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Posttraumatic Stress Disorder in Very Young Children: Diagnostic Agreement between *ICD-11* and *DSM-5*

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Abstract

The prevalence of posttraumatic stress disorder (PTSD) in very young children depends on the diagnostic criteria. Thus far, studies have investigated the proposed *International Classification of Diseases* (11th rev.; *ICD-11*) criteria for PTSD only in samples of children older than 6 years. The aim of this study was to test the diagnostic agreement between the *ICD-11* and the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*) criteria for children who are 6 years old and younger. Caregivers of children aged 3–6 years in foster care in Germany (n = 147) and children aged 1–4 years who had attended a hospital in Switzerland following burn injuries (n = 149) completed a questionnaire about children's PTSD. Rates of PTSD were calculated according to *ICD-11* (considering a specific and a more general conceptualization of intrusive memories) and *DSM-5* criteria and were compared using McNemar's tests and Cohen's kappa. The proportion of children who met the *ICD-11* criteria was 0.6–25.8% lower than the proportion of PTSD cases according to the *DSM-5* criteria. The diagnostic agreement between each *ICD-11* algorithm and *DSM-5* was moderate, κs = 0.52–0.66. A systematic investigation of adaptions of the *ICD-11* avoidance cluster identified alternative symptom combinations leading to higher agreement with the *DSM-5* requirements. Furthermore,

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DSM-5 had higher predictive power for functional impairment than the *ICD-11* algorithms. In conclusion, the findings suggest that the planned *ICD-11* criteria show less sensitivity in very young children, which can be explained by the more stringent avoidance cluster.

Over the past two decades, a growing body of research has shown that very young children (i.e., those 6 years of age or younger) can develop posttraumatic stress disorder (PTSD) following traumatic experiences (Scheeringa, 2011; Scheeringa, Zeanah, Drell, & Larrieu, 1995). Since young children's cognitive capacities in terms of perception, memory, and language skills are still developing, symptoms might manifest differently compared to older children and adolescents. For instance, very young children rarely show explicit symptoms of avoidance or cognitive symptoms, such as the sense of foreshortened future or self-blame (Scheeringa, Zeanah, & Cohen, 2011). Furthermore, most assessments of PTSD are based on caregivers' report, which is associated with certain problems. For example, caregivers often underreport highly internalized symptoms, such as intrusive recollections, nightmares, and avoidance of internalized reminders of past traumas (Scheeringa, 2011).

In 2013, the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; American Psychiatric Association [APA], 2013) introduced a new PTSD subtype for children aged 6 years and younger. The age-adapted diagnosis includes 16 symptoms in three clusters: (a) reexperiencing, (b) avoidance and negative alterations in cognitions and mood, and (c) arousal (Table 1). This PTSD subtype was adapted to the developmental characteristics of preschool age, which is reflected in the combined cluster of avoidance and negative alterations in cognitions and mood. For a PTSD diagnosis, one symptom from each cluster that lasts at least one month as well as clinically significant functional impairment are required.

In contrast to the *DSM,* the *International Classification of Diseases* (*ICD*) provides developmentally sensitive specifications for very young children neither in its current 10th version (*ICD-10;* World Health Organization, 1992) nor in the planned 11th version (*ICD-11*; Maercker et al., 2013). However, the need for developmental adaptations of the diagnostic criteria has been recognized and will likely lead to modifications or additional explanatory descriptions of the diagnostic criteria (Brewin et al., 2017). The *ICD-11* committee suggests a strongly reduced rationale: PTSD is proposed to be diagnosed when one symptom from each cluster of (a) reexperiencing, (b) avoidance, and (c) arousal is fulfilled (Table 1). The revised 11th version of the *ICD* will also require functional impairment, which is not a requirement in the 10th edition (Maercker et al., 2013). Symptoms that are not specific for PTSD and overlap with other diagnoses, such as sleep disturbance, were omitted from the *ICD-11* algorithm. There has been some discussion about the definition of intrusive memories as a symptom of reexperiencing. The current beta draft of the 11th version refers to reexperiencing the traumatic event in the form of vivid intrusive memories, flashbacks, or nightmares. Intrusive memories as defined by *ICD-11* involve reliving in the present, which differs from the more general

definition in *DSM-5* (Brewin et al., 2017; Brewin, Gregory, Lipton, & Burgess, 2010). However, there are some studies with children and adolescent samples that have examined the inclusion of intrusive memories that are not necessarily relived in the present as a third symptom of reexperiencing (e.g., Hafstad, Thoresen, Wentzel-Larsen, Maercker & Dyb, 2017).

Previously used developmentally sensitive algorithms, which formed the basis for the *DSM-5* PTSD diagnosis for children 6 years old and younger, have been evaluated and have consistently identified more positive PTSD cases in preschool children than criteria in the fourth edition of the *DSM* (*DSM-IV*; DeYoung & Kenardy, 2011; Graf, Schiestl, & Landolt, 2011; Meiser-Stedman, Smith, Glucksman, Yule, & Dalgleish, 2008; Scheeringa, Myers, Putnam, & Zeanah, 2012).

