

Post-traumatic stress reactions among individuals with visual impairments: a systematic review

Audun Brunes, Marianne B. Hansen & Trond Heir

To cite this article: Audun Brunes, Marianne B. Hansen & Trond Heir (2018): Post-traumatic stress reactions among individuals with visual impairments: a systematic review, *Disability and Rehabilitation*, DOI: [10.1080/09638288.2018.1459884](https://doi.org/10.1080/09638288.2018.1459884)

To link to this article: <https://doi.org/10.1080/09638288.2018.1459884>



Published online: 12 Apr 2018.



Submit your article to this journal [↗](#)



Article views: 17



View related articles [↗](#)



View Crossmark data [↗](#)

REVIEW ARTICLE



Post-traumatic stress reactions among individuals with visual impairments: a systematic review

Audun Brunnes^a, Marianne B. Hansen^a and Trond Heir^{a,b}

^aNorwegian Centre for Violence and Traumatic Stress Studies, Oslo, Norway; ^bFaculty of Medicine, Institute of Clinical Medicine, University of Oslo, Oslo, Norway

ABSTRACT

Purpose: To conduct a systematic review of post-traumatic stress reactions among individuals with visual impairment (VI).

Materials and methods: Qualitative and quantitative studies were identified through searches in MEDLINE, EMBASE, PsycINFO, CINAHL, Web of Science, and Cochrane Libraries. The literature search was limited to humans, of English and Scandinavian languages and publication year between 1980 and 2017. Study quality was assessed for all the included studies and extracted data were synthesized using narrative analysis.

Results: Of 4235 records identified through literature search, eleven were included in the analyses. Results from the qualitative studies illustrated multiple physical, behavioral, emotional, and cognitive manifestations of trauma. Four out of five quantitative studies showed that various types of potentially traumatic events were significantly associated with mental health adversities ($p < 0.05$). The prevalence of post-traumatic mental disorders was 4–21.2% for depression, 0.9% for dysthymia, and 32% for substance misuse. The quality of the reviewed studies was considered low to moderate.

Conclusion: Traumatic experiences appear to have a great impact on the mental health in people with visual impairment (VI) and these results highlight their need for mental health care. Future studies with higher methodological rigor are recommended.

ARTICLE HISTORY

Received 10 October 2017

Revised 28 March 2018

Accepted 28 March 2018

KEYWORDS

Blindness; post-traumatic stress reactions; post-traumatic stress disorder; potentially traumatic events; systematic review; visual impairment

► IMPLICATIONS FOR REHABILITATION

- Visual impairment entails a greater susceptibility to some types of potentially traumatic events, especially threats in everyday life. This calls for a greater emphasis on safe community environments and universal design in public spaces.
- In rehabilitation after serious accidents or potentially traumatic events, professionals working with people with vision impairment should be aware of the different manifestations of post-traumatic stress responses and that some stress responses may cause additional disability.
- The high prevalence of traumatic events and their impact on mental health in individuals with visual impairments highlights a need of mental health care.

Introduction

Visual impairment (VI) is a complex and heterogeneous condition characterized as reduced ability to see, with problems being related to the eyes and/or its connected nervous system [1]. There exist several diagnostic systems of VI. The International Classification of Diseases (ICD) is the international standard diagnostic system where VI is set through direct assessments of visual acuity (ability to discern fine details) and visual field (the area of which objects are visible during steady fixation of the eyes). The degree of VI is then categorized into moderate to severe VI, blindness, and unclassified VI [2]. The estimated number of people with ICD-defined VI is 285 million in the world [3] and the number is continuing to increase because of demographic changes, population growth, and greater frequencies of non-communicable diseases [4,5].

Individuals with VI may experience certain types of potentially traumatic events (PTEs) at rates greater than the general

population. In comparison to sighted individuals, results from previous reviews have shown that people with VI have significantly higher exposure to traumatic events like serious injuries [6] and falls [7]. In addition to the social and health disparities between populations with and without VI [8], increased exposure to some types of PTE may be due to the fact that vision is a key sensory modality to obtain rapid and precise information about one's own body and the surrounding environment [9]. Thus, VI could affect an individual's ability to predict, prepare for, and flee from dangerous and life-threatening situations.

Post-traumatic reactions are often manifested through reexperiencing symptoms; avoidance of trauma-related cues; negative changes in mood and/or cognition; and increased sympathetic activation causing disturbances with concentration and sleep [10,11]. In most cases, individuals who have been exposed to a traumatic event recover within a few months [12]. However, if the challenges from the traumatic event surpass the individual's coping abilities, this may lead to the development of post-traumatic

stress disorder (PTSD) [13] as well as some other physical and psychiatric conditions [13–16].

While the impact of trauma exposure is well-documented in various population groups [17–23], little is known about trauma reactions of visually impaired and blind individuals. To our knowledge, none has systematically reviewed the research literature about post-traumatic stress reactions of populations with VI. Therefore, our aim was to systematically synthesize and appraise data of qualitative and quantitative research on post-traumatic stress reactions among individuals with VI. Addressing post-traumatic stress reactions in this group of people is essential for accurate identification of adverse conditions, as well as to examine their need for mental health care and rehabilitation services.

