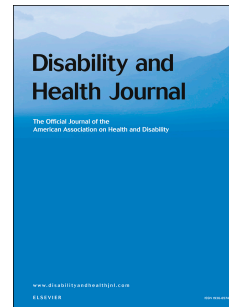


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The mental health and well-being among partners and children of military personnel and veterans with a combat-related physical injury: a scoping review of the quantitative research

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The mental health and well-being among partners and children of military personnel and veterans with a combat-related physical injury: a systematic review

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NS has no conflicts of interest to declare.

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GD has no conflicts of interest to declare.

SE has no conflicts of interest to declare.

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MC has no conflicts of interest to declare.

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Contributions:

Search terms were developed with input from all authors.

NS conducted the search and SE and STB assisted in study selection, data extraction, and quality assessment. RG and GD completed the final version of the manuscript.

All authors provided feedback on the manuscript drafts.

NTF is the guarantor of the review.

1 The mental health and well-being among partners and children of military personnel and
2 veterans with a combat-related physical injury: a scoping review of the quantitative research

3

4 Abstract

5

6 Background: Little research has focused on the impact of combat-related physical injuries on
7 the mental health and well-being of partners and children of military personnel and veterans.

8

9 Objectives: This scoping review identifies the consequences of combat-related physical
10 injuries (CRPIs) on the mental health and well-being of partners and children of military
11 personnel and veterans.

12

13 Methods: Quantitative articles examining mental health and well-being in partners and
14 children of military personnel and veterans with CRPIs from the UK, US, Canada, New
15 Zealand, Australia, European Union (EU), or Israel published since 2000 were identified.

16

17 Results: Seven articles were included, six from the US. The findings indicate the potential
18 negative and positive impacts CRPIs can have on the health and well-being of partners of
19 military partners and the negative impacts identified among children and how this differs
20 from psychological injuries.

21

22 Conclusions: This scoping review highlights the lack of research focussing on the impact of
23 CRPIs on the family members of military personnel and veterans. Additional research is
24 needed to understand how psychological injuries might have different effects on the mental
25 health and well-being partners and children of military personnel and veterans compared to
26 different types of CRPIs.

27

28 Keywords: military partners; military-connected children; combat injuries; occupational
29 health

30

31

32 Introduction

33

34 Due to advancements in combat casualty medical care, personal protective equipment
35 and rapid aeromedical evacuation, the number of fatalities among military personnel
36 deployed on combat operations has decreased in recent conflicts.^{1; 2} While exact estimates are
37 difficult to obtain, approximately 60,000 United States (US) and British military personnel,
38 the main parties in the Coalition forces, were wounded in action during combat operations in
39 Iraq and Afghanistan³⁻⁵, with approximately 90% surviving their injuries.^{6; 7} For this reason,
40 the Iraq and Afghanistan conflicts have collectively been referred to as the “*wars of*
41 *disabilities*”,⁸ with many military personnel returning home with serious long-term physical
42 injuries such as amputations, burns, or loss of vision.¹ Evidence from prior research suggests
43 combat related physical injuries (CRPIs) can place military personnel and veterans at risk of
44 psychological difficulties such as PTSD, anxiety and depression,^{1; 9; 10} alterations in
45 perceptions of body image and loss of self-esteem,¹¹ and changes to employment.¹²

46

47 The difficulties personnel and veterans with CRPIs experience also have implications
48 for the mental health and functioning of family members coping with their loved ones’
49 injuries. The responsibility to support and manage long-term recovery, disability and/or
50 changed behaviour among military personnel and veterans often falls to the family unit,
51 requiring caregiving roles that may be physically, emotionally, socially or financially
52 demanding.^{13; 14} The challenges of these responsibilities can result in elevated stress and
53 caregiver burden among family members which, over time, can lead to depression, social
54 isolation, anxiety, poor quality of life, and relationship tensions, as well as declines in
55 physical health among partners of those injured.¹⁴⁻¹⁷ CRPIs may also affect children within
56 military families¹⁸, with challenges to the parent-child relationship and child development as
57 a result of extended separation periods from hospitalisations, surgeries and long-term
58 rehabilitation.^{19; 20} This may differ by child age, with younger children expressing distress
59 through externalising behaviours, such as aggression, defiance, theft and vandalism, whilst
60 older children able to take on a caring role may become anxious or depressed as a result of
61 their increased responsibilities.²¹⁻²³ However, caregiving is a complex process which can
62 have several positive impacts. An increased sense of satisfaction, fulfilment, companionship
63 and familial closeness are reported among some caregivers,^{14; 16; 24; 25} with more positive
64 experiences of caregiving significantly associated with lower levels of depression and
65 caregiver burden as well as higher levels of physical health.²⁵ Being a child in a military