To date, there has been no empirical comparison of the proposed *ICD-11* algorithm to the *DSM-5* requirements for children 6 years of age and younger. For children and adolescents aged 7 years or older, authors of three studies found inconsistent results when comparing the diagnostic systems. Danzi and La Greca (2016) reported 2% more positive PTSD cases using the *ICD-11* criteria than using the *DSM-5* criteria in 7- to 12-year-old children exposed to natural disasters. They also found that children with PTSD as detected by the *ICD-11* algorithm were less functionally impaired compared to children with PTSD identified by the *DSM-5* criteria only and did not differ in their functional impairment compared to children without a PTSD diagnosis. In another study of young survivors of the 2011 Utøya attack in Norway, Hafstad and colleagues (2017) found similar PTSD rates when both the *ICD-11* and *DSM-5* criteria were applied. The only differences were detected 14–15 months after the attack, when the *ICD-11* criteria with two symptoms of reexperiencing identified 2.8% fewer positive cases than *DSM-5* criteria. In their sample, children with PTSD as detected by *ICD-11* and *DSM-5* were found to have similar functional impairment. Sachser and colleagues (2017) investigated a clinical sample of 475 children and adolescents aged 7–17 years in the United States, Germany, and Norway. When applying the *DSM-5* criteria with both self- and caregiver-report, the authors found 14.4–15.3% more positive PTSD cases compared to the *ICD-11* criteria with two symptoms of reexperiencing, and 5.8–11.8% more positive PTSD cases compared to the *ICD-11* criteria with three symptoms of reexperiencing. Taken together, the *ICD-11* algorithm was less sensitive than the *DSM-5* in a clinical sample but showed no or only slight differences in community samples of older children and adolescents. Throughout all studies, the use of a more general conceptualization of intrusive memories (i.e., those that are not necessarily relived) as a third symptom of reexperiencing increased the overlap of the *ICD-11* criteria with the *DSM-5* criteria. Thus far, there have been inconsistent results regarding the ability of each system to detect children who show functional impairment in one or more areas.

Results of studies that have evaluated the developmentally sensitive algorithms as a basis for *DSM-5* have underlined that the prevalence of PTSD in very young children depends strongly on the applied diagnostic criteria and has often been underestimated (Friedman, 2013; Scheeringa, 2011). It is likely that specifications for very young children will be included in the *ICD* formulations (Brewin et al., 2017), but based on current publications, there are still no specific recommendations. The consequences of using the new *ICD-11* criteria in young children are thus unclear. Therefore, in this

study, we aimed to investigate the overlap of the proposed *ICD-11* criteria with the *DSM-5* criteria in children aged 6 years and younger. We applied proposed *ICD-11* algorithms with both specific and more general conceptualizations of intrusive memories (i.e., with or without intrusive memories that are not necessarily relived as a third symptom in the reexperiencing cluster). Given that the definition of intrusive memories is more general in *DSM-5* than in the *ICD*, the *ICD-11* algorithm with the more specific conceptualization of intrusive memories that includes two symptoms of reexperiencing is considered a more accurate approximation of the *ICD-11* definition of PTSD. Investigating both *ICD-11* algorithms (i.e., those with two and three symptoms of reexperiencing) allows for comparisons to previous studies with older children and adolescents.

Furthermore, we systematically investigated alternative criteria for the *ICD-11* cluster of avoidance. We focused on the avoidance cluster for three reasons. First, main changes in the *DSM-5* PTSD subtype for children aged 6 years and younger compared to the criteria for older children and adults refer to the avoidance and alterations in cognitions and mood cluster. Second, previous research has shown that very young children rarely develop symptoms of avoidance that require advanced cognitive abilities. Third, symptoms of avoidance are difficult to detect by caregivers (Scheeringa et al., 1995). Hence, the *ICD-11* algorithm was systematically modified by excluding symptoms of avoidance or adapting symptoms and symptom combinations from the *DSM-5* to the *ICD-11* avoidance cluster. Finally, we investigated the ability of both diagnostic systems to detect children with functional impairment. Investigating the predictive power of the diagnostic systems to detect functional impairment can provide important information about their clinical utility (Hafstad et al., 2017).

Method

Participants and Procedure

Two independent samples of children between the ages of 1 year and 6 years, 11 months who were exposed to potentially traumatic events were included in the current study. Procedures were approved by the local ethics committees (University of Bremen, Germany and canton Zurich, Switzerland). The first sample consisted of 158 children aged 3 years to 6 years and 11 months (M_{age} = 4.91 years, *SD* = 1.14; 47.9% male) in foster care in Germany (Vasileva & Petermann, 2017). Participants were recruited by contacting governmental and private child welfare agencies, self-help organizations, and password-protected forums for foster parents. The procedure was coordinated at the University of Bremen, Germany. Inclusion criteria required children to (a) be in long-term foster care, (b) have no diagnosed autism spectrum disorder, and (c) have experienced a potentially traumatic event at any time in their life except in the past month. One foster parent answered questions about the child and the foster family using either an online or paper-and-pencil questionnaire. There were no differences in the severity of PTSD rated by foster parents who answered questions online compared to those who filled out the paper-and-pencil version, $t(135) = 1.58$, $p = .116$.

The second sample included 154 children aged 1–4 years (M_{age} = 2.71 years, *SD* = 0.07; 63.6% male) who were medically treated at the University Children's Hospital Zurich (Zurich, Switzerland) in the aftermath of burn injury (Haag & Landolt, 2017). The sample was part of a randomized controlled trial (RCT) testing the effectiveness of an early psychological intervention for preschool children and their parents following accidental burn injury (De Young, Haag, Kenardy, Kimble, & Landolt, 2016). Children were included in the current study if (a) their hospital stay lasted one week or less, (b) there was no suspected or substantiated child abuse at entry, and (c) they did not show evidence of cognitive impairment according to medical records. Symptoms of PTSD that were analyzed in this study were assessed approximately six months after the accident (*M* = 6.55 months, *SD* = 1.05). Out of 417 children who were treated at the University Children's Hospital Zurich for burn injury, 331 were eligible for study participation. Of this group, 46.5% (*n* = 154) consented to participate in the study. The main reasons for nonparticipation were lack of contact with the patients, lack of interest, and time. The final Swiss sample in the present analysis included three groups: low risk, intervention, and control. After all participating children completed an initial screening for risk of developing traumatic stress symptoms, the total sample was divided into an at-risk group (*n* = 44) and a low-risk group (*n* = 110). Afterwards, participants in the at-risk group were randomized into the intervention group (*n* = 23) and the control group (*n* = 21). Mean PTSD severity scores as measured by the Young Child PTSD Checklist (YCPC; Landolt, Haag, & Scheeringa, 2014; Scheeringa, 2013) did not differ between the three groups, $F(2, 147) = 2.49$, $p = .086$. Most of the children had experienced scald injuries (*n* = 92, 59.7%), followed by contact burns (*n* = 49, 31.8%).

