Published in final edited form as:

Health Care Women Int. 2016 ; 37(1): 45–74. doi:10.1080/07399332.2015.1005307.

Mental Health in Women With Traumatic Brain Injury: A Systematic Review on Depression and Hope

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Abstract

The prevalence of traumatic brain injury (TBI) in women has recently increased from 25% to 40%. Current literature inadequately captures challenges women face after injury, including depression. The limited focus on depression is problematic as rates of depression are increasing simultaneously with rates of TBI. A disabling symptom of depression is lack of hope; thus, depression, comorbid with TBI, leads to disability among women. Unfortunately, depression and hope among women with TBI has yet to be systematically examined. The purpose of this systematic review is to examine and synthesize current literature focusing on women with TBI, comorbid with depression, and hope.

A traumatic brain injury (TBI) is defined as “an alteration in brain function, or other evidence of brain pathology, caused by an external force” (Brain Injury Association of America [BIAA], 2012). The most common causes are falls, followed by motor vehicle accidents, struck by/against events, and assaults (Rutland-Brown, Langlois, Thomas, & Xi, 2006). A TBI produces a diminished or altered state of consciousness, resulting in impairment of cognitive capabilities or physical function, along with disturbances in behavioral or emotional functioning (BIAA, 2012). A TBI can be classified as mild, moderate, or severe, with 75% of the cases classified as mild (Rao et al., 2010). As a result, impairments can be temporary or permanent, causing partial or total functional impairment, psychosocial maladjustment, or both (BIAA, 2012).

TBI is becoming increasingly prevalent, as each year 10 million or more people sustain a TBI worldwide. In addition, TBI affects people of all ages, races, and sexes (Hyder, Wunderlich, Puvanachandra, Gururaj, & Kobusingye, 2007). Annually in the United States, TBI affects more than 1.7 million people, of which more than two-thirds are male (Rutland-Brown et al., 2006). However, the number of women with TBI is growing. In fact, the prevalence of TBI in women has risen from 25% to 40% of all people with TBI over the last 10 years (Centers for Disease Control and Prevention, 2014). As the prevalence of TBI continues to increase, so do associated costs. Each year in the United States, about \$76.5 billion is spent on TBI treatment, rehabilitation, and lost productivity caused by the injury (Finkelstein, Corso, & Miller, 2006).

Additionally, women are more likely to have a poorer outcome after TBI compared with men, (Ng, Lee, Lim, Wong, & Yan, 2006), evidenced by the finding that women have worse outcomes on 85% of variables tested (Farace & Alves, 2000). In particular, women with TBI, compared with men, report more headaches and dizziness (Farace & Alves, 2000), as well as loss of confidence, lack of initiative, perceived need for supervision, and problems setting realistic goals (Colantonio, Harris, Ratcliff, Chase, & Ellis, 2010). On average, compared with men, women frequently report more symptoms of depression and perceived stress after TBI (Bay, Sikorskii, & Saint-Arnault, 2009), and higher rates of anxiety (Liossi & Wood, 2009). These findings suggest that women with TBI have a different experience after injury compared with men.

Given the increasing rates of TBI among women, women's worse outcomes after TBI compared with men, and the fact that women are reporting more symptoms of depression, examining this comorbidity is critical. In addition, given that lack of hope is a symptom of depression and is also one of the emotional challenges experienced among women with TBI, it is imperative that depression and hope are studied. New knowledge on depression and hope as it relates to women with TBI has the potential to improve care provided to women around the world, which can aid in improving health outcomes for this group. To this end, the purpose of this review is to examine and synthesize the current literature that addresses mental health in women with TBI, comorbid with depression, and hope.

METHODS

Study Design

This systematic review was conducted following the "Guidance for Undertaking Reviews in Health Care," put forth by the Centre for Review and Dissemination (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were used to guide reporting of the findings (Centre for Review and Dissemination, 2009). The PRISMA flow diagram is shown in Figure 1 (Moher, Liberati, Tetzlaff, & Altman, 2009).

Literature Search Methods

This systematic review was conducted during 2013–2014. The studies reviewed were located through PubMed, CINAHL Plus, and PsycInfo, using the following keywords and phrases: (a) "traumatic brain injury OR brain injury OR TBI" AND "women"; (b) "traumatic brain injury OR brain injury OR TBI" AND "depression"; (c) "traumatic brain injury OR brain injury OR TBI" and "hope"; and (d) "traumatic brain injury OR brain injury OR TBI" AND "depression" AND "hope." All searches were restricted by period of publication (2002–2014), type of journal (academic), language (English), research subject (human), and age (18 years or older). Studies that met the inclusion criteria, where applicable, were included in this review. The reference list of each study that met inclusion criteria was examined for citations that were relevant and that met inclusion criteria.

Quantitative and qualitative studies were included to capture the breadth of knowledge on women with TBI. Combining literature from both quantitative and qualitative approaches allowed for a comprehensive examination of gaps in the literature and identification of areas

for future research. Because much of the literature on persons with TBI is sparse, particularly for women, and because studies on this population are fragmented, separate inclusion criteria (discussed below) were determined for each area of focus. The specific areas of focus include the following: (a) mental health in women with TBI; (b) sex-based differences in depression and TBI; (c) hope and TBI; and (d) depression, hope, and TBI.