Materials and methods

Search strategy and selection criteria

The literature search took place between 3 April 2017 and 6 April 2017. A standard literature search was performed in MEDLINE, PsycNET, EMBASE, Web of Science, Cochrane Library, and CINAHL to find published papers about PTE exposure and post-traumatic stress reactions among individuals with VI. To be included in this literature review, the studies had to be peer-reviewed journal articles involving research on humans, of English or Scandinavian language, and published between 1 January 1980 and 1 April 2017. The PTE exposure should have occurred among people with VI, i.e., we excluded studies in which the PTE was preceding the vision loss.

The search strategy was designed by a librarian and executed by one of the authors (AB). The strategy was adapted specifically to each database by using a combination of subject terms, text words and filters. Multiple terms were used relating to PTE (e.g., violence, traumatic event*, disaster*, explosion*, accident*, and terror*), post-traumatic stress reactions (post-traumatic stress disorder*, post-traumatic reaction*, disaster mental health), and VI (e.g., visual* impair*, vision disorder*, blindness, and vision loss). Additional strategies included screening of the reference list of retrieved studies, free-text hand searches in Google, and screening citations of articles in Google Scholar. Titles and abstracts were read through by one of the reviewers (AB). Screening for duplicates was performed by uploading the results from the literature search into EndNote X7 (Clarivate Analytics, Philadelphia, PA).

Figure 1 shows the flow chart of the extracted articles from our literature search. Overall, 3492 non-duplicated articles were identified. After a screening of the titles and abstracts, 11 articles were submitted for data extraction in the main synthesis and 64 articles were submitted for data extraction in the supplementary synthesis. Reasons for excluding papers were as follows: [1] non-relevant event, outcome, and/or study population [2], PTE exposure occurred prior to VI onset [3], no information about the temporal sequence between PTE exposure and VI onset [4], other papers than research papers or case reports [5], and papers having significant methodological weaknesses.

Data extraction and synthesis

One of the researchers (AB) extracted data on the following key methodological elements: publication, origin of study, study design, sampling procedure, study population, data collection procedure, and results. Additionally, in articles with qualitative designs, data were extracted on perspective of inquiries and type of data analysis. The extracted data were organized according to research methods and are presented in Tables 1 and 2.

A narrative analysis was used to summarize themes from studies including qualitative data [24]. The data synthesis included a series of steps. First, the reviewers read and re-read each paper to get an overall impression of the studies. Next, the reviewers identified the most important themes reported by the researcher of each study and brought them together. The identified themes fell into one of the following four major categories: physical, behavioral, emotional and cognitive reactions, respectively. Finally, the last stage involved exploring relationships and differences within and between studies.

Quantitative studies were categorized into subgroups according to study aim and the study results were summarized using narrative analysis. No overreaching meta-analysis was conducted due to the methodological heterogeneity of the studies. In studies aiming to assess the prevalence of post-traumatic reactions, the range of the effect estimates was reported for outcomes included in two or more papers. Additionally, in one study, relative risk and corresponding confidence intervals (CIs) were calculated by one of the reviewers (AB) based on numbers provided in the paper's result section [25].

In addition to the main data synthesis, a supplementary synthesis was performed by including studies aiming to examine the risk of specific or cumulative PTEs among individuals with VI (Figure 1). Results from the synthesis are presented in Supplementary Table S1 included in the online supplement.

Quality assessment

All the articles were quality assessed independently by two reviewers (AB and TH) based on reviewer-modified criteria employed from the Centre for Reviews and Dissemination [26] (quantitative studies) and the Critical Appraisal Skills Programme [27] (qualitative studies). Differences in scoring across reviewers were discussed until agreement was reached. A higher score indicates a better quality study. Detailed description of the two checklists and results from the study quality scoring can be found in the online Supplementary Tables S2–S5.

Results

Of the eleven studies being selected for inclusion in the main synthesis (Figure 1), five studies used qualitative methods [28–32] and six studies used quantitative methods with cross-sectional designs [25,33–37]. Sample sizes ranged from 4 to 1052 individuals, with a combined total of 1670 individuals with VI. The age distribution was from 10 to 100 years. All studies included both women and men. There was an equal geographical spread of publications from countries across Oceania ($n=3$), Middle East ($n=3$), North America ($n=3$), and Europe ($n=3$).

Review of qualitative studies

Table 1 shows summary of five studies with qualitative methodology that included themes related to post-traumatic stress reactions in individuals with VI. Three studies investigated lived experiences of people with VI having various levels of traumatization [28,29,32], one study assessed the lived experiences of individuals with VI having considerable emotional distress caused by the traumatic event [30], and one study included a clinical evaluation of four patients with blindness who had developed PTSD [31]. The studies included themes about various types of stress reactions (physical, behavioral, emotional, and cognitive reactions) and sources of stressors (PTE exposure, social, and environmental). When critically appraising the literature, maximum quality score