66 family in which a parent is injured may also have positive consequences such as increased
67 resilience, independence, family cohesion, sense of pride and community, and feeling safe.²⁶
68

69 To date, much of the current research has focused on the families of military
70 personnel or veterans with post-traumatic stress disorder (PTSD) from the US and United
71 Kingdom (UK). However, evidence suggests that military families may cope better with
72 CRPIs than psychological injuries due to heightened irritability, mood swings, emotional
73 numbing, memory loss and other behaviour among personnel among those with the latter.²⁷ It
74 is also important to note that while CRPIs can be life-changing, not every military personnel
75 or veteran with a CRPI will also experience a lasting mental health condition, with most
76 mental health issues occurring in the year following injury.²⁸ Several reviews have
77 summarised the evidence on the repercussions of caring for or living with a wounded, injured
78 or sick (WIS) military personnel.^{14; 29; 30} However, to date, none have focused exclusively on
79 the impact of living with or caring for family members with a physical injury to examine the
80 particular experiences of this population and how their experiences may differ from families
81 managing combat-related psychological injuries, or both, and how to better assist those with
82 psychological injuries.

83
84 This scoping review aims to estimate the influence of CRPIs on the mental health and
85 well-being of partners and children of military personnel and veterans, and to understand the
86 impact of different types of injuries on military family well-being. For the purposes of this
87 review, CRPIs were interpreted as any physical injury occurring as a result of combat-related
88 operations such as amputations, burns, loss of vision, scarring or other physical wounds.
89 Given the significant amount of research linking Traumatic Brain Injuries (TBIs) with
90 psychological injuries such as PTSD,³¹ it was decided to exclude studies focusing on this
91 outcome unless findings could be differentiated from CRPIs. Well-being was defined as
92 encompassing seven domains: health, employment or other meaningful activity, finances, life
93 skills/preparedness for challenges such as transition to post-military life, social integration,
94 housing/physical environment, and cultural/social environment.³²

95 96 Methods

97 Development of the review processes were based on Halas et al.³³. The methods and
98 reporting of the results of this scoping review are described according to PRISMA
99 guidelines³⁴ and registered with PROSPERO (reference: CRD42020185793).

100

101 Search Strategy

102

103 A comprehensive literature search was conducted in May 2020 using the electronic
104 databases of MEDLINE, PsycInfo, Embase, Web of Science, PILOTS, EBSCO and CINAHL
105 to identify articles that examined the mental health and/or well-being of partners and children
106 of military personnel or veterans with a CRPI using four broad search terms (Appendix A).
107 Articles were limited to those focusing on the nuclear family as these are the family members
108 often involved in care and co-habiting with the injured military member.^{13; 14} Research with
109 civilians has also shown caring for an injured partner has more negative effects on partners
110 compared to the injured person's parents.³⁵ Reference lists were shared with other researchers
111 in this field for them to identify any missing studies. No additional articles were identified
112 using this approach.

113

114 Articles eligible for inclusion were quantitative studies examining the mental health
115 and well-being of partners or children of military personnel or veterans with CRPIs from the
116 US, the UK, Canada, New Zealand, Australia, the European Union (EU), or Israel. This
117 restriction was included due to broad social, cultural, and military similarities across Five
118 Eyes Nations and Westernised countries. Articles were limited to those published in English
119 since 2000 to reflect developments in medical technology and increased survival rates from
120 combat-related injuries. Excluded articles included those where findings relating to CRPIs
121 and psychological injuries such as PTSD were not differentiated within the results, those
122 based on data from conflicts prior to 2000, qualitative or intervention studies, reviews, grey
123 literature, dissertations, abstracts, conference abstracts, and individual case studies. Where
124 available, comparisons are discussed between physical and psychological injuries.

125

126 Titles and abstracts were reviewed by one researcher (XX), with ten per cent
127 reviewed by a second author (XX) to ensure eligibility and exclusion criteria were
128 consistently applied. This process was repeated during full-text screening. Where researchers
129 differed in their decisions, this was discussed with the team and a consensus was reached.
130 Due to the range of study samples and methods used, a meta-analysis was not deemed to be
131 appropriate.

132

133 Data extraction

134

135 Data on author, country, military demographics, family member, study design, sample
136 size, measures, and the main findings were extracted from each article (Table 1). Data
137 extraction was compared and checked by XX, XX, and XX to ensure completeness.