Inclusion/Exclusion Criteria

The inclusion criteria for the four focus areas were the following: (a) studies published between 2002 and 2014 and (b) studies that had all keywords in the title or abstract, based on focus area. The time frame 2002–2014 was chosen to incorporate studies that were conducted after a systematic review on women with TBI, which was published in 2001 (Bell & Pepping, 2001). The focus area “mental health in women with TBI” had additional inclusion criteria, including having a sample of only women with TBI, and a topic that focused on mental health issues after TBI. Studies on depression also had narrowed inclusion criteria, including only on studies that discussed sex-based differences in depression for persons with TBI. Only studies focusing on individuals with TBI were included in this review.

Articles were excluded that did not separate the analysis by sex (depression focus area only). Articles focusing on adolescent populations or acquired brain injury were also excluded due to differences in outcomes after TBI. In addition, articles were excluded if they were (conference) abstracts, case studies, supplements, letters, editorials, books, reviews, or meta-analyses.

Quality Assessment

Both authors assessed the methodological quality of each of the 12 studies included in this review. The studies were analyzed to determine adequacy of research methods, reliability and validity of measures, and findings relevant to women with TBI. After assessing the studies independently, the authors discussed and compared assessments. Author agreement was approximately 93%. When disagreement occurred, authors reached consensus through discussion. All studies were assessed with the QualSyst tool for evaluating quantitative or qualitative studies, which contains individual, validated checklists for quantitative and qualitative studies (Kmet, Lee, & Cook, 2004). Standard psychometric information has yet to be established for the QualSyst tool (Kmet et al., 2004). The QualSyst tool for quantitative studies has 14 items, which were scored from 0 (*no*) to 2 (*yes*), or “not applicable.” Kmet et al. (2004) advise to exclude all items that are rated “not applicable” from the total score. A maximum total score of 28 is possible. We obtained the summary score for each quantitative study by first adding the total score across all applicable items and then dividing by the total possible score, with “not applicable items” excluded (e.g., $28 - (\text{number of “not applicable”} \times 2)$). The same procedure was used to calculate summary scores for all studies evaluated with the QualSyst tool for qualitative studies. The qualitative studies checklist, however, consisted of 10 items with scores from 0 to 2. The maximum score possible for qualitative studies was 20. After using the QualSyst checklist, a total and summary score were given to each study (see Table 1). Studies that did not meet the

minimum threshold of 0.55 set for inclusion of studies in this systematic review were excluded (Kmet et al., 2004).

Data Extraction

All articles that met inclusion criteria were read and coded deductively for the stated: (a) author(s); (b) year; (c) country; (d) study purpose; (e) sample characteristics; (f) design; (g) concepts or variables of study; (h) concepts or variables relevant to this review; (i) measures; (j) major findings; and (k) findings relevant to this review. The first author entered all articles into a table to allow for comparison across articles. Articles were organized by major concepts, allowing authors to compare and contrast findings across studies (see Table 3).

RESULTS

Search Outcome

The initial search identified 1,005 studies. The selection of studies is described in Figure 1. All studies were imported into an electronic citation manager, and 303 duplicates were removed. The first author independently screened the 702 remaining studies on title and abstract using the above criteria for eligibility. Twenty-eight studies were reviewed in full. Sixteen studies did not meet the minimum threshold for inclusion and were excluded from the review (Kmet et al., 2004). Ultimately, 12 studies were included in the review that focused on one or more aspects of the four focus areas. These studies were categorized by focus on four topics of interest: (a) mental health in women with TBI, $n = 4$; (b) sex-based differences in depression and TBI, $n = 3$; (c) hope and TBI, $n = 3$; and (d) depression, hope, and TBI, $n = 2$. The chosen studies varied by design, methodology, population, aims, and findings. Tables 3–6 provide a brief overview of the studies and important components, organized by focus area.

Overview of Studies

Of the 12 studies included in this review, two were qualitative studies (Antelius, 2007; Howes, Benton, & Edwards, 2005); two were mixed methods studies (only qualitative findings reported; Alston, Jones, & Curtin, 2012; Chamberlain, 2006); and the remaining eight were quantitative studies (Bay et al., 2009; Chase et al., 2012; Colantonio, Mar, et al., 2010; Hart et al., 2011; Peleg, Barak, Harel, Rochberg, & Hoofien, 2009; Strom & Kosciulek, 2007; Van der Horn, Spikman, Jacobs, & van der Naalt, 2013; Wilbur & Parente, 2008); The qualitative studies used various methods, including open coding (Alston et al., 2012); content analysis (Chamberlain, 2006); and interpretive phenomenology (Howes et al., 2005). The majority of quantitative studies used self-reported questionnaires.

All studies focused on persons with TBI after discharge from the hospital. Time since injury varied from less than or equal to 6 months (Bay et al., 2009) to 16 or more years (Chase et al., 2012). The sample size varied from six participants with TBI (Howes et al., 2005) to 1,570 participants with TBI (Hart et al., 2011). There was a large amount of variability in data collection time points, including multiple time points that were unspecified, 6 months or more postinjury (Howes et al., 2005; van der Horn et al., 2013), and 12 or more months postinjury (Hart et al., 2011). Finally, studies were conducted in various countries around the

world, including five in the United States (Bay et al., 2009; Chase et al., 2012; Hart et al., 2011; Strom & Kosciulek, 2007; Wilbur & Parente, 2008); two in Australia (Alston et al., 2012; Chamberlain, 2006); one in Canada (Colantonio, Mar, et al., 2010); one in Wales (Howes et al., 2005); one in the Netherlands (van der Horn et al., 2013); one in Sweden (Antelius, 2007); and one in Israel (Peleg et al., 2009).

