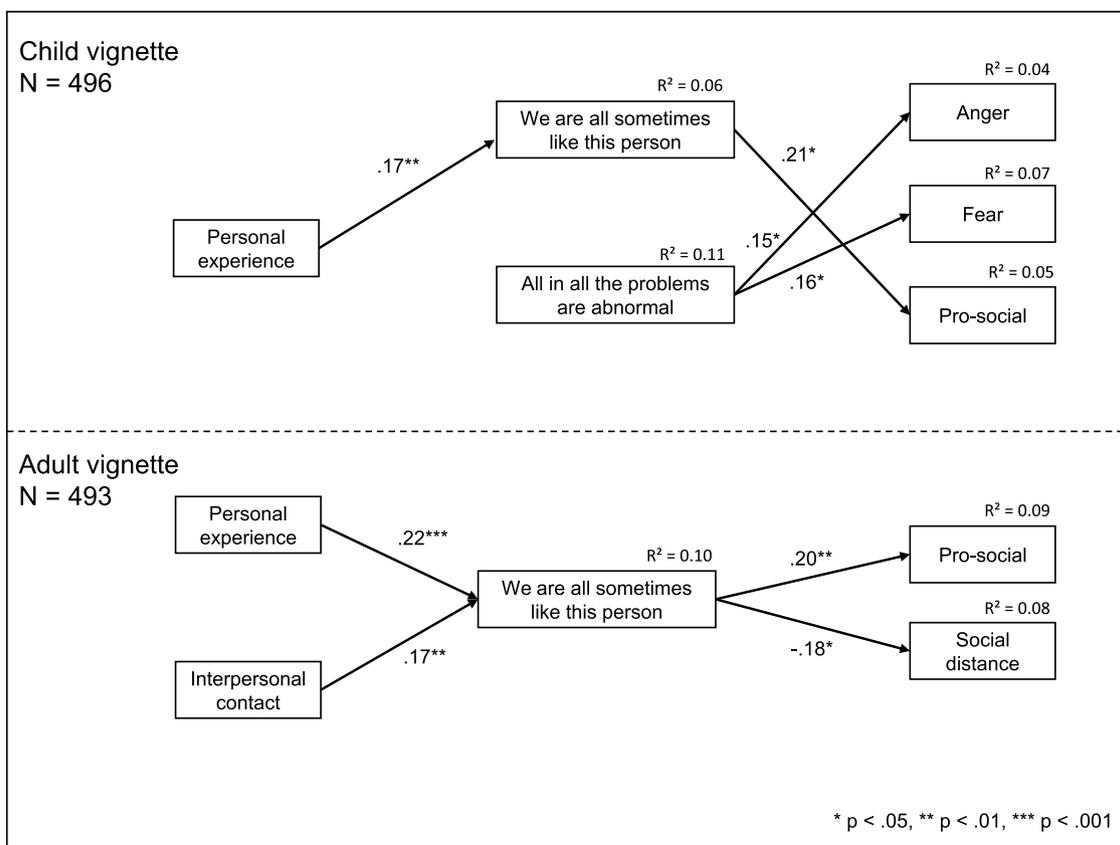


Fig. 2. Weighted results of the hypothesized path models for the two vignettes, controlled for age, education and gender (standardized coefficients). Only statistically significant path coefficients are shown. The full model can be found in supplementary Table 3. .

Point-Likert Scales can be found in supplementary Table 2.

Fig. 2 summarizes the results of the hypothesized path model for the two vignettes. We show significant standardized path coefficients (Beta). Standardized coefficients illustrate the effect size of significant relations. They indicate how many standard deviations the dependent variable will change if the independent variable changes by one standard deviation. The explained variance (R²) of the endogenous variables in the model was generally low.

The upper half of Fig. 2 comprises results for the child vignette. In this model, the integration of the additional variables resulted in an excellent model fit ($\chi^2 = 0.945$, $df = 4$, $p = 0.918$; Baseline model: $\chi^2 = 105.004$, $df = 35$, $p = 0.000$; RMSEA = 0.000; SRMR = 0.008; CFI = 1.000). Personal experience with the depicted symptoms was directly related to a stronger belief that “we are all sometimes like that person” ($B = 0.48$, $Beta = 0.17$, $p = 0.002$) while that belief was positively associated with more pro-social reactions in our model ($B = 0.18$, $Beta = 0.21$, $p = 0.030$). On the contrary, the belief that “all in all the problems are abnormal” was positively related to anger ($B = 0.12$, $Beta = 0.15$, $p = 0.028$) and fear ($B = 0.13$, $Beta = 0.16$, $p = 0.017$).