For both samples, only cases with less than 10% missing values in items assessing PTSD symptoms and functional impairment were included. In this way, children with more than three missing items were excluded in order to avoid clustering children as having PTSD by relying on fully statistically generated values. Excluded children (German sample, *n* = 11; Swiss sample, *n* = 5) did not differ in sex, $\chi^2(1, N = 311) = 2.08$, $p = .198$, or age, $z = 0.75$, $p = .450$, from children included in the analysis (overall, *N* = 296; German sample, *N* = 147; Swiss sample, *N* = 149). The Swiss sample contained more male children than the German sample, $\chi^2(1, N = 297) = 7.48$, $p = .006$. Foster children in the German sample had experienced more interpersonal potentially traumatic events, such as physical abuse and witnessing others being hurt whereas children in the Swiss sample had experienced more accidental injuries (Table 2).

Measures

Traumatic events. Potentially traumatic events were assessed with the approved German translation of the YCPC (Landolt, Haag, & Scheeringa, 2014; Scheeringa, 2013) or the PTSD-module of the Diagnostic Infant Preschool Assessment (DIPA; Scheeringa & Haslett, 2010). Caregivers reported whether the child had experienced any of 12 different traumatic events. For the current study, 10 items, which were identical in both instruments, were used to measure the following potentially traumatic events: accident, attack by an animal, manmade disaster, natural disaster, hospitalization or invasive medical procedure, physical abuse, sexual abuse, accidental burning, near drowning, and witnessing another person being hurt.

PTSD symptoms and functional impairment. The YCPC was used to assess symptoms of PTSD according to *DSM-5* and functional impairment in both samples. It includes 23 items related to children's PTSD symptoms, which are assessed on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*everyday*). For the current analysis, 18 of these items, which correspond to the *DSM-5* symptoms, were used to calculate *ICD-11* and *DSM-5* symptom combinations.

Additionally, functional impairment was assessed using five items rated on a 5-point Likert scale ranging from 0 (*hardly ever/none*) to 4 (*every day*). When given in an interview format, items showed a good test–retest interclass correlation coefficient (ICC = .87) and fair-to-good concurrent criterion validity using kappa for categorical agreement (κ = 0.48; Scheeringa & Haslett, 2010). Although the psychometric properties of both the original English and the German version of the YCPC have not been previously evaluated, the instrument was chosen because it was the only available measure for preschoolers that is based on the new *DSM-5* criteria. In the current samples, internal consistency was acceptable for the overall YCPC score (German sample, Cronbach's α = .93; Swiss sample, Cronbach's α = .74) and for the functional impairment score (German sample, Cronbach's α = .86; Swiss sample, Cronbach's α = .84).

Data Analysis

Analyses were conducted using SPSS (Version 24). Graphics were created with the R package VennDiagram (Version 1.6.17). Missing data in cases with less than 10% missing values in the YCPC (*n* = 5) were imputed using estimation maximization.

We calculated rates of PTSD by applying the *ICD-11* and the *DSM-5* algorithms. Similar to previous studies, we considered two alternatives of the *ICD-11* criteria (Table 1): (a) *ICD-11*(2), comprising two reexperiencing symptoms, and (b) *ICD-11*(3), comprising three reexperiencing symptoms, including intrusive memories that are not necessarily relived. Additionally, we systematically analyzed 18 alternative *ICD-11*(2) algorithms with zero or one symptoms of avoidance [*ICD-11*(A0)–*ICD-11*(A2)] or adapted combinations of two to six symptoms of avoidance and negative alterations in mood [*ICD-11*(A3)–*ICD-11*(A17)]. A symptom was considered present using two thresholds (a) when a child had a score of at least 1 (*once a week or less/once in a while*; lower threshold) and (b) when a child had a score of at least 2 (*two to four times a week/half the time*; higher threshold). Functional impairment was considered present when the caregiver rated at least one of the five items assessing functional impairment with a score of at least 1 (*some of the time*). Severity of functional impairment was calculated as the sum of the scores in these five items (range: 0– 20).

We calculated rates of symptom clusters and PTSD diagnoses as well as percentages of agreement of meeting full diagnostic criteria. Diagnostic agreement was investigated using two-tailed McNemar's tests and Cohen's kappa. The McNemar's test was applied to detect whether there were differences between the proportions of cases that fulfilled the diagnostic criteria by different diagnostic systems. Kappa was based on the percentages of agreement of both diagnostic systems but has the advantage that it considers the association between observed agreement and agreement occurring by chance. The association of each symptom combination with functional impairment was first

tested using chi-square tests. In a next step, odds ratios (*OR*s) and their 95% confidence intervals were calculated in order to identify the odds that a child with PTSD according to the symptom combination of each diagnostic system would have functional impairment relative to children without PTSD. For these analyses, the algorithms were used without the requirement for functional impairment. Odds ratios were considered significant when 1.0 was outside the confidence interval. We used analysis of variance with Tukey's correction for multiple comparisons to compare the severity of functional impairment in children who met full PTSD diagnostic criteria when different algorithms were applied and the severity of functional impairment in children without PTSD. Descriptive and inferential analyses were conducted separately for each sample.