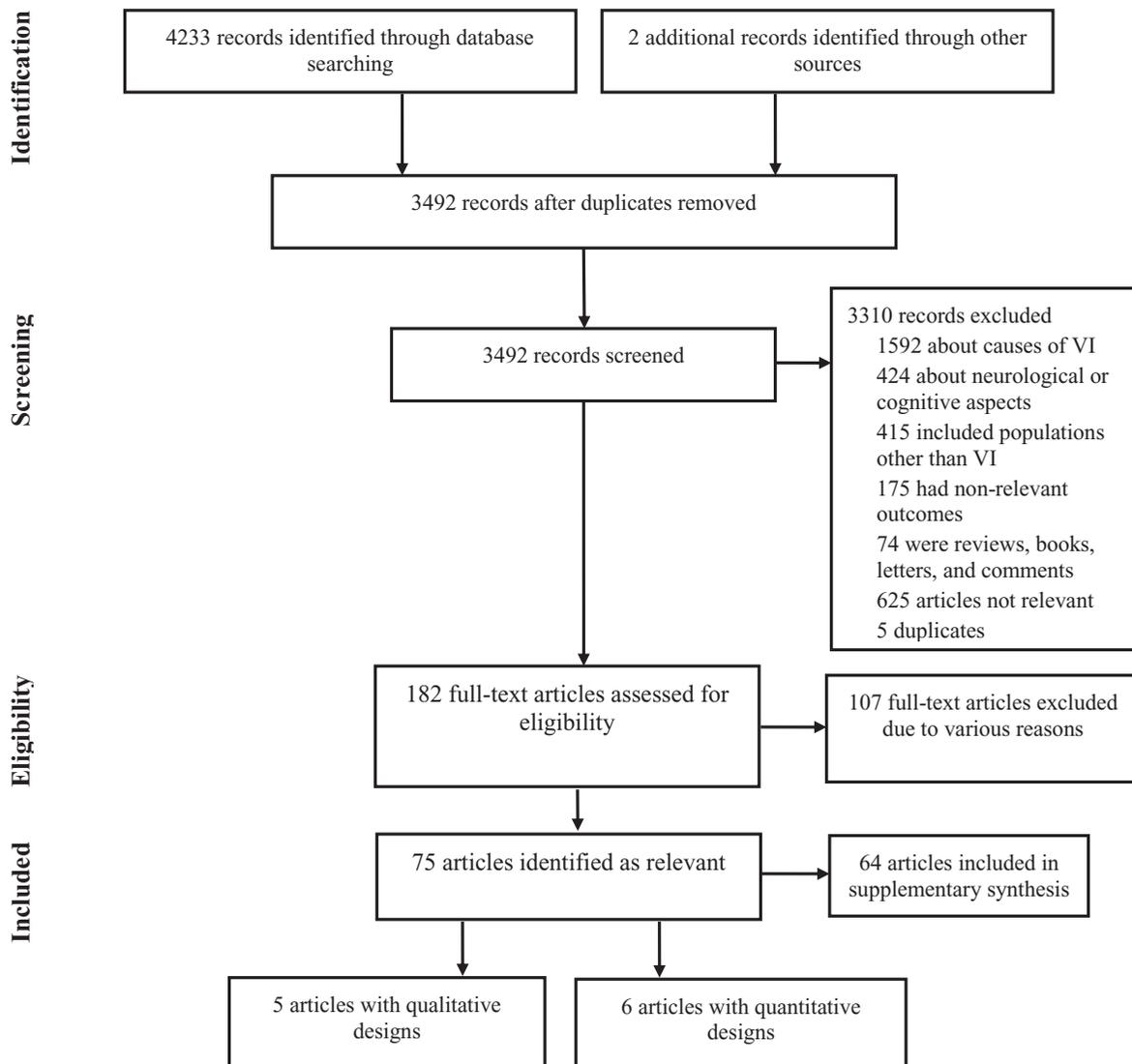


Figure 1. Flow chart of article selection. VI: visual impairment.

was not achieved in any of the qualitative studies (Supplementary Table S2). Main issues were related to limitations in data analysis and no discussion around the researcher-participant relationship.

Physical reactions

Physical reactions included bodily shock from the trauma [29,30], experiencing the traumatic episode as a sort of physical memory [29], sleep disturbances [28,30], and worsening of existing chronic condition [30]. Individuals with VI also spoke of hyperarousal and being at alert in case of future events [29,31,32]. The following description of a blind adult with PTSD was given in one of the studies: "She was hyperalert, tended to startle at the most minor noises, and was unable to concentrate" [31].

Behavioral reactions

Most articles included themes about social isolation [29–31] and avoidance of triggers associated with previous experiences [29,30,32]. One person explained: "I could not see, but I also chose not to listen to the news because it made me feel tenser..." [32]. Reduction or changes in activities were reported by some individuals [29–32], while others mentioned that the event did not impact what they were doing during the day [32]. Some talked

about increased difficulties in performing activities such as cooking and mobility [31].

Emotional reactions

A number of negative emotions were reported [28–32], either emotions immediately following the event or emotions existing on a more long-term basis. Common emotions and moods were intense fear, shock, anxiety, frustration, self-blame, helplessness, anger, guilt, and shame. One person described his intense anxiety towards riding a car after experiencing a motor vehicle accident: "I was so shaky that I barely managed ... I had to take a seat in the car again; we were all on our way to a job. ... I was a wreck. When we'd finished work, I refused to sit in a car ever again. It bothered me for almost 20 years. I was terrified to ride in a car..." [29]. Many spoke of increased feelings of vulnerability [29–31] and uncertainty about future events [28,30]. Some individuals reported that the traumatic event influenced how they felt about others, such as feeling more socially detached [30]. Only a few persons experienced emotional constrictions and emotional numbness [30,31].