138
139 Quality analysis

140
141 The quality of included articles was assessed using adapted guidelines from the
142 Consolidated Criteria for Reporting Qualitative Research (COREQ)³⁶ and the Quality
143 Assessment Tool for Observational Cohort and Cross-Sectional Studies³⁷ (Appendix B). Each
144 article was given a score of '1' if criteria for each item were met and '0' if not. Total scores
145 were calculated and categorised as 'poor' (0-2), 'fair' (3-4), or 'good' (5-6) (Table 1).
146 Articles were rated independently (XX, XX, XX) and any differences discussed until
147 consensus was reached.

148
149 Results

150 Initial searches returned 8926 references, including two identified from hand
151 searching journals. A total of 138 full-text articles were assessed and three additional articles
152 identified through reference-checking (Figure 1). The seven articles meeting inclusion criteria
153 are described in Table 1, with additional information provided in Supplemental Table 1.

154
155 Overview of included articles

156 Of the included articles, three focused on the partners³⁸⁻⁴⁰ of US personnel and
157 veterans with CRPIs and four focused on their children (Table 1).⁴¹⁻⁴⁴ Sample sizes ranged
158 from 41⁴⁴ to 485,000 (Supplemental Table 1).⁴³ The majority of partners were women (85-
159 100%) in married or long-term relationships, with mean ages ranging from 29.6-48.5 years⁴⁰;
160 ⁴⁴ Among children, 51% were boys, with mean/median reported ages ranging from 4-14
161 years.⁴¹⁻⁴⁴

162
163 Two articles were cross sectional, using surveys and semi-structured interviews to
164 collect data, four utilised longitudinal TRICARE Management Activity (TMA) healthcare
165 data, and one was a self-selected case series study (Supplemental Table 1). A variety of
166 measures were used to assess mental health and well-being among partners and children of
167 military personnel and veterans with CRPIs, from diagnoses of mental health disorders,
168 medical visits and medication use within medical records to commonly used validated
169 measures of mental health (Supplemental Table 1). Well-being measures included caregiver

170 burden, financial strain, family functioning, and relationships. Child mental health outcomes
171 were assessed either by medical records⁴¹⁻⁴³ or parental report.⁴⁴ CRPIs were determined
172 through verified governmental databases of confirmed injuries for five articles, with one
173 relying on self-reported injury status³⁸ and one recruiting medically discharged Canadian
174 personnel.³⁹ Although we aimed to examine variations in the influences of CRPIs on military
175 family well-being by type of injury, none of the included articles provided results at this
176 level, with most comparing outcomes relating to physical injuries to those arising mental
177 injuries among personnel and veterans.

178

179 Two articles were rated as ‘good’ quality, three as ‘fair’ and two as ‘poor’ (Table 1).
180 Those with lower ratings tended to not pre-specify participant inclusion/exclusion criteria or
181 failed to report necessary statistical estimates such as sample size justification, variance, or
182 effect sizes. Discussion of findings will place more emphasis on the articles that scored
183 higher on the quality assessment.

184

185 Mental health and well-being of partners/caregivers

186 Three articles examined the health and well-being of partners/caregivers of military personnel
187 and veterans with CRPIs.³⁸⁻⁴⁰

188

189 The first two papers discuss how mental health was found to be poorer among the
190 partners of personnel/veterans with CRPIs compared to the partners of personnel/veterans
191 without injuries. In the first paper, significantly higher depression and PTSD scores were
192 found among the partners of US National Guard personnel reporting deployment-related
193 physical injury compared to the partners of non-injured personnel but there was no
194 association with alcohol use.³⁸ In the second paper, perceptions of personnel and veteran
195 health were highlighted as a key factor in partner health, with partners’ psychological distress
196 negatively associated with their ratings of military members’ mental health but not with
197 partner ratings of military members’ physical health.³⁹ However, unlike partner perceptions
198 of mental health, perceptions of service member physical health were not found to be
199 associated with considerations of divorce or caregiver burden,³⁹ suggesting potential
200 differences in the impacts of different injury types, and required caregiving roles, on
201 relationship satisfaction.

202

203 Broader aspects of well-being were also examined by two of these studies. In the first
204 paper, relationship satisfaction was not found to differ between service members or partners
205 according to injured vs non-injured status but the mean scores of partner parental stress were
206 significantly lower compared to service members, suggesting personnel found parenting post-
207 injury more difficult than their civilian partners.³⁸ There was some evidence suggesting that
208 the challenges of being in a relationship with military personnel or veterans with physical or
209 psychological injuries may differ. In the third paper, quality of life was found to be highest
210 among wives of physically wounded Croatian veterans across a range of domains compared
211 to widows and wives of veterans suffering from PTSD respectively, indicating once again the
212 differential consequences that physical versus mental injuries may have on military
213 families.⁴⁰ However, this study was deemed to be of low quality and the findings should be
214 treated with caution.