Results

Rates of PTSD

Table 3 summarizes rates of symptom clusters and PTSD cases using different criteria. The lowest rates of PTSD were identified using the *ICD-11*(2) criteria (lower threshold: 34.7% of the German sample, 0.7% of the Swiss sample; higher threshold: 15.6% of the German sample, no PTSD cases in the Swiss sample). The highest PTSD rates were found when using the *DSM-5* criteria (lower threshold: 60.5% of the German sample, 1.3% of the Swiss sample; higher threshold: 30.6% of the German sample, no PTSD cases in the Swiss sample). There were no or only slight differences between the rates of PTSD according to *ICD-11*(2) and *ICD-11*(3). The proportion of children who fulfilled the *ICD-11*(2) criteria was between 0.6% and 25.8% lower than the proportion of children who fulfilled the *DSM-5* criteria. For all symptom clusters except the arousal cluster in the Swiss sample, the *ICD-11* criteria identified fewer positive cases than the *DSM-5* criteria.

Diagnostic Agreement

In the German sample, the *ICD-11*(2) criteria had moderate agreement with the *DSM-5* criteria, 74.2% agreement, κ = 0.51, McNemar's $\chi^2(1, N = 147) = 36.03$, $p < .001$ for the lower threshold and 82.3% agreement, κ = 0.52, McNemar's $\chi^2(1, N = 147) = 16.96$, $p < .001$ for the higher threshold. As shown by the McNemar's test, the *DSM-5* criteria identified significantly more PTSD cases than the *ICD-11*(2) criteria. In the Swiss sample, the overall agreement between *ICD-11*(2) and *DSM-5* constituted 99.3% using the lower threshold. The diagnostic agreement was moderate, κ = 0.66. There were no significant differences in the proportion of the subjects who were identified by the *ICD-11*(2) compared to the proportion of subjects identified by the *DSM-5* algorithm, McNemar's $\chi^2(1, N = 149) = 0$. Analyses of agreement were not conducted for the higher threshold in the Swiss sample because no children were identified as having PTSD by any diagnostic criteria.

In the German sample, using the *ICD-11*(3) algorithm led to similar agreement with the *DSM-5* criteria when applying the lower threshold, 74.9% agreement, κ = 0.53, McNemar's $\chi^2(1, N = 147) = 35.03$, $p < .001$. The agreement did not change from the agreement between the *ICD-11*(2) and the *DSM-5* algorithms when we applied the higher threshold in the German sample or in the Swiss sample.

Figure 1 depicts the variation in the diagnostic agreement between the two alternatives of the *ICD-11* algorithm and the *DSM-5* requirements for the German sample. Adding a third symptom of reexperiencing changed the overlap only slightly or not at all.

In the last simulation, symptoms of avoidance were excluded, or combinations of one to four symptoms of negative alterations in mood were added to the *ICD-11* avoidance cluster. Table 5 summarizes the seven symptom combinations showing the highest agreement with the *DSM-5* criteria in both samples. All of these algorithms were significantly different from the *ICD-11*(2) algorithm (see Supplementary Table for all combinations). The algorithm that included only the symptom of "avoidance of external cues" (Table 1) showed the lowest agreement in both samples. In the German sample, excluding all avoidance symptoms or adding any additional symptom or symptoms increased coefficients for agreement between the alternative *ICD-11* and *DSM-5* algorithms; however, the *DSM-5* criteria still detected significantly more PTSD cases for all algorithms and both thresholds. In the Swiss sample, excluding all avoidance symptoms led to lower agreement. The *ICD-11*(A17) and *ICD-11*(A18) showed the highest agreement with the *DSM-5* in the German sample, with $\kappa = 0.78$ for the lower threshold and $\kappa = 0.70$ for the higher threshold. These algorithms differed in the inclusion of the symptom "diminished interest in activities" (Table 1). There was a tendency for higher agreement when using algorithms with combinations of the symptom "negative emotional state" with either the symptom "detachment/social withdrawal" or the symptom "inability to express positive emotions." In the Swiss sample, adding the symptom "negative emotional state" or any symptom combinations including this symptom lead to full agreement between *ICD-11* and *DSM-5*, lower threshold: 100% agreement, $\kappa = 1.0$, McNemar's $\chi^2 = 0$.

Association with Functional Impairment

In the German sample, the proportion of children with functional impairment was significantly greater in children with PTSD than in non-PTSD cases according to both *ICD-11* alternatives as well as *DSM-5* (Table 4). In the Swiss sample, this association was significant for the *DSM-5* symptom combination. Analyses of the predictive power of the diagnostic systems were conducted only for the lower threshold in the Swiss sample. In both samples, using the *DSM-5* criteria was associated with fewer children with functional impairment in the no PTSD group and more children with functional impairment in the PTSD group compared to the *ICD-11* algorithms.

Analyses of odds ratios and their confidence intervals showed the greatest odds ratios for the *DSM-5* algorithm, indicating that the likelihood for a child with PTSD to have functional impairment relative to a child without PTSD was the greatest when using the *DSM-5* criteria. The predictive power for functional impairment was lower for the *ICD-11*(2) and *ICD-11*(3) algorithms. For these algorithms, the odds ratios were significant only for the lower threshold in the German sample but not for the higher threshold in the German sample or in the Swiss sample (Table 4).

Severity of functional impairment was compared only for the German sample because there were few children with PTSD in the Swiss sample ($n = 2$). Children identified as having PTSD according to

DSM-5 only or according to any *ICD-11* alternative as well as *DSM-5* had higher functional impairment than children without PTSD, $M_{difference}$ = 3.14–5.77, $p < .001$ to $p = .002$. There were no significant differences in mean functional impairment between children with PTSD identified by *DSM-5* only and children with PTSD identified by *ICD-11* as well as *DSM-5*, $M_{difference}$ = 0.89–1.30, *p*s = .500–.738. There were two children whose PTSD was detected only by the *ICD-11* algorithms using the higher threshold. These children had a higher level of functional impairment than children with no PTSD ($M_{difference}$ = 2.77) but a lower level than children identified solely by the *DSM-5* algorithm ($M_{difference}$ = - 1.70) or by both *ICD-11* and *DSM-5* algorithms ($M_{difference}$ = -3.00); no inferential comparison was conducted due to the small sample size (*n* = 2, detected only by the *ICD-11* criteria).