Table 1. Summary of qualitative studies about post-traumatic stress reactions among individuals with VI.

Publication, country, and QS	Sample characteristics	Methods	Type of events	Definition of VI	Perspective of inquiries/data analysis
Good et al. [28] New Zealand QS: 2/7	n: Twelve elderly adults with VI who have survived a few earthquakes and three staff members from the Blind Citizens. n: Twenty individuals with VI who are currently or have been an owner of a guide dog.	Recruited through The Association of Blind Citizens. Data collected via semi-structured face-to-face interviews. Purposive sampling strategy of individuals experiencing emotional impact after a guide dog attack. Data collected via in-depth semi-structured telephone interview.	Earthquake. Dog attack on the individual's guide dog.	Not reported. Not reported.	Lived experiences and experiences of staff members. Thematic analysis. Lived experiences. Thematic analysis.
Marques-Brocksopp [30] Marques-Brocksopp UK QS: 4/7	n: Four adults with blindness; Age: 26–34 years; Gender: 50% males.	Clinical case study of individuals with blindness who had a diagnosis of post-traumatic stress disorder.	Various types of events (Accidents, assault, and sexual abuse).	Descriptive. Three with congenital blindness and one with acquired blindness. Three with no light perception.	Clinical evaluation. Description of post-traumatic stress symptoms for each case.
McFarlane [31] Australia QS: –	n: Seventeen adults with VI; Age: 20–70 years; Gender: 29.4% males.	Participants recruited through the Norwegian Association of the Blind and Partially Sighted and personal networks. Data collected via semi-structural interviews and focus groups.	Various types of events (bullying, accidents, assaults, disasters, witnessing a near death experience, abuse, cancer, and getting lost).	Descriptive. Seven with moderate VI, three with severe VI, and seven with blindness.	Lived experiences. Thematic analysis.
Saur et al. [29] Norway QS: 5/7	n: Five adults with VI. Age: 30–56 years. Gender: 40% males.	Convenience sample. Data collected through focus groups with general and specific questions.	War events.	Descriptive. Three with moderate to severe VI and two with blindness.	Lived experiences. Thematic analysis.
Shpigelman and Gekkopf [32] Israel QS: 4/7					

QS: quality score; VI: visual impairment.

Cognitive reactions

People with VI had often problems recalling key features of the event [29–31], whereas some themes were about disturbed concentration and memory [31]. The following description was provided by McFarlane: "...he found it more difficult to discriminate cues and could not concentrate on his orientation tasks" [31]. Recurrent nightmares, flashbacks, or intrusive memories were common [29–31], with flashbacks and intrusive memories being manifested visually, auditorily, or bodily [29,31]. Auditory and bodily flashbacks were more common among those with a greater degree of vision loss [31]. A few narratives were about exaggerated blame of self or others for causing the trauma [30,31].

Review of quantitative studies

Table 2 shows detailed information about the six studies with quantitative designs. The majority of studies included depression ($n = 4$) as an outcome measure, followed by PTSD ($n = 1$), anxiety ($n = 1$), substance dependence ($n = 1$), negative self-esteem ($n = 1$), and life satisfaction ($n = 1$). Three studies included more than one outcome. The studies were considered to be of low quality because most of them did not meet more than five out of ten study quality criteria. The limitations of most of these studies were related to the sampling procedure and the description of non-respondents (Supplementary Table S4).

Occurrence of stress reactions

The prevalence of mental disorders was assessed in three studies, including 1264 individuals with VI. Two studies showed that the prevalence of depression and dysthymia among individuals with VI were 4–21.2 and 0.9%, respectively [36,37]. Brooks et al. [34] found that the prevalence of substance dependence was 32% among participants of a training program for people with VI.

Post-traumatic stress reactions

Five of the reviewed studies examined the association between negative life events or traumatic experiences and stress reactions, covering 1977 individuals with visual impairments [33–37]. In studies showing significant associations, the event of interest was associated with depression [36,37] and substance dependence [34]. On the other hand, one study did not find any differences in depression and life satisfaction in data collected 2 months before a terror attack in comparison to 2 months after the attack [33]. One study showed that the impact of potential traumatic exposure varied across outcome measures [35]. Duyan and Karatas [35] found significantly greater symptoms of trait anxiety and negative self-esteem, but not state anxiety, among completely blind individuals living in an earthquake-prone area than among completely blind individuals living in an area without earthquakes.

Characteristics of visual impairment

The degree of vision loss was the only VI characteristic of interest in the reviewed studies. The study by Shaar [25] found higher rates of PTSD in adolescents who were blind compared with hard-of-hearing adolescents (OR: 8.57, 95% CI: 2.24–32.76), whereas a non-significantly higher rate was observed in those who had moderate to severe VI (OR: 1.58, 95% CI: 0.43–5.87). In addition, two studies observed a

Table 2. Description of the quantitative studies about post-traumatic reactions in individuals with visual impairments.