Detailed Results

Mental health in women with TBI—The four studies presented in this section provide a basis for the research that has been done on mental health issues faced by women with TBI. These areas include adaptation issues and problems with social isolation and emotional functioning, including depression, as seen in Table 3. As few studies have been conducted on women with TBI (Colantonio, Harris, et al., 2010), only studies that focused solely on mental health in women with TBI were included in this section. In this section, sample size varied from 11 to 208 women with mild to severe TBI, aged 18 to 76 years.

Alston, Jones, and Curtin (2012) conducted a mixed methods study, with a qualitative portion that focused on the experience of women with TBI. In their original study, the authors did not aim to study sex-based differences, but the data showed evidence of sex-based differences in psychosocial experiences after TBI. The women in this study ($N = 11$) were 24 to 66 years of age, had various times since injury (less than 5 years to 10 or more years), and all lived in rural areas. The authors used an opening coding method to analyze the data, which was not well described. Findings showed that women with TBI face multiple challenges after injury, including an altered sense of self; issues with power, control, and isolation; and alteration in caring and gender roles. Women felt they must attempt to “pass as normal” due to fear of being stigmatized by others, which led to isolation and dependency on others. In addition, women felt they were vulnerable and that others were taking advantage of them, which stemmed from role changes that occurred after the TBI. Because some of the women had to depend on others, new power imbalances left them vulnerable to abuse and disempowerment (i.e., family and friends stealing money from them). This cycle of abuse made it hard for the women to trust other people and to trust their own judgment, furthering isolation. Finally, many of the women struggled to return to their preinjury roles. Although some physical and cognitive impairments were present, their role as a caretaker for others continued after the injury. Some women expressed a lack of care provision and assistance from family members, which was thought to be caused by scripted gender roles. Finally, some of the women had poor self-care and often had little or no assistance for themselves (Alston et al., 2012).

Howes, Benton, and Edwards (2005) explored adaptation issues after injury for women with TBI, showing the increased need of health care provider support for these women. The authors conducted an interpretive phenomenological study describing the experience of six women with acquired brain injury (all but one participant had TBI), aged 30–51 years. Each participant had a semistructured interview, with a second interview 1 year later. There were four themes: (a) awareness of change, (b) emotional reaction, (c) the struggle to make sense, and (d) adaptation and acceptance. Regarding “awareness to change,” the women perceived themselves differently postinjury compared with preinjury, and they struggled to understand

what the injury meant for them and what the consequences could be. The theme “emotional reaction” was characterized by intense emotions about the overwhelming changes in function; the women often felt anger directed in-ward and outward to caretakers or others nearby. The women also reported recurrent feelings of anxiety and depression, which the authors linked to multiple losses that occur after TBI. The theme “the struggle to make sense” depicted a paradigm shift; the women were no longer able to believe in a world that was just, and, at times, they felt vulnerable and insecure. The women often talked about uncertainty and safety. Finally, the theme “adaptation and acceptance” focused on the women adjusting to a new identity postinjury (Howes et al., 2005).

Because it is evident that women with TBI experience challenges with emotional functioning, Colantonio, Mar, et al. (2010) expanded on this topic by exploring several health outcomes, including depression. More specifically, Colantonio and colleagues (2010) conducted a retrospective, cohort study on women with moderate-to-severe TBI, investigating the long-term impact of several health outcomes (for example, menstrual functioning and fertility). Participants in this study were 5 to 12 years postinjury and aged 18 to 40 years. Compared with women without TBI ($N=104$), women with TBI ($N=104$) had a higher incidence of amenorrhea and postpregnancy difficulties. Of direct relevance to this review, compared with controls, more women with TBI were unmarried, unemployed, had more financial problems, and had less emotional support postinjury. The measure utilized that is most related to this review was the Medical Outcomes Short Form-36, which assessed perceived health and function and, more specifically, emotional well-being at the time of the screening. Upon identification of pregnancy difficulties after sustaining a TBI, authors asked participants to identify other challenges present from a list; depression was among the items listed. Of the 12 women with TBI who reported postpregnancy difficulties after TBI, five also reported depression (Colantonio, Mar, et al., 2010). However, authors failed to use a depression screening instrument to properly assess for the presence of depression. For women with TBI, accurate diagnosis of depression is important because treatment of depression is essential for proper rehabilitation and recovery.

Chase and colleagues (2012) conducted a retrospective cohort study with the purpose of investigating various health factors related to primary health care for women with TBI ($N=75$) compared with women in the general population in Pennsylvania (controls) ($N=3,559$). The participants in this study had a mean time postinjury of 16.4 years, mean age of 46.4 years (range 26 to 76), and a mean education of 12.8 years. An adapted version of the Behavioral Risk Factor Surveillance System (BRFSS) was used to collect data on the women with TBI and women in the general population. National general population data were used in comparison with women with TBI when Pennsylvania general population data were unavailable. Findings showed that women with TBI had a significantly higher prevalence of depression and lower mental health compared with controls. In addition, women with TBI were three times more likely to report problems with depressive symptoms compared with women in the general population. These findings point to the fact that mental health is a critical issue for women with TBI. The higher prevalence of depression in women with TBI compared with women in the general population emphasizes the need for mental health support for women with TBI (Chase et al., 2012).