215

216 Mental health and well-being of children

217 Four articles examined the health and well-being of children of military personnel or
218 veterans with CRPIs.⁴¹⁻⁴⁴

219

220 In the fifth paper, children of physically or psychologically injured military personnel
221 and veterans were found to have a significantly higher number of TRICARE outpatient visits
222 for mental, behavioural health, and injuries, as well as significantly higher visit rates for child
223 maltreatment compared to the children of non-injured military personnel.⁴² No significant
224 differences were found according to the nature of the parent's injury (physical vs
225 psychological). Conversely the sixth paper, a later study by the same authors that selected
226 TRICARE data based on parental injury, did find differences in child outcomes according to
227 the type of injury parents had sustained. Mental health visits and psychiatric medication
228 prescription days were higher among children of physically injured parents (58%, 70%)
229 compared to children of parents with TBI (40%, 62%), with the greatest psychiatric
230 medication days found among children of parents with PTSD (94%).⁴³ Overall, a greater
231 number of visits and prescription days were seen among boys and with increasing child age,
232 although results were unadjusted and may be explained by other factors. While the paper
233 does not record if these findings are significant or not, the difference in the proportions
234 reported and the large sample size of the study suggest differences in the magnitude of impact
235 between physical injury and TBI on child mental health utilisation are likely to be true. In the
236 fourth paper, sleep disorders were found to be significantly higher among adolescents with a

237 parent with a physical or psychological injury compared to the two years preceding the
238 injury.⁴¹ While there was no difference according to physical, psychological, TBI or other
239 injury type, significant increases were seen in the number of days taking sleep medication
240 since the time of injury among adolescents whose parent had experienced an unspecified
241 battle-injury (IRR 19.1 [3.10-119]).⁴¹

242

243 Only one study, the seventh paper, explored broader well-being among children of
244 personnel/veterans with CRPIs. High deployment-related family distress prior to combat
245 injury as reported by spouses, together with family disruption post-injury were both found to
246 be significantly associated with higher child distress.⁴⁴ However, due to the small sample
247 size, confidence estimates were large, and in combination with the low quality score, the
248 findings of this study should be treated with caution.

249

250 Discussion

251

252 The findings highlight the impact CRPIs can have on the mental health and well-
253 being of partners or children of military personnel and veterans with CRPIs, including mental
254 health and behavioural outcomes, family functioning, caregiver burden, spouse employment,
255 relationship satisfaction, and quality of life. Only seven articles examining the health and
256 well-being of the partners and children of military personnel and veterans with CRPIs were
257 identified, highlighting the lack of research in this area. The available evidence suggests
258 CRPIs may have a lesser impact on family health and well-being compared to PTSD among
259 personnel and veterans, although additional research is needed to understand why this might
260 be so. None of the included articles examined differences in influence according to type of
261 CRPI.

262

263 Overall, the included articles suggests CRPIs among military personnel and veterans
264 have a largely negative consequences on the health and well-being of partners.³⁸ While prior
265 research indicates that increasing compassion fatigue over time may give rise to maladaptive
266 coping mechanisms among partners of those with CRPIs, such as using drugs and alcohol,^{45;}
267 ⁴⁶ this review found no evidence for this.³⁸ Positive impacts were reported by one low quality
268 study,⁴⁰ with higher quality of life among spouses of veterans with combat-related physical
269 disabilities compared to spouses of veterans suffering from PTSD and spouses of war
270 veterans. Such findings may be due to the increased challenges posed by psychological

271 injuries,²⁷ greater distress among the partners of military personnel and veterans with mental
272 health problems, and a competing desire to protect personnel and veterans from being
273 identified as having difficulties.⁴⁷ Associations between psychological distress, partner
274 caregiver burden and considerations of divorce and partner perceptions of personnel or
275 veteran psychological injury may also be important.³⁹ These findings were consistent with
276 previous civilian research suggesting a lower emotional burden among family caregivers of
277 individuals with physical disabilities and injuries compared to family caregivers of those with
278 psychological disorders^{48; 49} and suggest CRPIs do pose different challenges for the partners
279 of military personnel and veterans but more research is needed to understand how and why.