Publication, country, and QS	Study population	Study methodology	Definition of VI	Data collection	Results
Brennan et al. [33] US QS: 5/10	n: Hundred and seventy two adults with VI; Years: 65–98; Gender: 44% males. Origin: vision rehabilitation service applicants living in New York during the terror attack.	Cross-sectional design; Two group sample: those providing data either 2 months prior or 2 months following the September 11 attacks.	Visual acuity. Type of diagnostic tool not described.	Structured interview. Exposure: terror attack. Outcome: Centre of Epidemiological Studies Depression Scale (CES-D).	Exposure prevalence: –. Depression: no significant association between terror attack and mean depression scores (CES-D. Mean (SD): 7.63 (7.10) versus 8.63 (6.60), $p = 0.81$), after adjusting for age, gender, and education. Life satisfaction: terror attack not significantly associated with life satisfaction ($p > 0.05$). Exposure prevalence: 35%. Outcome prevalence: 32%. Alcohol: a history of abuse significantly associated with moderate to high probability of substance dependence ($p = 0.05$). Significant gender differences (Men: 62% and Women: 27%).
Brooks et al. [34] US QS: 5/10	n: Sixty nine adults with VI and 57% with blindness. Years: 18–78. Gender: 62% males. Origin: participants of a training program for people with VI.	Cross-sectional design. One group, non random, convenience sample.	Self-reported	Questionnaire. Exposure: a history of physical or sexual abuse. Outcome: Substance Abuse Screening Inventory (SASSI-3).	Exposure prevalence: 35%. Outcome prevalence: 32%. Alcohol: a history of abuse significantly associated with moderate to high probability of substance dependence ($p = 0.05$). Significant gender differences (Men: 62% and Women: 27%).
Duyan and Karatas [35] Turkey QS: 4/10	n: Hundred and seventy five adults with blindness. Years: 35.1 (Sakaraya) and 32.0 (Ankara). Gender: 58.3% males Origin: Citizens of Sakaraya (earthquake region) or Ankara (non-earthquake region).	Cross-sectional design. Two group sample, recruited from two different regions.	Type of diagnostic tool not described.	Structured interview. Exposure: Earthquake. Outcome: Self-esteem Inventory; State-Trait Anxiety Inventory (STAI).	Exposure prevalence: –. Anxiety: individuals in an earthquake-prone area had significantly more trait anxiety (mean: 49.7 versus 45.2) compared with individuals in non-earthquake area ($p < 0.001$), but not state anxiety (mean: 38.1 versus 37.9, $p \geq 0.001$). Self-esteem: earthquake significantly associated with lower self-esteem (mean: 15.4 versus 17.6, $p < 0.001$).
Horowitz et al. [37] USA QS: 5/10	n: Thousand fifty two adults with VI, 21% with best corrected VA <20/200 in the better-seeing eye. Age: 65–100 years Gender: 47.3% males. Origin: applicants for community-based vision rehabilitation services.	Cross-sectional design Non-random, convenience sample. Response rate: 55.5%.	Visual acuity. Type of diagnostic tool not described.	Structured interview. Exposure: negative life events (12 months). Outcomes: Mood Disorders Module of the Structured Clinical Interview; Center for Epidemiologic Studies Depression Scale (CES-D).	Exposure prevalence: 24.7%. Outcome prevalence: subthreshold depression: 26.9%; Major depressive disorder: 7.2%; Dysthymia: 0.9%; CES-D score ≥ 16 : 21.2%. Depression: in fully adjusted models, negative life events were associated with increased odds of subthreshold depression (OR: 1.81, 95% CI: 1.16–2.83, $p < 0.05$) and clinical depression (OR: 2.22, 95% CI: 0.96–5.16, $p > 0.05$). Exposure prevalence: 26.6%. Outcome prevalence: 14.7%. Depression: negative life event in the past year were significantly associated with depression symptoms in the fully adjusted models ($\beta = 0.15$, $p < 0.05$).
Rees et al. [36] Australia QS: 5/10	n: Hundred and forty three adults with VI, 18.2% with >1.0 best-corrected LogMAR. Age: 24–97 years. Gender: 40.6% males. Origin: eye clinic patients in Melbourne.	Cross-sectional design. Non-random, convenience sample.	Visual acuity. Type of diagnostic tool not described.	Structured interview-administered questionnaire. Exposure: negative life events (12 months). Outcome: Patient Health Questionnaire-9 (PHQ-9).	PTSD: Highest odds of PTSD for those with complete blindness (OR: 8.57, 95% CI: 2.2–32.8) compared with those who were hard-of-hearing, whereas the odds were non-significantly higher for those with moderate to severe VI (OR: 1.58, 95% CI: 0.43–5.87).
Shaar [25] Lebanon QS: 6/10	n: Threehundred and thirty four, of which 49.7% had VI. Age: 10–20 years. Gender: 39.8% males. Origin: educational services for individuals with SI.	Cross-sectional design. Recruited between 1991 and 1992. Random selected schools of non-impaired adolescents Response rate: 71.6%.	Type of diagnostic tool not described.	Questionnaire. Exposure: exposure to traumatic events. Outcome: Post-traumatic Stress Reaction Checklist for Children (PTSRC).	PTSD: Highest odds of PTSD for those with complete blindness (OR: 8.57, 95% CI: 2.2–32.8) compared with those who were hard-of-hearing, whereas the odds were non-significantly higher for those with moderate to severe VI (OR: 1.58, 95% CI: 0.43–5.87).