The findings from this section suggest the following create difficulties for women with TBI: decreased mental health after injury, challenges with social isolation and emotional functioning, and increased rates of depression. Social isolation is of particular concern because it can occur as a consequence of poor emotional functioning, but it can also result when depression negatively affects emotional functioning (Mukherjee, Levin, & Heller, 2006). Given the challenges experienced by women with TBI, more research is needed to improve women's mental health after TBI. The following recommendations are made for future research: (a) further exploration of challenges women face after TBI at various time points in recovery; (b) use of rigorous design and methods, including use of comparison groups and appropriate screening instruments that provide valid and reliable diagnoses; and (c) investigation of whether current resources are adequate and appropriate for women.

Sex-based differences in depression and TBI—While it is apparent that some women with TBI experience depression, few scholars have considered sex-based differences in depression when studying persons with TBI. As many studies reflect outcomes of men with TBI (Mukherjee, Reis, & Heller, 2003), including treatments for depression, there is limited knowledge about how depression affects women with TBI. This lack of knowledge is a critical barrier to progress because there is missing information regarding the effectiveness of depression treatments based on sex. The following three studies, described in Table 4, present an overview of what is known about depression in persons with TBI, including a study that considers sex when describing findings, and two studies that consider sex-based differences in depression as their study purpose. In this section, the sample size varied from 159 to 1,570 men and women with minor-to-severe TBI, aged 16 to 65 years.

Although Hart et al. (2011) described findings with sex considerations, revealing that women with TBI had higher rates of major depression, their purpose did not include sex-based differences in the incidence of depression. Authors conducted a prospective, observational study of persons with TBI ($N = 1,570$) 1 year after sustaining a moderate-to-severe TBI. The variable of interest relevant to this review was depression (Patient Health Questionnaire-9). Authors state data were obtained through medical record review and telephone interviews with persons with TBI and their family, yet there was no explanation of recruitment strategies (Hart et al., 2011). Participants had a mean age of 39.9 years ($SD = 18.8$), were 27% women, 71.1% White, 16.2% Black, 8.9% Hispanic, and 3.8% Asian or other. In the sample, the rate of major depression was 26%; the rate of minor depression was 22%. Age was treated as a categorical variable, and age distribution was not reported (Hart et al., 2011). The term “younger” was not defined, but the authors said that increased prevalence of depression among younger participants was consistent with previous studies (Rapoport, McCullagh, Streiner, & Feinstein, 2003). Women were more likely than men to report previous mental health treatment but less likely to report substance abuse prior to injury (Hart et al., 2011). Women were also over-represented among those with major depression (Hart et al., 2011). Over-representation of women with major depression is consistent with estimates for the general population but not representative of persons with TBI (Blazer, Kessler, & McGonagle, 1994). While the authors' findings considered women with TBI, the aims of their study did not incorporate sex-based differences, limiting knowledge of sex-specific incidence of depression.

Whereas other studies (Hart et al., 2011) were able to distinguish sex-based differences regarding depression after statistical analysis, Bay et al. (2009) categorized samples and reported findings based on sex. The authors' aim was to examine the differences of postinjury depressive symptoms between men and women with mild-to-moderate TBI. The authors conducted a secondary analysis of two cross-sectional studies conducted 3 years apart ($N = 159$; men = 82, women = 77). Because participants from each study might have been different on relevant variables, this may limit internal validity. Participants were 18 to 60 years old, sustained a mild or moderate TBI in the last 3 years, and were hospitalized at the time of injury. Variables included depressive symptoms (Center for Epidemiological Studies-Depression [CES-D]), perceived stress, present pain level and descriptors of intensity, and post-TBI symptoms. However, the CES-D (Radloff, 1977), a self-report scale developed to assess depression in the general population, was not designed for use with persons with TBI (Agency for Healthcare Research and Quality, 2011). All participants recruited were referred to specialized treatment centers. The referral alone may imply these individuals needed additional assistance in the rehabilitation process, which may limit external validity. Findings showed that women had significantly higher levels of depressive symptoms, perceived stress, and brain injury symptoms compared with men (Bay et al., 2009). Finally, when controlling for significant preinjury variables, women reported greater chronic perceived stress, pain, and cognitive symptoms (Bay et al., 2009). These findings emphasize that sex-based differences in depression and related symptoms after injury are present after TBI.

The consequences of depression in persons with TBI can be seen in poor long-term outcomes, especially return to work. Van der Horn and colleagues (2013) investigated the relationship between postconcussive complaints, anxiety, depression, and vocational outcomes (return to work) in men and women after minor or moderate-to-severe TBI. This prospective, cross-sectional, cohort study included 242 participants. Minor and moderate-to-severe TBI were dichotomized. The average age was 39.2 years (range 16–65), and 27% of participants were women. Participants completed a 19-symptom checklist, a measure developed by the authors that was not tested for reliability and validity, along with the Hospital Anxiety and Depression Scale. Data from these measures were analyzed with participant computed tomography (CT) scans that were obtained upon admission, as well as participant outcomes assessed by a trauma neurologist. In the sample, 18% of participants had depression. More women also reported postconcussive complaints than men (80% vs. 62%, respectively). Only 51% of women completely returned to work compared with 66% of men. Impaired vocational outcome was associated with emotional distress. The female sex was found to be a disadvantageous prognostic factor for return to work.