280

281 Findings relating to the children of military personnel and veterans with CRPIs were
282 more negative in nature but also mixed. Increased mental health visits and psychiatric
283 medication prescription days were identified among this group compared to the children of
284 personnel with TBI⁴³ and increases in outpatient visits for sleep disorders were especially
285 pronounced in children of parents with more severe physical injuries.⁴¹ However, other
286 articles suggested that there were no differences according to physical or psychological
287 parental injury or the number of injuries, with the exception of child maltreatment medical
288 appointments.^{42; 44} Research on differences in demographic groups was limited, with
289 unadjusted findings suggesting boys and older children were more at risk of poorer mental
290 health outcomes as defined by number of visits and psychiatric medication prescription days,
291 while girls and older children were more at risk from maltreatment.⁴³

292

293 Additional aspects of health and well-being among partners were also examined in
294 included studies but in limited scope. Caregiver burden among partners and other caregivers
295 of military veterans with CRPIs was examined in one article which suggested psychological
296 distress among partners was only present among caregivers who held less favourable ratings
297 of the military member's mental, rather than physical, health.³⁹ While relationship
298 satisfaction did not appear to differ among the partners of physically injured personnel
299 compared to other groups,^{38; 39} it has been noted in some of qualitative research on caregivers
300 of veterans.⁴⁹ Other functioning issues, such as greater parental stress among physically
301 injured service members suggest these parents may struggle more with parenting post-injury
302 than partners.³⁸ Given the association between poorer family functioning post-injury and
303 higher child distress,⁴⁴ the impact of parent-child relationships may be extremely important in
304 helping support families experiencing CRPIs.

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Strengths and limitations

This scoping review is the first the authors are aware of to examine the impact of combat-related physical injuries among military personnel and veterans on the mental health and well-being of their partners and children. As such, it provides much needed understanding of the range of available evidence in this area and highlights important differences in the outcomes of CRPIs on military families compared to psychological injuries.

Limitations are evident among the included articles and should be considered when reviewing the evidence. A range of different outcome measures relating to mental health and well-being were used, making comparability across studies difficult, and a reliance on parental reports for child outcomes. Some articles retrieved from the search were not able to be included in the review as they failed to distinguish between psychological and physical injury. Of those included, although specific injury type was often available, differences between outcomes relating to particular injury type were not reported, preventing comparisons across different types of CRPIs. There were also differences in how some studies conceptualised and measured CRPI, reducing comparability of findings. Injury severity was also not routinely captured. Studies of partners focused primarily on female partners, with a lack of information on male spouses or LGBTQ+ partners. While common in military family research on mental health outcomes⁵⁰, this approach fails to acknowledge the gendered nature of caring and differences in support for male and female personnel and veterans and their partners. There was a lack of research on caregiving burden in particular but also in relation to partner employment, social support, and relationship satisfaction. Finally, sample sizes were variable, with studies focusing on family functioning and other well-being outcomes considerably smaller than those using TRICARE records. Medical records provide a helpful starting point for understanding potential differences by injury type, but often fail to capture important influential factors such as caregiver burden, family functioning and relationship quality. Additional large-scale, cross-sectional and longitudinal studies should be conducted to address this issue and develop understanding of CRPIs and the impact on military families.

337 Future directions and implications

338 With only seven articles identified, there is a clear need for greater focus on the
339 effects of CRPIs on military family health and well-being, especially given the number of
340 personnel wounded during deployments to Iraq and Afghanistan. Future research would
341 benefit from investigating the long-term effects of different types of CRPIs to determine
342 which, if any, may be particular risk factors for poor mental health and well-being among
343 personnel, veterans, and their families and to examine broader aspects of health and well-
344 being beyond purely the psychological consequences. It is important that the impact of
345 CRPIs, including different types of injury (amputation, burns, or vision loss), is examined
346 independently from psychological injuries, as the available evidence suggests differential
347 effects on families. Such research should attempt to be as inclusive as possible, including
348 both married and unmarried partners, as well as male partners and those in LGBTQ+
349 relationships. Efforts should be made to collect data directly from children to allow their
350 voices and experiences to be reflected. Care should be taken in the measures used to allow
351 comparability to prior research on non-injured family members and comparability between
352 countries, as well as to capture both the positive and negative aspects of living with military
353 personnel or veterans with CRPIs.

354

355 Conclusions

356 The findings from this review highlight the lack of research on the mental health and
357 well-being of spouses/partners or children of military personnel and veterans with CRPIs.
358 The available evidence suggests CRPIs have a largely negative impact on partners and
359 children but with limited research on broader well-being. There may be differences in
360 outcomes according to type of combat-related injury, although additional research is needed
361 to confirm and understand these associations.

