

# INPLASY

## A scoping review protocol on utilization and evaluation of VR-based Interventions for the training of child endangerment assessment

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### ADMINISTRATIVE INFORMATION

**Support** - Lower Saxony Ministry for Science and Culture (MWK) via zukunft.Niedersachsen.

**Review Stage at time of this submission** - Piloting of the study selection process.

**Conflicts of interest** - None declared.

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**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 17 September 2024 and was last updated on 18 November 2024.

### INTRODUCTION

**Review question / Objective** The scoping review assesses home environments concerning potential child welfare risks using virtual reality (VR)-based technologies. Four questions are central to the review:

I) What findings and interventions are already known and used to educate and train students and professionals in assessing child welfare risks by using VR-based technologies?

II) How and with the help of which tools have the VR-based interventions been developed and evaluated?

III) What effects do such VR-based interventions have on the development of skills and the subjective perception of the participants themselves in comparison to conventional training and further education measures?

IV) To what extent have VR-based interventions already been used to support decision-making in assessing situations that jeopardize children's welfare?

Thus, this scoping review aims to generate a comprehensive insight into the possibilities and shortcomings of VR-based methods for training social work students and professionals.

**Population/Participants:** all students of social work and people who, in the course of their work, have to make professional assessments of child well-being.

**Concept:** VR-based interventions to assess and interact with situations that represent and simulate child endangerment and subsequent processes.

**Context:** education and training of professionals and experts, as well as students and teaching in social work, focusing on assessing child well-being.

**Background** Child endangerment in the home environment, manifested by physical or psychological injury, under-care and/or neglect by parents and/or other guardians, poses a risk to children and their well-being that should not be underestimated. Threats of this kind are also a significant problem for society in terms of public health, as the consequences of child abuse and neglect can still be felt in adulthood (1). Such experiences in childhood are by no means a rarity and, therefore, require more intensive consideration (2). Experts in social work, police, child education, and health care are trained in recognizing, recording, evaluating, and reporting signs that may indicate a child's welfare is at risk. Assessing the welfare of the child can be very challenging. On the one hand, false positive reports must be avoided to spare parents and children unfounded stress. Still, on the other hand, false negative reports can also lead to children having to endure a more extended period of suffering and more protracted consequences. There are various assessment tools for this purpose, but they all have disadvantages and limitations (3, 4). It can be seen that the subjective assessment of sometimes very complex situations can lead to different evaluations, making it difficult to arrive at uniform and precise interpretations of threats to the child's welfare (5). Nonuniform and imprecise interpretations, combined with weaknesses in the training and further education of professional staff to identify child abuse and neglect (6), lead to uncertainty on the part of the assessors and to misinterpreted situations.

**Rationale** VR applications have been used for years. They are increasingly used in various industries and areas of the labor market to facilitate or improve work (7) or train groups of people (8). The assessment of child welfare risks is not exempt from this either. In addition to VR-based interventions, various digital applications are being tested and used to improve prevention, medical education, diagnostics, treatment, screening, and forensics (9). However, it appears that the area of assessing child welfare threats and the training to implement such assessments adequately, appropriately, and reliably have not yet been systematically recorded. Due to the different professional groups that are involved in the assessment of child welfare conditions and due to the fragmentation of the assessment situations, be they in the home environment, in child-rearing facilities, or in medical care, it seems sensible to provide an overview of studies dealing with VR-based interventions for training purposes to assess child welfare. This scoping review addresses the possible gap in best practice examples and

research results for developing and evaluating such interventions. This gap includes the presentation of fitting tools for development and evaluation, identifying suitable test environments, and determining ethical questions and conflicts. Further utilization options like AI-based and decision support systems may also be explored in this review.

## METHODS

**Strategy of data synthesis** For this scoping review, we plan on scrutinizing the databases PubMed, SCOPUS, ProQuest, WOS, IEEE, ACM Digital Library, and EBSCO (EBSCOhost Research Databases including APA PsycArticles, APA PsylInfo, CINAHL, eBooks collection, HBS select case study collection, MEDLINE, OpenDissertations and APA PsycTests).

As for the words chosen for our search term, we already gathered suitable terms in German and English and classified those to form groups.

Group 1 consists of words relating to children: "child", "children", and "minor".

Group 2 consists of words relating to the endangerment of children: "neglect", "endangerment", "violence", "maltreatment", "abuse", "adverse childhood experience", and "ACE".

Group 3 consists of training-related words: "training", "exercise", "practice", "teaching", "learning", and "education".

Group 4 contains words on VR systems and adjacent digital interventions: "virtual reality", "augmented reality", "child avatar", and "digital twin".

If applicable, truncations will be incorporated. The following search term can be viewed as an example. Adjustments will be made if the database calls for them.

(Kinder OR child OR children OR minderjährig\* OR minor) AND (vernachlässigung OR neglect OR gefährdung OR endanger\* OR gefährden OR gewalt OR violence OR misshandlung OR maltreatment OR abuse OR "adverse childhood experience" OR ACE) AND (training OR übung OR exercise OR practice OR üben OR lehre OR lernen OR teaching OR learning OR unterricht\* OR education) AND ("virtuelle realität" OR "virtual reality" OR "augmentierte realität" OR "augmented reality" OR "child avatar" OR "digital twin" OR "digitaler zwillig").