Findings from our review of the literature on this section have shown that depression can have significant consequences, including challenges with aggression and anxiety, poorer recovery, and increased health care costs (Bombardier et al., 2010). As women with and without TBI are already disproportionately affected by depression, these consequences can play a role in sex-based health disparities after TBI (Farace & Alves, 2000; Slewa-Younan, Van Den Berg, Baguley, Nott, & Cameron, 2008). Thus, it is important to learn more about how depression affects women with TBI, including the following recommendations: (a) investigating the predictors, incidence, onset, and severity of depression for women with

TBI, including use of a prospective, longitudinal design and comparison groups; (b) determining the patterns of relationships over time among sex, depression, and related symptoms after injury for women; (c) categorizing samples based on sex and reporting sex-based findings; (d) determining if current depression screening instruments adequately capture the construct of depression for this population (Agency for Healthcare Research and Quality, 2011); (e) using or developing and testing depression measures that are informed by the experience of persons with TBI (Agency for Healthcare Research and Quality, 2011); and (f) determining if current depression treatments and interventions are effective for women with TBI.

Hope and TBI—Although more women are affected by depression, and lack of hope is associated with the depression (Chang & DeSimone, 2001), few scholars have studied hope in the rehabilitation and recovery process for persons with TBI, and none have explored hope in women with TBI. Some scholars have discussed hope in persons with TBI by briefly mentioning hope as a piece of their findings; a focus on hope was not the main purpose of these studies. In addition, the studies located on hope and TBI did not address hope in women with TBI. While the compilation of the three studies in this section provide insight for future research, which includes two studies with a main focus on hope and one that briefly mentions hope in their findings, none of these studies includes a focus on women with TBI, as seen in Table 5. The studies in this section have various sample sizes (14 to 75 participants) and include men and women with mild-to-severe TBI, aged 18 to 81 years.

Antelius (2007) conducted a study that incorporated a large component on hope, revealing that hope is essential to the rehabilitation and recovery process for persons with TBI. Antelius explored narratives of hope and foreclosure in persons with TBI ($N = 75$) in a clinical setting in four day centers in Sweden. A description of participants was not included. In this qualitative study using narrative analysis, the researcher describes that for persons with TBI, hope is contingent on aspects of recovery. The author notes that hope relates to the future, because “hope is an opening of time—an opening that holds a distant horizon of impressionable possibilities” (Antelius, 2007, p. 325). Findings revealed the distant horizon of hope was not as open as was previously believed; the “distant horizon of impressionable possibilities” was actually fragile or fixed, yet participants were still hopeful (Antelius, 2007). While going through rehabilitation and recovery, participants also had continuous negotiation between two possible futures: hope and foreclosure. The future of hope entailed hoping for recovery. Foreclosure signified a future with an “air of finality” (Freeman, 2000), due to understanding recovery outcomes as inescapable.

Because it is clear that hope is essential to the rehabilitation and recovery process after TBI, a study conducted by Wilbur and Parente (2008) provided pertinent knowledge on how health care providers can maintain and increase levels of hope for persons with TBI. Authors applied a theory of hope to develop a cognitive therapy used to train hope in persons with TBI. In the sample of 14 participants (7 women, 7 men), all participants took part in a 6-week group treatment for hope training. No control group was used. The authors did not provide any information on design or participant recruitment. The group was led by a group leader and met once a week for approximately 3 hours. Participants completed 14 lessons, which included engaging in discussions and receiving a personalized lifestyle change plan

related to eating, exercising, and sleeping. The Domain Specific Hope Scale was administered pre- and post-intervention. Findings showed that four areas of life were significantly improved by the intervention: (a) social relationships, (b) romantic relationships, (c) work, and (d) leisure activities. Authors also stated that results show this hope training therapy affects the person's ability to envision options, followed by the ability to implement them (Wilbur & Parente, 2008). While findings are promising for hope training in persons with TBI, longitudinal intervention research is needed to determine maintenance of improvements in hope over time, as well as determination of any sex-based differences in hope after TBI.

Although hope was not the focus of the study, Chamberlain (2006) discussed hope in the findings of her mixed methods study on the experience of surviving TBI. For the qualitative portion, the author used content analysis, a qualitative research method, to investigate the experience of the self within survival and recovery after TBI. Another aim of the study was to investigate the meaning of the experience of surviving TBI, all from the perspective of survivors (Chamberlain, 2006). The sample included 59 participants, who were 33% women, had a median age of 59 years, and had varying severities of TBI. All participants were recruited from one intensive care unit (ICU), which limits generalizability. Unstructured interviews were conducted 1 year after the participant sustained a TBI, two times a month for 12 months. The author also stated that interview bias may be present due to rapport developed with participants over multiple interviews. While four major themes were found in this study, the two themes of relevance to this review were "insensitivity of health professionals" (Chamberlain, 2006, p. 412) and "the recovering self" (Chamberlain, 2006, p. 413). The theme "insensitivity of health professionals" was characterized by participants feeling that health care providers lacked empathy for challenges that they faced post-TBI. In addition, participants looked to health care providers for validation of the things they were feeling. When health care providers did not provide this validation, it damaged the participants' hope and quest for recovery. Participants expressed that sometimes hope was all they had, and this hope was diminished by health care providers' insensitivity. In addition, within the theme "the recovering self," participants expressed that having hope was essential for recovery. Participants who were dependent on caregivers also expressed that caregivers could also facilitate hope for recovery.