362

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Journal Pre-proof

536 Appendix A: Example of database search

537

- 538 1. "psychological distress" or "mental illness" or "mental disorder*" or "behavioral
539 disorder*" or "neurotic disorder*" or "panic disorder*" or "depressive disorder*" or
540 "common mental health disorder*" or anxiety or "anxiety disorder*" or "stress
541 disorder*" or "acute stress" or PTSD or "post-traumatic stress disorder" or "traumatic
542 stress" or depress* or "emotional disorder" or "mood disorder" or "psychological
543 well-being" or "affective disorder*" or "emotional disturbance" or "emotional
544 well-being" or internalis?* or externalis?* or "problem behavior*" or "conduct
545 disorder*" or "attention deficit hyperactivity disorder*" or ADHD or hyperactivity or
546 "adjustment disorder*" or "substance misuse" or "substance abuse" or "alcohol
547 misuse" or "drinking behaviour" or "secondary traum*" or "secondary stress" or
548 "vicarious trauma*" or "suicidal ideation" or "suicidal thoughts" or "eating disorder*"
549 or "disordered eating" or "anorexia nervosa" or anorexia or bulimia or "binge-eating
550 disorder*" or "post-traumatic growth" or "psychological growth" or PGTI or
551 resilience
- 552 2. BMI or appetite or diet or "physical activity" or nutrition or "social support" or "social
553 networks" or "intimate partner violence" or "domestic violence" or "sexual violence"
554 or "child welfare" or employ* or finan* or debt or qualification or "relationship
555 satisfaction" or "relationship quality" or "interpersonal relationship*" or "romantic
556 relationship" or "parent-child relationship" or "marital relationship" or "marital
557 satisfaction" or "caregiver burden" or "sleep disorder*" or "sleep problem*" or "sleep
558 apnea" or fatigue or insomnia or "emotional safeguarding" or "social integration" or
559 housing or "family function*" or "family dynamic*" or spiritu* or relig* or faith
- 560 3. military or veteran* or soldier* or "service personnel" or "air force" or army or
561 "commissioned officer*" or marine* or "national guard*" or "active duty" or navy or
562 servicemen or "ex-service person" or reservist* or "army reserve*" or "reserve
563 soldier*" or "army officer" or combat or "armed service*" or "infantry" or "combat
564 experience"
- 565 4. famil* or wives or wife or spouse* or husband* or marriage or "intimate partner*" or
566 co-habiting partner*" or partner* or couple* or kid* or adolescen* * or youth* or
567 teen* or dependent* or offspring or "significant other*" or pubescent or "young
568 adult*" or "young person" or "young people" or "family unit" or "military famil*" or
569 "military couple" or "military spouse"

570 Appendix B: Quality assessment questions

571

572 1. Was the research question or objective in this article clearly stated?

573

574 2. Was another sampling method used besides convenience sampling?

575

576 3. Were all the subjects elected or recruited from the same or similar populations
577 (including the same time period)?

578

579 4. Were inclusion and / or exclusion criteria for being in the study clearly stated, pre-
580 specified and applied uniformly to all participants?

581

582 5. Was a sample size justification, power description, or variance and effect estimates
583 provided?

584

585 6. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and
586 implemented consistently across all study participants?

587

588 Scores of 0, 1 or 2 = 'poor' quality rating

589

590 Scores of 3 or 4 = 'fair' quality rating

591

592 Scores of 5 or 6 = 'good' quality rating

593

Table 1: Summary of included articles

First Author (Country)	Design	Family Member	Injury Type and Severity	Findings	Quality Score
Partners					
Gorman, 2014 ³⁸ (US)	Cross-sectional survey	Spouses & unmarried partners	Self-reported injury	<p>41% service members, 38% spouses report clinically distressed relationships. In parents, 46% service members, 43% spouses met cut off for parental stress. No significant difference in clinically distressed relationships or parental stress between service members and spouses.</p> <p>No significant difference in dyadic adjustment between service members or spouses according to injured vs non-injured.</p> <p>Significantly lower mean parental stress scores in spouses of injured service members compared to injured service members – no difference in parental stress for couples in no injury group.</p> <p>Significantly higher BDI, PHQ-9 and PTSD scores among spouses of injured service members compared to spouses of non-injured.</p> <p>Injury status did not affect spouse alcohol use.</p>	Good (5)
Skomorovsky, 2017 ³⁹ (Canada)	Cross-sectional survey	Spouses/ partners – 91% married	Medically released CAF members	<p>Spouse psychological distress directly associated with caregiver burden and indirectly with ratings of service member mental health.</p> <p>Spouses, who rated military member's mental health less favourably, reported more caregiver burden.</p>	Good (5)