The lower half of Fig. 2 comprises the results for the adult vignette condition. In this model, the integration of the additional variables resulted in high χ^2 values indicating a misspecification of the model. The model fit of the hypothesized basic model was good to acceptable ($\chi^2 = 2.221$, $df = 1$, $p = 0.136$; Baseline model: $\chi^2 = 67.369$, $df = 18$, $p = 0.000$; RMSEA = 0.050; SRMR = 0.020; CFI = 0.975). In this model, not only personal experience with the depicted symptoms ($B = 0.58$, $Beta = 0.22$, $p = 0.000$), but also stated interpersonal contact ($B = 0.40$, $Beta = 0.17$, $p = 0.005$) were directly related to a stronger belief that “we are all sometimes like that person” while that belief was again positively associated with prosocial reactions ($B = 0.17$, $Beta = 0.20$, $p = 0.006$). Further, a higher belief in a

continuum of symptoms was directly related to less desire for social distance ($B = -0.14$, $Beta = -0.18$, $p = 0.019$) towards the depicted adult with ADHD.

Total effects from personal experience or previous interpersonal contact variables on emotions or desire for social distance were not significant, suggesting no possible mediation mechanism of the investigated continuum beliefs.

Age, education and gender were included as potential confounding variables in our weighted models. Briefly summarized, age was related to a stronger belief that “all in all the problems are abnormal” (children vignette) and to a higher desire for social distance (adult vignette). A female gender instead was associated with less belief that “all in all the problems are abnormal” (children vignette), as was educational achievement, and with more pro-social reactions in both vignettes.

The full models with all unstandardized coefficients (B) and their confidence intervals (CI) representing direct effects, specific indirect effects, total effects and total indirect effects and the explained variances of the endogenous variables are reported in the supplementary Table 3.

4. Discussion

This is the first population study to investigate emotional reactions and conceptualisations of symptoms related to ADHD, using unlabelled case-vignettes to avoid possible bias due to the use of medical vocabulary. Additionally, vignettes depicting a child and an adult with symptoms of ADHD were used in the same study design to allow direct comparisons of differences related to the age of the depicted person. Despite these strengths, our results need to be discussed in the light of the limitations of our study. First, in investigating the identification of typical symptoms of ADHD as mental illness, we used unlabelled case-vignettes depicting core symptoms of ADHD, while reactions to labeled

vignettes or real persons with ADHD or only some symptoms might differ. Second, despite using sampling weights for our analyses, our study design carries a risk for selection, non-responder and agreement bias as well as social desirability. Third, our study was conducted in Germany and results are likely to differ in other socio-cultural contexts. Fourth, when interpreting the social distance measure, it is important to stress that it had to be placed at the very end of the interview and the label “ADHD” was mentioned in two previous questions. Fifth, the proposed models for both vignette conditions differed with regard to the general model fit. This might be rooted in different item perceptions depending on the age of the depicted person (e.g. “abnormal” or “fear”). Sixth, we computed a path model with low-explanatory power on cross-sectional data without an experimental design to elucidate possibly important associations of continuum beliefs and other predictors. Therefore, no statements can be made in terms of causality and there are other factors that are associated with the endogenous variables that were not examined in our study. For example, it might be possible that participants with generally stronger pro-social attitudes towards the depicted person more easily believe in a continuum of ADHD. Further, we are aware that the missing visualization of non-statistically significant results in Fig. 2 is not unproblematic considering the evolving discussion about the interpretation of statistical significance itself (Amrhein et al., 2019). On the other hand, a clear visualization of the main results of a complex path model is mandatory. Therefore, we decided to publish the full model in the supplemental material.