The degree of hope is an important component of depression, and the studies focusing on hope and TBI in this section emphasized the fact that hope is essential to the rehabilitation and recovery process. However, few studies have included hope in the discussion of their findings, and even less have included hope as a variable in the study. As hope is an important factor after TBI, future research should focus on how hope influences the lives of women with TBI by the following means: (a) exploring the influence of hope on the rehabilitation and recovery process with use of rigorous design and methods; (b) determining the effectiveness of current hope interventions for women with TBI; (c) developing and testing effective interventions to maintain levels of hope, increase levels of hope, or both, in women with TBI, including use of longitudinal design and comparison groups; and (d) determining any sex-based differences in hope after TBI.

Depression, hope, and TBI—While depression and hope can have a significant impact on the lives of women with TBI, only individual studies exist on depression and TBI and on hope and TBI, and no studies have simultaneously explored both depression and hope in women with TBI. The two studies included in this section provide a foundation for the relationship between hope and depression in persons with TBI (Table 6). These studies have varying sample sizes (65 to 94 participants) and include men and women with mild-to-severe TBI, aged 18 to 74 years.

Although sex was not considered, one study focused on the extent to which hope was a predictor of the severity of depression (using the Beck Depression Inventory; Peleg et al., 2009). Peleg et al. (2009) examined hope, operationalized as a coping variable (Adult Hope Scale), and dispositional optimism (Life Orientation Test-Revised) in persons with mild-to-severe TBI ($N = 65$, age 18–55 years) who were on average 2.9 years postinjury and were involved in a rehabilitation program. Only 27.7% of the sample were women. In describing their sample, authors compared levels of hope and depression in their sample to a sample of the general population; 3 years postinjury, hope was significantly lower [$t(64) = -4.0$, $p = .000$] and depression was significantly higher [$t(64) = 9.1$, $p = .000$] in sampled persons with TBI compared with healthy adults. Consistent with other studies of persons with TBI, the incidence of depression was 45%, and the degree of hope was significantly lower than norms in the general population (Jorge et al., 2004; Snyder et al., 1991). Results showed that hope and dispositional optimism predicted depression severity and had a positive, moderate correlation with each other. Hope negatively correlated with depression due to hope pathways, which is a strategy that involves coping in a goal-oriented manner. Hope was a stronger predictor of depression severity than dispositional optimism. In a previous study, hope had a direct effect on depression ($\beta = -.23$), and also it indirectly influenced depression ($N = 341$, $p < .001$) through coping style ($\beta = .31$) and appraisals of control ($\beta = -.40$; Chang & DeSimone, 2001). Because all measures utilized were developed for persons other than those with TBI, authors may not have accurately captured necessary constructs relevant to this population. While these findings reveal the important relationship between hope and depression in persons with TBI, no sex-based differences in this relationship were determined.

Although sex-based differences were not discussed, a second study was located that focused on the relationship between dispositional hope and depression in persons with TBI. Strom and Kosciulek (2007) conducted a study to test a portion of the stress, appraisal, and coping model and its application after mild TBI. The sample consisted of 94 participants with mild TBI, with a mean age of 43.91 years (range 18 to 74). Approximately 62% of the sample were women. The average time since injury was 48.8 months. Data were collected using two strategies: phone interviews ($n = 60$) and paper-and-pencil surveys ($n = 34$). Participants completed multiple measures: (a) stressors (Perceived Stress Scale), (b) appraisal (Hope Scale), (c) coping (Problem Solving Inventory), (d) stress response (Beck Depression Inventory-II), and (e) adjustment (Community Integration Questionnaire and Satisfaction with Life Scale). Although authors chose these measures, there are multiple ways to conceptualize components of this model. Path analysis was used to test the hypothesized model. The initial model did not fit the data. After modification, findings showed that the

model had a significant relationship among perceived stress, depression, and hope. This was evidenced by higher levels of perceived stress predicting increased reporting of depressive symptoms. In addition, higher levels of depression predicted lower levels of dispositional hope. Finally, dispositional hope positively predicted both life satisfaction and work productivity. Although findings were not analyzed by sex, findings have direct relation to women with TBI.

The findings from studies on depression and hope in this section show that both depression and hope are directly and indirectly associated. Depression and the degree of hope can significantly influence the rehabilitation and recovery process after TBI. Recommendations for future research follow: (a) understanding how depression and hope influence the rehabilitation and recovery process based on sex; and (b) using rigorous designs, such as a prospective, longitudinal design, use of a comparison group, and use of only one data collection strategy per study to prevent bias.