				Spouse caregiver burden and divorce considerations significantly positively associated with their ratings of military members' mental health only.	
				Ratings of service member physical health not related to spousal well-being or divorce considerations.	
Zdjelarevič, 2011 ⁴⁰ (Croatia)	Cross-sectional survey	Spouses	Veterans suffering from PTSD, widows, veterans with physical disabilities resulting from war activities	QoL scores significantly different between wives of physically disabled veterans compared to widows and wives of veterans with PTSD. Wives of physically disabled veterans scored highest overall quality of life, health, sexual satisfaction, enjoying life, meaning of life, physical security, financial security, self-satisfaction, and satisfaction with close persons compared to widows and wives of veterans with PTSD.	Poor (2)
Children/adolescents					
Ahmed, 2020 ⁴¹ (US)	Retrospective cohort	Adolescents aged 12-16yrs at time of parent's injury	Injury/illness that could incur in battle – e.g., burns, amputation, shrapnel, fracture, spinal cord injury, blindness, and PTSD and TBI	Approx. 2% of adolescents had diagnosed sleep disorder. Outpatient visits for any sleep diagnosis increased significantly post-parental injury; higher for adolescents of parents with TBI, comorbid TBI and PTSD, battle injury, and those medically discharged - no statistically significant difference by type of injury. Outpatient visits increased significantly among adolescents with parents with both severe (medically retired) and less severe not medically retired) injuries. Sleep outpatient visits and medication use by adolescents whose parent experienced battle injuries did not change significantly.	Fair (4)

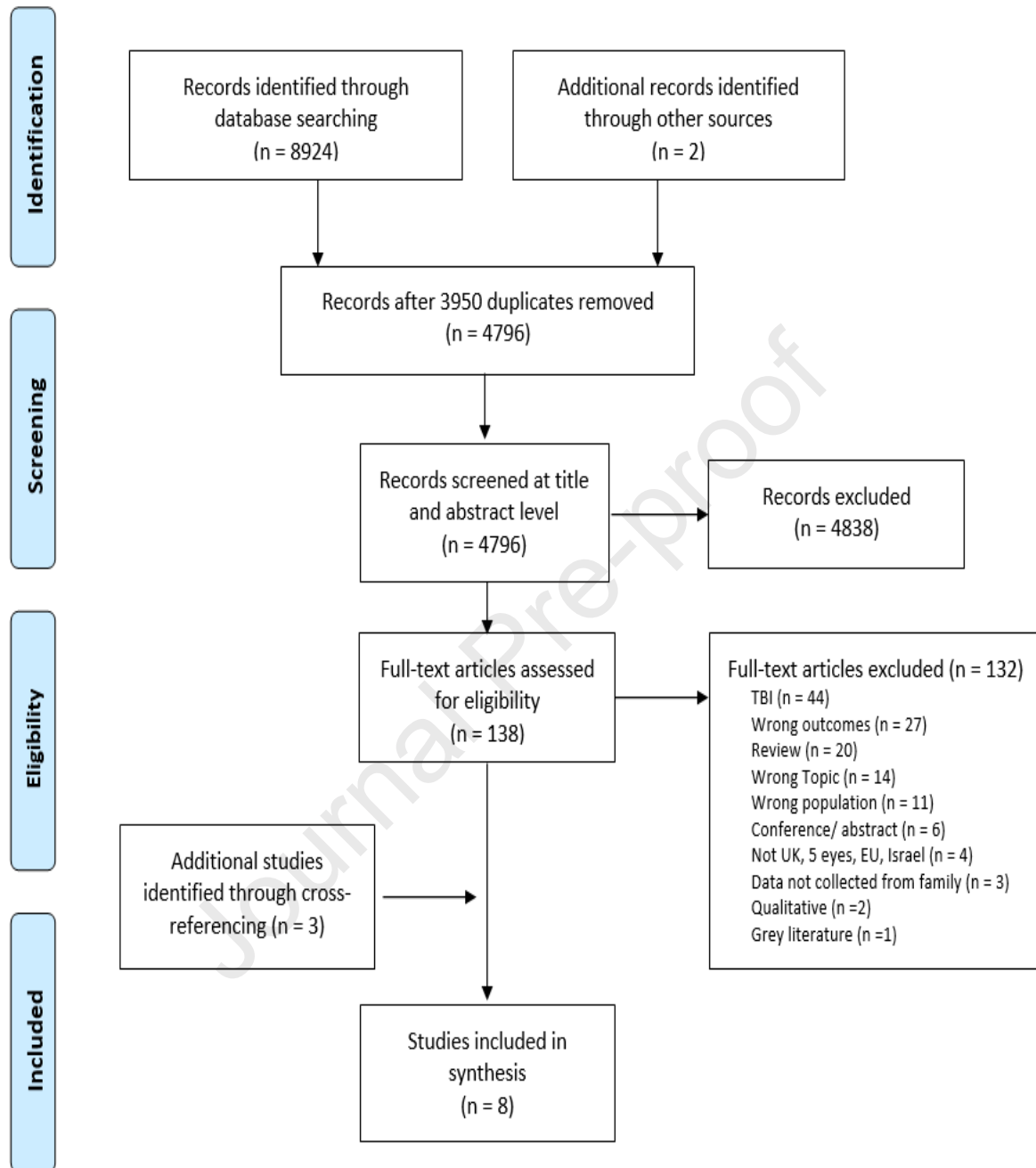
				<p>Significant increase in no. of days taking sleep medication for adolescents after parent experienced battle-injury.</p> <p>Use of sleep medication significantly increased post-parental injury but no change in no. of sleep medication days. No association between type of parental injury and sleep medication use.</p>	
<p>Hisle-Gorman, 2015⁴² (US)</p>	<p>Retrospective cohort</p>	<p>Children aged 3-8yrs of parent with combat injury enrolled in MHS in fiscal years 2006-2007</p>	<p>Parental injury identified from TRICARE database of mental & physical injuries associated with combat in Iraq/Afghanistan, (e.g., fractures, PTSD, traumatic brain injury, battle injuries, shrapnel injury, amputations, and mental health)</p>	<p>Post-deployment visits significantly higher among children of deployed/injured parents compared to children whose parents did not deploy. No difference by type of injury (psychiatric vs physical or by total number of injuries).</p> <p>Outpatient mental/behavioural health care visit significantly higher in children with deployed/injured parents. Post-deployment health care use higher in children of older, unmarried, and junior enlisted parents, and male children.</p> <p>Significantly higher visits for mental health, injury, and child maltreatment compared to children of deployed parents.</p> <p>Children of combat-injured parents had more care for mental health screening, adjustment disorder, anxiety, ADHD, developmental conditions, mood disorders compared to children whose parents did not deploy.</p> <p>Mental health care use by children of injured service members not affected by type of injury or total number of injuries sustained.</p> <p>Children of combat-injured parents had higher rates of injury visits (fractures, open wounds, crushing, intracranial injuries) - no difference by type or number of injuries sustained by parent.</p>	<p>Fair (4)</p>