Results can broadly be compared to an earlier study, that used case vignettes of other mental illnesses and mostly identical questions but was conducted with face-to-face interviews (Schomerus et al., 2013b). When comparing the prevalence rates, belief in a continuum of symptoms in ADHD seems particularly frequent: 70% for ADHD, 42% for depression, 27% for alcohol dependence and 26% for schizophrenia. This finding is also reflected by the surprisingly high number of people stating that they have had personal experience with the depicted symptoms of ADHD (23%/ 28%) or have had interpersonal contact to someone with the depicted symptoms (47%). In accordance with these findings, Pescosolido et al. reported results from the U.S.-based National Stigma Study-Children, suggesting that a majority of the U.S. public (61.6%) categorizes the symptoms of ADHD as “somewhat or not at all serious” (Pescosolido et al., 2008). This underpins a public perception that symptoms of ADHD are relatively common and widespread compared to the symptoms of other mental illnesses.

Interpreting the emotional reactions towards a person with ADHD, the fact that feeling pity and the need to help were more frequently endorsed after the child vignette is most likely a result of the perception of a child as being innocent and in need of protection and might be thought of as emotional reactions rather explained by evolutionary psychology (Kahn et al., 2002) than by the ADHD phenotype depicted in the vignettes. Interestingly, the frequency of all other emotional reactions except fear did not differ between vignette conditions to a statistically significant degree. The finding that “provokes fear” was more frequently endorsed in the child vignette condition was particularly surprising. While the presented rotated factor loadings of the emotional reactions suggest a valid measurement of “fear of somebody” in the total sample, a misconception of the item by implying “fear for somebody” in the context of the child vignette seems highly probable given the widespread use in German language when relating to children (“Angst um jmd.”).

The desire for social distance towards an adult with ADHD in all seven social situations seems lower when broadly compared to other mental illnesses like depression, schizophrenia or alcohol dependence (Angermeyer et al., 2013). Nonetheless, the finding that one in five of the German general population would rather not introduce the depicted person to a friend and that one in four feels rather annoyed and would not recommend this person for a job points to the fact that stigma remains an important issue for patients and relatives. This is also

underlined by findings from the National Stigma Study-Children in the United States, which indicate a much higher desire for social distance towards children with ADHD and increased perceptions of dangerousness to self and others when compared to children with “normal troubles” (Martin et al., 2007; Pescosolido et al., 2007). This also seems to apply for children as peers (Law et al., 2007). Further, Martin et al. found that both perceiving the vignette child's problems as part of the “normal ups and downs” of childhood and female gender of respondents reduce social distance preferences towards a child with ADHD (Martin et al., 2007). This resonates well with our finding that belief in a continuum of symptoms and female gender of respondents are associated with pro-social reactions in both vignette conditions. For adults with depression, schizophrenia and alcohol dependence, a similar pattern of associations was found, with belief in a continuum of symptoms linked to more pro-social reactions and less desire for social distance from people with schizophrenia, depression or alcohol dependence (Schomerus et al., 2013b; Angermeyer et al., 2014). In conjunction with these findings, the belief that the “problems are abnormal” was associated with more fear and anger in the child vignette.

While personal experience (both vignettes) and stated interpersonal contact (adult vignette) were positively related to a stronger belief in a continuum of the depicted symptoms, there were no significant total effects on stigmatizing attitudes. This finding is particularly interesting, since it provides first quantitative evidence that a belief in a continuity of symptoms might be influenced by one's own experience and familiarity with symptoms. On the other hand, it has to be considered that the explained variance of those variables in our model was low and the belief in a continuum of symptoms is related to other factors such as personal experience and previous contact. This resonates well with evidence from studies showing that continuum beliefs are an important target for intervention (Schomerus et al., 2016) (Corrigan et al., 2017). Despite a relevant specific indirect effect from personal experience through the continuum variable on pro-social reactions ($B = 0.10$, $Beta = 0.04$, $p = 0.037$) and desire for social distance ($B = -0.08$, $Beta = -0.04$, $p = 0.040$) in the adult vignette condition, a significant mediation process in our model cannot be proposed due to a missing total effect.

It seems important that the stigma related to treatment options and a low acceptance of the disorder constituting a mental illness might pose particular difficulties for patients and relatives in a disorder like ADHD that is dominated by beliefs of symptom continuity (Pescosolido et al., 2008; Mueller et al., 2012; Speerforck et al., 2019). On the other hand, promoting an aetiological model of ADHD without considering aspects of a continuum may well be a missed opportunity regarding the stigma attached to this disorder.

Declaration of Competing Interest

All authors report no conflict of interests.

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Compliance with ethical standards

The study protocol was approved by the ethics committee of Greifswald University (BB 072/17).

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2019.112570.

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