DISCUSSION

In this systematic review, we provided a synthesis of four focus areas: (a) mental health in women with TBI; (b) sex-based differences in depression and TBI; (c) hope and TBI; and (d) depression, hope, and TBI. Based on the results of this review, we found two overarching themes throughout the literature: (a) women with TBI frequently face mental health issues and (b) lack of literature addressing mental health issues in women with TBI.

Of the overarching themes, the theme “women with TBI frequently face mental health issues” was readily apparent in multiple studies (Alston et al., 2012; Chase et al., 2012; Colantonio, Mar, et al., 2010; Howes et al., 2005). While the causes, types, and severities of mental health issues in women with TBI varied, the frequent presence of mental health issues in women after TBI was apparent and concerning. The results of this systematic review support previous literature that shows that depression is one of the most common mental health issues in persons with TBI (Bombardier et al., 2010), particularly women (Bay et al., 2009; Hart et al., 2011). Researchers have estimated that between 10% and 77% of persons with TBI are depressed (Bay et al., 2009). Unfortunately, no statistics could be located on the rate of depression in women with TBI, which is a critical gap in knowledge. Research has shown, however, that TBI, comorbid with depression, increases risks for poor recovery (Rao et al., 2010).

Sex, in particular being female, has been identified as a risk factor for depression among persons with TBI (Whelan-Goodinson, Ponsford, Schönberger, & Johnston, 2010). Higher rates of depression also occur in women in the general population compared with men (Kessler, 2003). Depression is one of the most common psychiatric conditions in people with TBI, associated with decreased cognitive function, challenges with aggression and anxiety, increased functional impairment, poorer recovery, and increased health care costs (Bombardier et al., 2010). Depression causes similar consequences in women without TBI in the general population (Kessler, 2003; Nolen-Hoeksema, 1991). Untreated chronic depression can have severe effects on the quality of life for people with TBI (Hart et al., 2011). While significant problems with mental health are present for both men and women

following TBI, including a high prevalence of depression, depression appears to be a more critical issue for women.

Regardless of injury, depression disproportionately affects all women with and without impairments compared with men, particularly because of differences in gender roles (Kessler, 2003; Radloff, 1975). Many of the roles of women differ from those of men, including marital, occupational, parenting, and household roles (Kandel, Davies, & Raveis, 1985). In addition, women often balance child-rearing responsibilities, educational pursuits, and self-care (Venkatesh, 1980). Women frequently hold multiple roles at once, and the attempt to balance some or all of these roles can cause higher levels of stress and lower levels of fulfillment compared with men (Kessler, 2003; Radloff, 1975). Two of these roles, specifically being married and being employed, increase risk factors for depression (Kessler, 2003; Radloff, 1975).

Despite long-term cognitive and physical impairments caused by TBI (BIAA, 2012), many women still attempt to return to preinjury roles (Howes et al., 2005), including some of those mentioned above. Women struggle to return to preinjury roles after TBI, reporting having problems returning to work (Corrigan et al., 2007; Isaki & Turkstra, 2000), school (Gerberich et al., 1997), and parenting (Van Vliet-Ruissen, McKinlay, & Taylor, 2014). The struggle to return to preinjury roles after TBI alone may be a cause for depression for women.

Women's challenges with depression are evidenced by higher rates of reporting depressive symptomology compared with men after TBI (Bay et al., 2009; Whelan-Goodinson et al., 2010). Major depression within the first year after TBI is associated with increased problems with mobility, usual activities, and role functioning, as well as poorer self-reported health (Bombardier et al., 2010). Women's higher prevalence of depression following TBI may put them at increased risk for poorer health outcomes (Bay et al., 2009; Hart et al., 2011). Even more concerning is that women's higher rates of depression are compounded by the finding that women are already at a disadvantage due to having overall poorer health outcomes after TBI compared with men (Farace & Alves, 2000; Ng et al., 2006; Slewa-Younan et al., 2008).

The health disparities faced by women with TBI are of particular importance because they may influence long-term health outcomes. The combination of the two findings, women's worse outcomes after TBI and women's higher rates of depression after TBI, may cause a marked difference in health outcome after TBI for women compared with men. Thus, it is essential that research be conducted to learn more about mental health issues faced by women with TBI, with the goal of developing more tailored sex-specific interventions to help improve women's health outcomes.

The second overarching theme, "lack of literature addressing mental health issues in women with TBI" was evidenced because few studies could be located on various mental health issues in women with TBI. Of these seven studies on mental health issues included in the review, only three focused specifically on depression, even though it is one of the most common mental health issues faced by women with TBI. No studies, however, discussed what is being done to address this problem in women with TBI. Women with TBI have a

higher prevalence of depression, and one of depression's classic symptoms, lack of hope, has yet to be systematically examined in women with TBI. This lack of research on mental health issues in women with TBI is problematic because it increases the risk of impairment among this group.

Strengths and Limitations

This review used strict guidelines for the search strategy, selection procedures, and critical assessment of all studies included. Relevant databases were used. Two reviewers conducted the critical appraisal procedures independently, resulting in a synthesis of the literature on women with TBI, depression, and hope. This review reflects critical challenges faced by women with TBI, including depression and hope. However, some limitations should be considered when interpreting the results.