Hisle-Gorman, 2019 ⁴³ (US)	Case Series Study	Children aged 2-16yrs at time of parent's injury	Parental injury identified through TRICARE database on injuries that could be obtained from combat in Iraq /Afghanistan.	<p>Compared to prior to parental injury, post-injury preventive care visits for children decreased by 21% among children of parents with physical injury.</p> <p>Compared to prior to parental injury, child injury visits, mental health care visits, and psychiatric medication days significantly increased. Maltreatment visits increased by 41%. Mental health care visits and psychiatric medication prescription days increased with male sex and child age.</p> <p>Mental health visits for children increased by 58% for children of physically injured parents compared to 40% for children of parents with TBI.</p> <p>Child injury among children of physically injured parents increased by 6%, preventative health by 21%, and psychiatric medication prescription days by 23% compared to other injury types. There was no significant increase in visits for child maltreatment in children of physically injured parents.</p> <p>Psychiatric medication days increased decreased with years of parental deployment.</p>	Fair (4)
Cozza, 2010 ⁴⁴ (US)	Cross-sectional clinical interview	Spouses; 63% married 5yrs or less	Multi-trauma (78%), amputation (32%), TBI (24%). Most described as moderate to severe (92.5%)	63% spouses experienced high deployment-related family distress, 48% reported high family disruption, 44% perceived injuries as very serious, and 68% reported high child distress prior to combat injury. No significant associations found with demographics (parent age, number of years married, and no. children).	Poor (2)

Spouses reporting high preinjury deployment-related family distress significantly more likely to report high child distress postinjury and those with high family disruption

Journal Pre-proof

Figure 1: Flow diagram of the search process: screened and excluded articles.



11 May 2021

Dear Editors of Disability Health Journal,

I, [Anna Verey], verify that I am aware of being acknowledged in the paper titled " The mental health and well-being among partners and children of military personnel and veterans with a combat-related physical injury: a scoping review of the quantitative research " by Noa Solomon et al, which has been submitted for publication in the journal Disability Health Journal. I do permit this acknowledgment.

Sincerely,

[*Anna Verey*]

Anna Verey