The systematic investigation of alternative symptom combinations of avoidance and negative alterations in mood for the *ICD-11* algorithm showed that excluding symptoms of avoidance or adding symptom combinations lead to a significantly greater likelihood for functional impairment in children with PTSD than in children without PTSD in the German sample. Table 6 includes the seven combinations that were significantly different from the original *ICD-11*(2) algorithm and had the highest predictive power for functional impairment using both thresholds (see the Supplementary Table for all combinations). Symptom combinations including the combinations of the symptom "negative emotional state" and the symptom "inability to express positive emotions" (Table 1) had the highest odds ratios for functional impairment for the lower threshold, *OR*s = 13.9–14.9. These combinations showed high predictive power for the higher threshold as well, *OR*s = 10.0–10.9. However, an algorithm that excluded all symptoms of avoidance had the highest odds ratio for the higher threshold, *OR* = 11.9. In the Swiss sample, symptom combinations that (a) excluded all avoidance symptoms, (b) included only the symptom of "avoidance of internal cues," or (c) included the symptom of "negative emotional state" additionally to the avoidance symptoms were associated with functional impairment in children with PTSD compared to children without PTSD, χ^2 = 4.3–12.7, $p < .001$ to $p = .037$, *OR*s = 7.9–11.2 (see the Supplementary Table for all combinations). The algorithm that included only the symptom of "avoidance of internal cues" had the highest predictive power for functional impairment, *OR* = 11.2.

Discussion

The aim of this study was to compare the proposed *ICD-11* criteria for PTSD with the *DSM-5* criteria for children aged 6 years and younger. Rates of PTSD cases varied depending on the applied diagnostic algorithms, with *ICD-11* identifying lower PTSD rates than *DSM-5*. Although *ICD-11* and *DSM-5* detected children who did not differ in the severity of their functional impairment, the *DSM-5* symptom algorithm showed higher predictive power to detect children with functional impairment. Excluding all symptoms of avoidance or adapting symptoms of the *DSM-5* cluster of avoidance and negative alterations in cognitions and mood in the *ICD-11* algorithm increased the diagnostic agreement between *ICD-11* and *DSM-5* and led to better prediction of functional impairment. Potential symptom combinations included negative emotional state, detachment/social withdrawal, and inability to express positive emotions.

The results of the current study are in line with those reported in studies of older children and adolescents that have found more cases of PTSD according to the *DSM-5* algorithm compared to the *ICD-11* criteria (Hafstad et al., 2017; Sachser et al., 2017). However, differences in the current samples seem stronger in proportion to the total of PTSD cases: There were nearly twice as many PTSD cases when applying the *DSM-5* criteria compared to the *ICD-11* criteria. It should be acknowledged that in the current study, symptoms of PTSD were rated by the caregivers. Sachser et al. (2017) used both self- and caregiver reports in their sample and found stronger discrepancies between *DSM-5* and *ICD-11* in the caregivers' reports than in the self-reports; rates of PTSD by the caregivers' reports were overall lower than in the self-reports. Hence, the *ICD-11* criteria might be too restrictive to diagnose PTSD in children who need treatment when caregivers' reports are used (which is necessary with very young children).

As opposed to studies with older samples of children and adolescents (Hafstad et al., 2017; Sachser et al., 2017; Sachser & Goldbeck, 2016), using the more general definition of intrusive memories (i.e., those that are not necessarily relived) in the *ICD-11* algorithm did not increase rates of PTSD nor did it increase the agreement with the *DSM-5* criteria in the current study. Intrusive memories are a highly internalizing symptom that might not be verbalized by very young children; this makes this symptom difficult to be recognized by caregivers (Scheeringa, 2011). The current findings do not support the recommendation that a more general definition of intrusive memories needs to be adapted as a diagnostic requirement for very young children.

The agreement between *ICD-11* and *DSM-5* could be increased by excluding all symptoms of avoidance or by adding symptoms or symptom combinations of negative alterations in mood to the *DSM-5* criteria for children 6 years of age and younger. Previous studies with samples of very young children have shown that adapting symptoms of avoidance in such a way that they have less weight for the PTSD diagnosis increased the sensitivity of PTSD criteria (Graf et al., 2011; Scheeringa et al., 2012). In the current samples, the *ICD-11* criteria included symptoms of negative alterations in mood in the avoidance cluster identified more PTSD cases. It is possible that the alternative *ICD-11* criteria actually detected more true PTSD cases; this could be interpreted as greater sensitivity of alternative *ICD-11* criteria. It should be considered that using more sensitive diagnostic criteria contains the risk to diagnose children who may not need mental health treatment. However, it is possible that the alternative *ICD-11* criteria identified children with disorders other than PTSD, which is the main criticism of the *DSM-5* criteria (Friedman, 2013). The symptoms that were found to increase agreement between alternative *ICD-11* algorithms and the *DSM-5* requirements overlap with symptoms of depression (i.e., negative emotional state, detachment/social withdrawal, and inability to express positive emotions).

Another important finding was that the *DSM-5* criteria showed better prediction of functional impairment than the *ICD-11* criteria. The predictive power was increased when adding symptom combinations of negative alterations in mood to the avoidance cluster of *ICD-11*. This might be because of higher sensitivity of the *DSM-5* criteria or because it included children with other disorders associated with functional impairment. Furthermore, the higher level of functional

impairment could indicate that *DSM-5* identifies cases of children who had developed symptoms following traumatic experiences that go beyond the PTSD symptoms and instead correspond to concepts such as developmental trauma disorder (van der Kolk, 2005) or complex PTSD (Brewin et al., 2017). For the current study, this issue might be particularly important for the German sample of foster children who were exposed mainly to interpersonal trauma.