QS: quality score; SI: sensory impairment; VI: visual impairment; PTSD: post-traumatic stress disorder; logMAR: minimum logarithmic angle of resolution; VA: visual acuity; OR: odds ratio; –: exposure prevalence not directly assessed.

significant association between negative life events and depression after controlling for severity of visual acuity loss [36,37].

Sociodemographic characteristics

Some studies examined for differences across sociodemographic characteristics [25,33–35]. The study by Brooks et al. [34] showed that abused men had a higher risk of substance dependence compared with abused women. One study reported differences in adverse outcomes across categories of all sociodemographic characteristics [35], while another study did not find any significant subgroup differences [33].

Supplementary synthesis: risk of potentially traumatic events

Supplementary Table S1 shows the summary of quantitative studies investigating the risk of specific and cumulative PTEs among individuals with visual impairments. When the reference category was individuals without any visual impairment, majority of the previous publications have found that individuals with visual impairments had a significantly higher risk of falls, different types of accidents, bullying, violence, and abuse. Only one study had previously assessed the cumulative risk of PTE among individuals with and without visual impairments. In contrast to the specific PTEs, Shaar [25] observed that adolescents with sensory impairments living in war conflict areas had lower scores on cumulative PTE than their non-impaired peers.

Discussion

Our review is the first to synthesize and appraise the evidence of post-traumatic stress reactions among individuals with VI. It provides an overview of the existing literature, including results from a broad range of study types, methodology, samples, PTE exposures, and VI characteristics. Our synthesis of the five qualitative studies illustrated the multiple types of post-traumatic stress reactions among individuals with VI; categorized into physical, behavioral, emotional, and cognitive reactions. Of the quantitative studies, four out of five studies found significant associations of PTE exposure with mental health adversities, and the prevalence of various trauma-related mental disorders ranged between 0.9% and 32%.

Stress responses

The synthesis of qualitative data illustrated a complexity and variability of traumatic stress reactions among people with moderate to severe VI and blindness. This is in line with our expectations as a broad range of factors prior to, during, and after trauma affects the manifestation of stress reactions. Individual experiences, access to support, coping and life skills, and potential responses from the larger community are essential factors in this respect.

Mental health adversities

Some themes from the qualitative data were about post-traumatic stress symptoms like avoidance behavior, hypersensitivity, negative emotions, and reexperience. In our review, we only found one quantitative study including measurements of PTSD. Results from previous systematic reviews of VI-prone populations have shown that the prevalence of current PTSD ranged from 0.7% to 32.5% [22,23], which is both lower and higher than what has been found in general Westernized populations (range: 2.5–4.9%) [13,38]. Based on current evidence, we cannot conclude on whether

individuals with VI are at higher risk for PTSD. Thus, there is a need for future research to consider prevalence, causes, and trajectories of PTSD in populations with VI.

Depression is common in the aftermath of disasters and life-threatening events [16,17]. The prevalence of depression in the reviewed studies was higher than that reported in the general population [39], with 2- to 5-fold higher rates. However, our study findings for depression may not be generalizable to populations with VI as the studies recruited elderly adults seeking rehabilitation services. Moreover, the use of self-report may not be completely comparable with clinical interviews. These two factors should be taken into account in future research.

Many themes from the qualitative studies were about anxiety-prone stress reactions. Only one quantitative study examined the impact of PTE on anxiety disorders. Future research may benefit from the use of quantitative methods to illuminate the impact of trauma on anxiety disorders.

Functional limitations

A few themes from the qualitative research were related to individual functioning in daily life, i.e., mobility, instrumental activities of daily living, and social interactions. Some stress responses may cause significant disability for the affected person. For example, we observed from the qualitative studies that some stress reactions were connected to sound or noise, with reactions such as auditory hypersensitivity [32] and auditory reexperience of the trauma [29,31]. Disruption to the perception of auditory information may be an additional burden to the functioning of individuals with VI as they rely more heavily on auditory information in everyday situations than sighted individuals [9,40].

None of the reviewed quantitative studies included functioning as an outcome measure. The assessment for how PTE influences functioning of populations with VI may lead to implications in a rehabilitation perspective.

Trauma characteristics

In the current review, mental health adversities among people with VI were associated with a broad range of life-threatening events. However, the majority of the reviewed studies were concerned with single events or events lasting for a short period in time. Recurrent events, such as repeated abuse or violence, may result in different mental health adversities than events that happens once [41,42].

In the quantitative studies, it is unclear whether the participants had actually experienced the event as traumatic as most of the reviewed studies either assessed whether the individual had experienced certain types of events (e.g., sexual abuse) or selected populations living in areas affected by mass accidents or catastrophes. There is evidence that the subjective appraisal of danger differs between individuals with and without VI [43]. Thus, we recommend future research to include validated measurement tools for assessing both objective and subjective components of trauma exposure.

Strengths and limitations

Several methodological issues must be taken into account for the individual studies, as none of them reached maximum score in the quality assessment. For the quantitative studies, differences were found in terms of assessment tools, timing of assessment, sample size, and response rate. None of the reviewed studies, apart from the study by Shaar [25], had whole population

samples. The likelihood of selection bias is high given that most studies used convenience sampling. Few of the reviewed studies had a sufficient description of the affected visual functions, as well as the cause, stability, progression rate, and onset-age of vision loss. Furthermore, none of the studies had information about the type of diagnostic system used to classify VI. Based on the poor documentation related to causes of VI, we cannot exclude the possibility that previous trauma exposure might have caused the vision loss.