A preliminary search showed that incorporating certain abbreviations like VR for virtual reality and AR for augmented reality increases the number of found studies. However, most do not focus on virtual reality but on other unrelated topics with the

same abbreviation. Therefore, this review refrains from incorporating those into our search terms. As for restrictions, only publications published between 2014 and 2024 will be included in this review. They must be written in English or German, and an abstract must be available. The abovementioned search terms will be applied to the title, abstract, and keywords, including author and MeSH Terms. Adjustments will be made depending on the database's search properties. The search terms are not to be applied to the full texts.

**Eligibility criteria** Study eligibility will be measured in three categories that can be assigned to the PCC scheme.

**Population/Participants:** Studies need to focus on professional personnel who work to sustain child welfare. This definition includes university-based students, i.e., social care workers and working staff in different professions such as medical care, police, and children's education. Studies that focus on children or parents are excluded.

**Concept:** Studies need to incorporate an intervention in the form of a VR-based system, an AR-based system, a digital twin, and/or a child avatar – adjacent technologies might be incorporated as well, if applicable. Those systems need to be used for the population's training or educational purposes. Studies focusing on other interventions like non-digital ones or incorporating these technologies for reasons other than child welfare assessment will be excluded.

**Context:** Studies need to focus on education, teaching, or some other kind of training for the population mentioned above.

The review will not include studies that aim to examine interventions that seek to educate or empower children to recognize child welfare issues for themselves or others, nor studies that focus on non-professional populations such as parents.

### Source of evidence screening and selection

The article retrieval will be done by one researcher, who will export data from the databases used and convert and combine study information in one singular document, followed by a duplicate check and exclusion. Title and abstract screening will be done in duplicates. Both researchers will screen while marking studies for inclusion or exclusion with an option for an uncertain decision. After deciding on 10% of the studies, both researchers will discuss their findings and decisions to ascertain any discrepancies in their respective screening and rating behavior. In succession to this, adjustments to the screening process will be implemented if deemed necessary. Disagreements regarding inclusion or exclusion will be discussed

at the end. If no agreement can be found, a third researcher will decide on inclusion or exclusion while being blinded to previous decisions.

After conducting the title and abstract screening, two researchers will examine at least five random full-texts of the dataset. The insight gathered during this step will be used to create a suitable extraction table. This table will be based on the discussion and consensus of those two researchers. Full-text retrieval will be performed by at least one researcher. The full-text review will be done by two researchers sharing the workload. After scrutinizing 10% of the studies, the extraction table will be checked for inconsistencies. If any can be identified, reasons will be discussed, and the extraction approach will be revised if necessary. This process might be repeated if deemed suitable. The extraction table can be adjusted, i.e., additional columns can be added for further information. This approach has to be discussed with the other researchers in advance. If no agreement can be found in the end, a third researcher will decide on inclusion or exclusion while being blinded to the decisions made before.

**Data management** Data management will be done in Microsoft Excel. The databases that will be used do not allow for uniform data exports. The data will be exported as a .xlsx file and a .cls, if needed. If these options are not presented, alternative formats such as .ris will be used. In some cases, databases only allow the abstract to be exported to a .txt file. A self-written Python script for converting .txt files into .ris files is available if needed. The data will be combined in a single Excel file incorporating the following information: studyID - assigned by the researchers, database, authors, titles, abstract, year of publication, journal information, and DOI.

Additional information may be added if suitable. The Excel file will be accessible to all researchers simultaneously. As for the full-text extraction form, an additional Excel sheet containing information assigned to columns based on the initial five full-text screenings will be created. Irrespective of this procedure, at least the following information is recorded: studyID - assigned by the researchers, authors, title, country of data collection, year of data collection, operationalized outcomes, study design, study methods, population, setting, n=, intervention/technology used, funding, results.

**Reporting results / Analysis of the evidence** Due to our insights based on a preliminary search, a narrative presentation of results seems to be fitting. The studies are expected to be heterogeneous in terms of the methodologies

used, involving quantitative and qualitative research. To address this heterogeneity, a narrative analysis and report will be incorporated.

**Presentation of the results** The results will be presented in the form of a table within an Excel sheet. Alongside this, the derivation of a framework will be considered based on the findings made.

**Language restriction** The language of the reviewed articles will be limited to English and German.

**Country(ies) involved** Germany.

**Keywords** Child abuse; child endangerment; child maltreatment; child neglect; virtual reality; education of professionals.

**Dissemination plans** This scoping review is intended to be published as a journal article and will form the basis for the Aid4Children project. Aid4Children project has received funding from the Lower Saxony Ministry for Science and Culture (MWK).

#### Contributions of each author

Author 1 - Jan-Oliver Kutza - Developing the search strategy and executing it, conducting title/abstract and full-text screening, evaluating and reporting the results, generating the manuscript, and addressing review comments.

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