Of note, the *ICD-11* algorithm failed to predict functional impairment in the Swiss sample. This supports the necessity for adapting diagnostic requirements of *ICD-11* to the developmental characteristics of very young children (Brewin et al., 2017). It should be noted that in the Swiss sample, only two children were found to have PTSD by either diagnostic algorithm, and compared to the German sample, children were characterized by accidental traumatic experiences and younger age. The low rates in the Swiss sample could mean that there are few children with true PTSD or that the diagnostic criteria might not be sensitive enough to detect posttraumatic symptomatology in these very young children.

There were several limitations of the present study. The current study was a simulation of the application of different symptom combinations and did not attempt to report prevalence rates of PTSD in children aged 6 years or younger. It should be noted that the YCPC is a checklist that is not suitable for formally diagnosing PTSD but is intended to detect children at risk for PTSD. Furthermore, the psychometric properties of the YCPC have not yet been investigated. Since the YCPC is based on the *DSM-5*, it allows only an approximation of the *ICD-11* symptoms of reexperiencing. For example, intrusive memories in *DSM-5* are more general because they do not require reliving. Furthermore, in the *DSM-5* diagnosis for children aged 6 years and younger, the content of nightmares should not necessarily be related to the traumatic event in order to fulfil this criterion. Using a *DSM-5*-based checklist also hampered the comparison of the *ICD-11* algorithms with the *ICD-10*. In both the German and Swiss samples, some children had been or were in treatment at the time of the study, which might have influenced the PTSD rates. Children in the German sample were involved in the supporting system of the child welfare agencies, with 50.8% receiving some therapeutic services, and 14.9% of the Swiss sample received the Coping with Accident Reactions treatment (CARE; De Young et al., 2016). Although results on the diagnostic agreement of different alternatives of the *ICD-11* algorithm were similar across the German and the Swiss samples, these samples were very different in terms of caregivers who reported the symptoms and type of the traumatic experiences. For instance, foster parents may lack information necessary to compare the child's behavior before and after the traumatic event. Age effects based on the younger children in the Swiss sample cannot be ruled out. Differences between the samples hampered combined analysis of the data. The interpretation of the kappa coefficient in the Swiss sample was limited because there were very few PTSD cases. Furthermore, symptoms were estimated by the caregivers' report; thus, interpretation of results should consider low parent-child agreement in diagnosing PTSD (Humphreys, Weems, & Scheeringa, 2017).

The current findings indicate that the *ICD-11* PTSD criteria might be more specific but less sensitive for very young children than the *DSM-5* criteria. Future studies addressing the limitations of the

current study (e.g., using *ICD-11*-based instruments as well as structured diagnostic interviews or investigating comorbidity) should validate the present results. Given that the *ICD* is binding for most health insurance systems, applying less sensitive criteria will have consequences for individuals, society, and economics. There remains the risk that less sensitive diagnostic criteria do not identify children that might need treatment. Detection of maladaptive adjustment after trauma is especially important considering the unfavorable lifelong course of psychopathology following trauma exposure in early childhood (Kessler et al., 2010). Hence, developmentally sensitive specifications may need to be added in the *ICD-11* diagnostic requirements. Another aspect that should be considered is that the *DSM-5* is predominantly used in research. Discrepancies between the diagnostic criteria will cause difficulties in disseminating research findings in the clinical practice. In order to avoid this, researchers should apply both alternative diagnostic systems when investigating PTSD in very young children.

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Table 1

Overview of Posttraumatic Stress Disorder (PTSD) Criteria for Preschool Children in the DSM-5 and the Proposed ICD-11

Symptom	YCPC Item(s)	Diagnostic Criteria		
		DSM-5	*ICD-11*(2)[a]	*ICD-11* (3)[b]
DSM-5 Cluster A: Traumatic Event	1–11	×	×	×
DSM-5 Cluster B: Reexperiencing		≥ 1	≥ 1	≥ 1
B1 Intrusive memories	14–15	×		×
B2 Nightmares	16	×	×	×
B3 Dissociative reactions/flashbacks	18–19	×	×	×
B4 Psychological distress	20	×		
B5 Physiological reaction to reminders	21	×		

DSM-5 Cluster C: Avoidence/Negative Alterations in Cognition and Mood		≥ 1	≥ 1	≥ 1
C1 Avoidance of external cues	24	×	×	×
C2 Avoidance of internal cues	23	×	×	×
C3 Negative emotional state	22	×		
C4 Diminished interest in activities	25	×		
C5 Detachment/social withdrawal	26	×		
C6 Inability to express positive emotions	27	×		
DSM-5 Cluster D: Arousal		≥ 2	≥ 1	≥ 1
D1 Irritable behavior/anger	28	×		
D2 Hypervigilance	29	×	×	×
D3 Exaggerated startle response	30	×	×	×
D4 Concentration problems	31	×		
D5 Sleep disturbance	32	×		
DSM-5 Cluster F: Functional impairment		×	×	×

Note. DSM-5 = *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.); *ICD-11* = *International Classification of Diseases and Related Health Problems* (proposed 11th rev.); YCPC = Young Child PTSD Checklist.

[a]Proposed *ICD-11* criteria (e.g., Maercker et al., 2013). [b]An *ICD-11* algorithm including intrusive memories without reliving.

Table 2

Prevalence of Potentially Traumatic Events in the German and Swiss Samples

Traumatic Event	German Sample (N = 147)		Swiss Sample (N = 149)		Fisher's Exact Test[a]
	n	%	*n*	%	χ^2
Accident	1	0.7	2	1.3	0.32
Attack by an animal	8	5.4	3	2.0	2.43
Manmade disaster	2	1.4	2	1.3	0.00
Natural disaster	1	0.7	1	0.7	0.00
Hospitalization	71	48.3	46	30.9	9.40**
Physical abuse	73	49.7	0	0.0	98.22***
Sexual abuse	16	10.9	1	0.7	14.26***
Accidental burning	5	3.4	138	92.6	235.86***
Near drowning	3	2.0	1	0.7	1.04

Note. [a]N = 296, df = 1.