This systematic review has some strengths and limitations worth noting. Among the strengths is the inclusion of qualitative and quantitative research methods, the multiple-database standardized search strategy, the flexible eligibility criteria, and finding relevant literature by searching reference lists and using internet searches. Of limitations, it should be mentioned that we might have missed out on some relevant papers because of publication bias or the exclusion of gray literature, and although the included studies were considered to be “roughly about the same things”, our inclusion criteria were very heterogeneous in terms of study type, publication year, study aim, methodology, and sample characteristics. This heterogeneity, in combination with a low number of studies, hampered our ability to perform meta- or comparative analysis. Finally, we restricted our review to populations already living with VI when the dangerous situation occurred. We highly recommend additional reviews to assess the impact and burden of vision loss caused by disasters or serious accidents.

Implications

Mental disorders cause suffering or reduced ability to functioning in daily life for those affected. For visually impaired individuals this can be even more demanding and marginalizing. The possible link between PTE and mental adversities implies the need for recognition of the mental health in individuals with VI who have experienced events that threaten life, health, or integrity. Ophthalmologists, eye care workers, and others who face people with vision loss need to consider referral to mental health care services. Psychosocial aftercare and rehabilitation should meet the challenges and needs of traumatized individuals with VI, including predictability, time, adequate information, and maintaining self-reliance and independency.

Conclusion

The findings from this review have shown that potentially traumatic experiences are manifested into various stress reactions and may subsequently impact their mental health. However, there appears to be a paucity of data from high-quality studies and most studies did not address the possibility of bias or gave inadequate descriptions about VI diagnosis and important VI characteristics. More research with a greater methodological rigor is needed to accurately measure associated factors and implications of past trauma experiences on the health and functioning of people with VI.

Acknowledgements

We would like to thank Johanne Longva, a librarian at the Norwegian Institute of Public Health, for her valuable help and guidance throughout the standard literature search.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

- [1] Colenbrander A. Assessment of functional vision and its rehabilitation. *Acta Ophthalmol.* 2010;88:163–173.
- [2] World Health Organization. International Classification of Diseases 10th revision: 2016 [Internet]. 2016 [cited 2017 Aug 22]. Available from: <http://apps.who.int/classifications/icd10/browse/2016/en/>
- [3] Pascolini D, Mariotti SP. Global estimates of visual impairment: 2010. *Br J Ophthalmol.* 2012;96:614–618.
- [4] Murthy G, Johnson G. Prevalence, incidence, and distribution of visual impairment. In: Johnson G, Minassian D, Weale R, West S, editors. *The epidemiology of eye diseases.* 3rd ed. London, UK: Imperial College Press; 2012. p. 3–53.
- [5] World Health Organization. Visual impairment and blindness [Internet]. 2014 [cited 2017 Aug 22]. Available from: <http://www.who.int/mediacentre/factsheets/fs282/en/>
- [6] Legood R, Scuffham P, Cryer C. Are we blind to injuries in the visually impaired? A review of the literature. *Injury Prevention.* 2002;8:155–160.
- [7] Reed-Jones RJ, Solis GR, Lawson KA, et al. Vision and falls: a multidisciplinary review of the contributions of visual impairment to falls among older adults. *Maturitas.* 2013;75:22–28.
- [8] Cumberland PM, Rahi JS. Visual function, social position, and health and life chances: the UK Biobank Study. *JAMA Ophthalmol.* 2016;134:959–966.
- [9] Cattaneo Z, Vecchi T. *Blind vision: the neuroscience of visual impairment.* Cambridge, Massachusetts: MIT Press; 2011.
- [10] Silverman WK. Children experiencing disasters: definitions, reactions, and predictors of outcomes. In: La Greca AM, Silverman WK, Vernberg EM, Roberts MC, editors. *Helping children cope with disasters and terrorism.* Washington DC, US: American Psychological Association; 2002. p. 11–33.
- [11] American Psychiatric Association. *Diagnostic and statistical manual of mental disorders (DSM-5®).* Arlington (VA): American Psychiatric Pub; 2013.
- [12] La Greca AM, Silverman WK, Vernberg EM, et al. Symptoms of posttraumatic stress in children after Hurricane Andrew: a prospective study. *J Consult Clin Psychol.* 1996;64:712.
- [13] Goldstein RB, Smith SM, Chou SP, et al. The epidemiology of DSM-5 posttraumatic stress disorder in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions-III. *Soc Psychiatry Psychiatr Epidemiol.* 2016;51:1137–1148.
- [14] Gupta MA. Review of somatic symptoms in post-traumatic stress disorder. *Int Rev Psychiatry.* 2013;25:86–99.
- [15] Brady KT, Killeen TK, Brewerton T, Lucerini S. Comorbidity of psychiatric disorders and posttraumatic stress disorder. *J Clin Psychiatry.* 2000;61:22–32.
- [16] Hussain A, Weisaeth L, Heir T. Psychiatric disorders and functional impairment among disaster victims after exposure to a natural disaster: a population based study. *J Affect Disord.* 2011;128:135–141.
- [17] Norris FH, Friedman MJ, Watson PJ, et al. 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981–2001. *Psychiatry.* 2002;65:207–239.
- [18] Stevelink S, Malcolm E, Mason C, et al. The prevalence of mental health disorders in (ex-) military personnel with a

- physical impairment: a systematic review. *Occup Environ Med.* 2015;72:243–251.
- [19] Norris FH. Epidemiology of trauma: frequency and impact of different potentially traumatic events on different demographic groups. *J Consult Clin Psychol.* 1992;60:409.
- [20] Steel Z, Chey T, Silove D, et al. Association of torture and other potentially traumatic events with mental health outcomes among populations exposed to mass conflict and displacement: a systematic review and meta-analysis. *JAMA.* 2009;302:537–549.
- [21] Vilchinsky N, Ginzburg K, Fait K, Foa EB. Cardiac-disease-induced PTSD (CDI-PTSD): a systematic review. *Clin Psychol Rev.* 2017;55:92–106.
- [22] Volkert J, Schulz H, Härter M, et al. The prevalence of mental disorders in older people in Western countries—a meta-analysis. *Ageing Res Rev.* 2013;12:339–353.
- [23] Spottswood M, Davydow DS, Huang H. The prevalence of posttraumatic stress disorder in primary care: a systematic review. *Harv Rev Psychiatry.* 2017;25:159–169.
- [24] Snilstveit B, Oliver S, Vojtkova M. Narrative approaches to systematic review and synthesis of evidence for international development policy and practice. *J Dev Effect* 2012;4:409–429.
- [25] Shaar KH. Severe war trauma and post-traumatic stress disorder in adolescents with sensory impairments: a cross-sectional study. *Health Psych Res.* 2013;1:69–73
- [26] Centre for Reviews and Dissemination. Systematic reviews: CRD's guidance for undertaking reviews in healthcare. York, UK: Centre for Reviews and Dissemination, 2008.
- [27] Critical Appraisal Skills Programme. 10 questions to help you make sense of qualitative research [Internet]. 2017 [cited 2017 Aug 22]. Available from: <http://www.casp-uk.net/casp-tools-checklists>
- [28] Good GA, Phibbs S, Williamson K. Disoriented and immobile: the experiences of people with visual impairments during and after the Christchurch, New Zealand, 2010 and 2011 earthquakes. *J Vis Impair Blind.* 2016;110:425–435.
- [29] Saur R, Hansen MB, Jansen A, et al. Visually impaired individuals, safety perceptions and traumatic events: a qualitative study of hazards, reactions and coping. *Disabil Rehabil.* 2017;39:691–696.
- [30] Marques-Brocksopp L. How does a dog attack on a guide dog affect the wellbeing of a guide dog owner? *Br J Vis Impair.* 2015;33:5–18.
- [31] McFarlane AC. Posttraumatic stress disorder and blindness. *Compr Psychiatry.* 1988;29:558–560.
- [32] Shpigelman CN, Gelkopf M. The experiences and needs of individuals with disabilities exposed to chronic political violence. *Disabil Rehabil.* 2017;39:23–35.
- [33] Brennan M, Horowitz A, Reinhardt JP. The September 11th attacks and depressive symptomatology among older adults with vision loss in New York City. *J Gerontol Soc Work.* 2003;40:55–71.
- [34] Brooks GI, DiNitto DM, Schaller J, et al. Correlates of substance dependence among people with visual impairments. *J Vis Impair Blind.* 2014;108:428–433.
- [35] Duyan V, Karatas K. Effects of the 1999 earthquake on the completely blind living in and outside Marmara, Turkey. *IJSW.* 2005;48:610–619.
- [36] Rees G, Tee HW, Marella M, et al. Vision-specific distress and depressive symptoms in people with vision impairment. *Invest Ophthalmol Vis Sci.* 2010;51:2891–2896.
- [37] Horowitz A, Reinhardt JP, Kennedy GJ. Major and subthreshold depression among older adults seeking vision rehabilitation services. *Am J Geriatr Psychiatry.* 2005;13:180–187.
- [38] Bromet E, Atwoli L, Kawakami N, et al. Post-traumatic stress disorder associated with natural and human-made disasters in the World Mental Health Surveys. *Psychol Med.* 2017;47(2):227–41.
- [39] World Health Organization. Health statistics and information systems: Estimates for 2000–2015 [Internet]. 2015 [cited 2017 Aug 22]. Available from: http://www.who.int/health-info/global_burden_disease/estimates/en/
- [40] Després O, Boudard D, Candas V, et al. Enhanced self-localization by auditory cues in blind humans. *Disabil Rehabil.* 2005;27:753–759.
- [41] Suliman S, Mkabile SG, Fincham DS, et al. Cumulative effect of multiple trauma on symptoms of posttraumatic stress disorder, anxiety, and depression in adolescents. *Compr Psychiatry.* 2009;50:121–127.
- [42] Krupnick JL, Green BL, Stockton P, et al. Mental health effects of adolescent trauma exposure in a female college sample: Exploring differential outcomes based on experiences of unique trauma types and dimensions. *Psychiatry.* 2004;67:264–279.
- [43] Visagie L, Loxton H, Ollendick TH, et al. Comparing fears in South African children with and without visual impairments. *J Vis Impair Blind.* 2013;107:193–205.