**$p < .01$. ***$p < .001$.

Table 3

Participants Meeting Criteria for Symptom Clusters and Full Posttraumatic Stress Disorder

Symptom Cluster and Diagnostic System	German Sample (*N* = 147)				Swiss Sample (*N* = 149)			
	Threshold				Threshold			
	Lower		Higher		Lower		Higher	
	n	%	*n*	%	*n*	%	*n*	%
Reexperiencing								
ICD-11(2)[a]	110	74.8	54	36.7	25	16.8	3	2.0
ICD-11(3)[b]	120	81.6	56	38.1	48	32.2	5	3.4
DSM-5	126	85.7	68	46.3	57	38.3	6	4.0
Avoidance								
ICD-11	79	53.7	43	29.3	9	6.0	0	0.0
Avoidance/negative alterations in cognitions and mood								
DSM-5	111	75.5	69	46.9	18	12.1	2	1.3
Arousal								
ICD-11	93	63.3	55	37.4	54	36.2	13	8.7
DSM-5	112	76.2	70	47.6	26	17.4	3	2.0
Full PTSD								
ICD-11(2)[a]	51	34.7	23	15.6	1	0.7	0	0
ICD-11(3)[b]	52	35.4	23	15.6	1	0.7	0	0
DSM-5	89	60.5	45	30.6	2	1.3	0	0

Note. ICD-11 = International Classification of Diseases (proposed 11th rev.); *DSM-5 = Diagnostic and Statistical Manual of Mental Disorders* (5th ed.); PTSD = posttraumatic stress disorder.

[a]Proposed algorithm of *ICD-11* with two symptoms of reexperiencing. [b]An *ICD-11* algorithm including intrusive memories without reliving as third symptom of reexperiencing

Table 4

Ability of DSM and ICD Diagnostic Algorithms to Detect Functional Impairment

Diagnostic System	German Sample (*N* = 147)					Swiss Sample (*N* = 149)				
	Functional Impairment (%)		χ^{2a}	*OR*	95% CI	Functional Impairment (%)		χ^{2b}	*OR*	95% CI
	No PTSD	PTSD				No PTSD	PTSD			
Lower Threshold										
ICD-11[2][c]	70.2	96.2	14.1***	10.8	[2.5, 47.5]	8.3	25.0	1.4	3.7	[0.4, 38.3]
ICD-11[3][d]	69.9	96.3	14.7***	11.2	[2.6, 49.2]	8.3	25.0	1.4	3.7	[0.4, 38.3]
DSM-5	52.8	94.7	36.5***	15.9	[5.6, 45.4]	7.6	50.0	8.7**	12.2	[1.6, 95.0]
Higher Threshold										
ICD-11[2][c]	76.4	95.8	4.7*	7.1	[0.9, 54.8]					
ICD-11[3][d]	76.4	95.8	4.7*	7.1	[0.9, 54.8]					
DSM-5	71.3	97.8	13.7***	18.1	[2.4, 137.7]					

Note. ICD-11 = *International Classification of Diseases* (proposed 11th rev.); *DSM-5* = *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.); OR = odds ratio; PTSD = posttraumatic stress disorder.

[a]*N* = 147, *df* = 1. [b]*N* = 149, *df* = 1. [c]Proposed algorithm of *ICD-11* with two symptoms of reexperiencing. [d]An *ICD-11* algorithm including intrusive memories without reliving as third symptom of reexperiencing.

*p < .05. **p < .01. ***p < .001.

Table 5

Diagnostic Agreement between Alternative ICD-11 and DSM-5 Algorithms

Diagnostic Algorithm	Symptoms in Cluster C[b]	German Sample (N = 147)				Swiss Sample (N = 149)	
		Threshold				Threshold	
		Lower		Higher		Lower[c]	
		χ^{2d}	κ	χ^{2d}	κ	χ^{2d}	κ
ICD-11(A0)	None	4.76*	0.71	5.26*	0.67	1.30	0.56
ICD-11(A8)	C1, C2, C3, C5	18.05***	0.73	10.32**	0.67	0.00	1.00
ICD-11(A9)	C1, C2, C3, C6	16.06***	0.76	10.32**	0.67	0.00	1.00
ICD-11(A13)	C1, C2, C3, C4, C5	18.05***	0.73	10.32**	0.67	0.00	1.00
ICD-11(A14)	C1, C2, C3, C4, C6	16.06***	0.76	10.32***	0.67	0.00	1.00
ICD-11(A16)	C1, C2, C3, C5, C6	14.06***	0.78	8.47**	0.70	0.00	1.00
ICD-11(A17)	C1-C6	14.06***	0.78	8.47***	0.70	0.00	1.00

Note. ICD-11 = *International Classification of Diseases* (proposed 11th rev.); *DSM-5* = *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.); C1 = avoidance of external cues; C2 = avoidance of internal cues; C3 = negative emotional state; C4 = diminished interest in activities; C5 = detachment/social withdrawal; C6 = inability to express positive emotions; PTSD = posttraumatic stress disorder.

[a]All algorithms differed significantly from the original *ICD-11* algorithm (p < .05). [b]Symptoms refer to the symptom cluster of avoidance/negative alterations in cognition and mood in the *DSM-5* PTSD subtype for children 6 years old and younger. [c]The agreement for the higher threshold could not be calculated in the Swiss sample because there were 0 PTSD cases. [d]McNemar's chi-square, *df* = 1; German sample, *N* = 147, Swiss sample, *N* = 149.

*p < .05. **p < .01. ***p < .001.

Table 6

Ability of Alternative *ICD-11* Algorithms to Detect Functional Impairment in the German sample

Diagnostic System[a]	Symptoms in Cluster C[b]	Lower Threshold					Higher Threshold				
		Functional Impairment (%)		χ^{2c}	*OR*	95% CI	Functional Impairment (%)		χ^{2c}	*OR*	95% CI
		No PTSD	PTSD				No PTSD	PTSD			
ICD-11(A0)	None	60.0	95.1	27.5***	13.0	[4.2; 39,8]	74.1	97.1	8.7**	11.9	[1.6; 90.7]
ICD-11(A8)	C1, C2, C3, C5	64.0	95.8	22.9***	12.9	[3.7, 45.1]	75.0	96.8	7.1**	10.0	[1.3, 76.6]
ICD-11(A9)	C1, C2, C3, C6	63.0	95.9	24.5***	13.9	[3.9, 48.4]	75.0	96.8	7.1**	10.0	[1.3, 76.6]
ICD-11(A13)	C1, C2, C3, C4, C5	64.0	95.8	22.9***	12.9	[3.7, 45.1]	75.0	96.8	7.1**	10.0	[1.3, 76.6]
ICD-11(A14)	C1, C2, C3, C4, C6	63.0	95.9	24.5***	13.9	[3.9, 48.4]	75.0	96.8	7.1**	10.0	[1.3, 76.6]
ICD-11(A16)	C1, C2, C3, C5, C6	62.0	96.1	26.3***	14.9	[4.3, 52.1]	74.6	97.0	7.9**	10.9	[1.4, 83.5]
ICD-11(A17)	C1-C6	62.0	96.1	26.3***	14.9	[4.3, 52.1]	74.6	97.0	7.9**	10.9	[1.4, 83.5]

Note. ICD-11 = International Classification of Diseases (proposed 11th rev.); *DSM-5 = Diagnostic and Statistical Manual of Mental Disorders* (5th ed.); PTSD = posttraumatic stress disorder; OR = odds ratio; C1 = Avoidance of external cues; C2 = Avoidance of internal cues; C3 = Negative emotional state; C4 = Diminished interest in activities; C5 = Detachment/Social withdrawal; C6 = Inability to express positive emotions.

[a]All algorithms differed significantly from the original *ICD-11* algorithm (p < .05). [b]Symptoms refer to the symptom cluster of avoidance/negative alterations in cognition and mood in the *DSM-5* PTSD subtype for children 6 years old and younger. [c]N = 147, df = 1.

**p < .01. ***p < .001

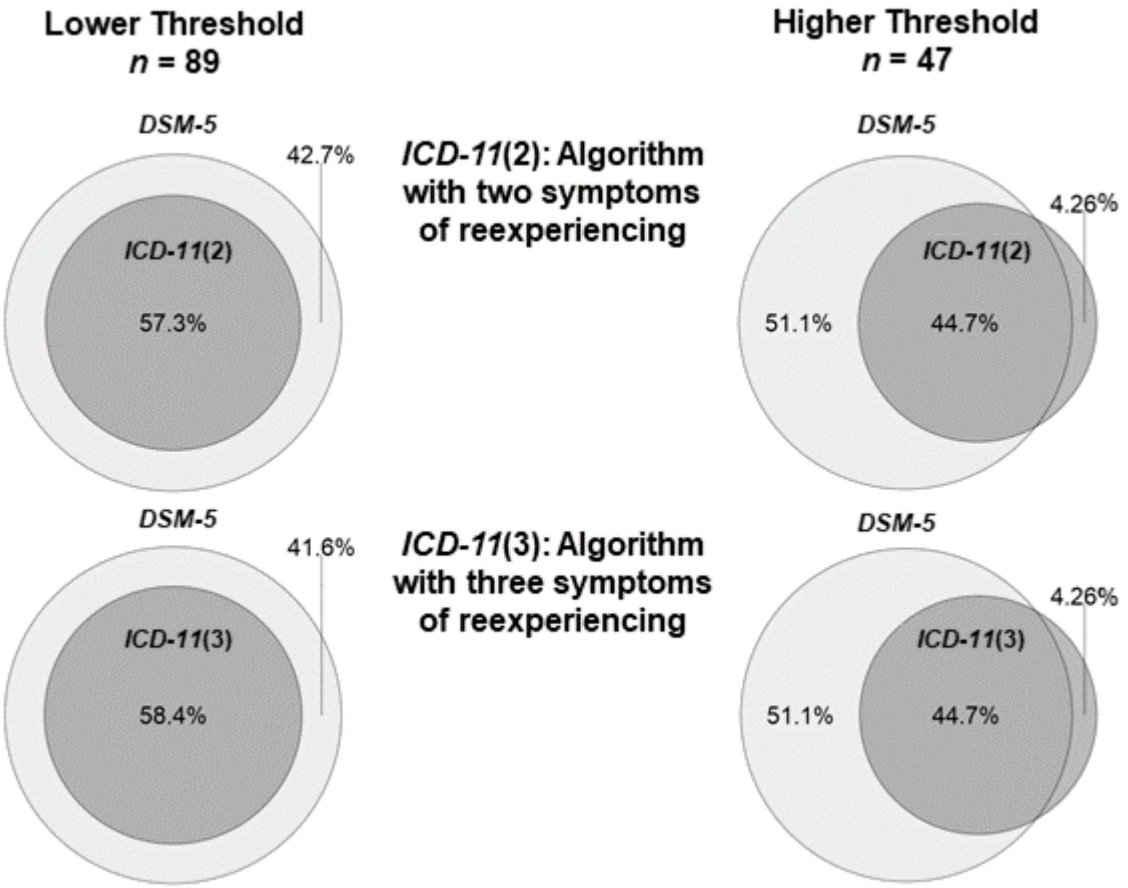

Figure 1. Overlap in children detected as posttraumatic stress disorder (PTSD) cases in the German sample. *ICD-11 = International Classification of Diseases* (proposed 11th rev.); *DSM-5 = Diagnostic and Statistical Manual of Mental Disorders* (5th ed.).