First, selection bias is possible because of the timeframe chosen (2002–2014) and inclusion of only studies published in English. Second, measurement bias may be present in this review because both quantitative and qualitative studies were included and because there is large variation in sample size, time since injury, injury severity, and measures utilized. Third, because the literature on women with TBI is sparse and segmented, multiple search terms were used to find relevant literature. Finally, the studies were conducted in seven different countries. As each country has a different health care system, findings may not be generalizable.

Implications for Future Research

In the results section of each of the four focus areas, authors proposed specific recommendations for future research. Based on the findings of this review, however, it is apparent that the overall theme of future research is a focus on understanding mental health issues for women with TBI. More knowledge is needed on how women with TBI experience mental health issues, particularly depression, as well as treatment of mental health issues. In addition, new knowledge is needed on how depression influences the rehabilitation and recovery process for women with TBI. Future research should include development and testing of interventions to treat women's mental health issues, which would provide women with TBI who face mental health issues with additional resources. With the use of rigorous design and methods, including use of appropriate screening tools, data collection strategies, and determination of sex-based differences in mental health issues, future research on women with TBI can help to shed light on prevention and treatment of mental health issues. In addition, findings from future research can provide researchers and health care providers with essential knowledge to enhance the TBI rehabilitation and recovery process for women.

CONCLUSION

For health care providers to have a better understanding of the needs of women with TBI postinjury, comprehensive research with appropriate design and methods is needed. This systematic review suggests that there are gaps in knowledge about women with TBI, relating to their experience with mental health issues, particularly depression and the degree of hope. To date, current studies examining mental health issues in women with TBI have been

inadequate, and no scholars have investigated how depression and hope influence the lives of women with TBI during the rehabilitation and recovery process. To improve women's health outcomes after TBI, it is necessary to conduct more research to determine if current resources, treatments, and interventions are effective for women.

Acknowledgments

We would like to thank Dr. Eileen Porter for her guidance and feedback and the University of Wisconsin-Madison School of Nursing faculty and staff.

FUNDING

This research was supported by NIH/NIGMS Initiative for Maximizing Student Development (PI, M. Carnes) Grant# R25GM083252.

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FIGURE 1.
Flow diagram.

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TABLE 1

Quality Assessment With QualSyst Tool (Quantitative Studies; Kmet et al., 2004)

Studies	Question	Quality assessment quantitative studies													
		Study design	Selection	Subject characteristics	Random allocation	Blinding investigators	Blinding subjects	Outcome	Sample size	Analytic methods	Estimate of variance	Confounding variables	Results	Conclusion	Summary score
Bay et al. (2009)	2	2	2	2	N/A	N/A	N/A	2	2	2	2	1	2	2	21/22=0.95
Chase et al. (2012)	2	2	2	2	N/A	N/A	N/A	2	2	2	2	1	2	2	19/22=0.86
Colantonio, Mar, et al. (2010)	2	2	2	2	N/A	N/A	N/A	1	2	2	2	1	2	2	18/22=0.81
Hart et al. (2011)	2	2	2	1	N/A	N/A	N/A	2	2	2	2	2	2	2	21/22=0.92
Peleg et al. (2009)	2	2	2	2	N/A	N/A	N/A	2	2	2	2	1	2	2	19/22=0.86
Strom et al. (2007)	2	2	2	2	N/A	N/A	N/A	1	2	2	2	1	2	2	18/22=0.81
Van der Horn et al. (2013)	2	2	1	2	N/A	N/A	N/A	2	2	2	2	1	2	2	18/22=0.81
Wilbur and Parente (2008)	2	1	2	1	N/A	N/A	N/A	2	2	2	2	1	2	2	17/22=0.77

Note. 2 = yes; 1= partial; 0 = no; N/A = not applicable.

TABLE 2

Quality Assessment With QualSyst Tool (Qualitative Studies; Kmet et al., 2004)

Studies	Question/Objective	Quality assessment qualitative studies									
		Study design	Context	Theoretical framework	Sample strategy	Data collection	Data analysis	Verification procedures	Conclusion	Reflexivity	Summary score
Alston et al. (2012)	2	2	2	2	2	2	0	0	2	1	15/20=0.75
Antelius (2007)	2	0	1	2	2	1	0	0	2	1	11/20=0.60
Chamberlain (2006)	2	2	2	2	2	2	0	0	2	1	15/20=0.75
Howes et al. (2005)	2	2	2	2	1	1	0	0	2	1	13/20=0.65

Note. 2 = yes; 1= partial; 0 = no.

TABLE 3

Data Extraction—Women With TBI

Author (Year), Country	Design	Sample characteristics	Data collection/analysis methods	Findings of relevance to this review
Howes et al. (2005), Wales	Interpretive Phenomenology, qualitative approach	<i>N</i> = 6 Age 30–51	Semistructured interviews 5 broad questions	Women in the sample had adaptation issues after injury. Themes included (a) awareness of change, (b) emotional reaction, (c) the struggle to make sense, and (d) adaptation and acceptance.
Chase et al. (2012), USA	Retrospective, cohort	<i>N</i> = 75 women with TBI; <i>N</i> = 3,559 women in general population (controls)	Phone interviews Adaptation of Behavioral Risk Factor Surveillance System (BRFSS)	Women with TBI had significantly lower mental health and a higher prevalence of depression than women in the general population. Women with TBI were also three times as likely to report having problems with depressive symptoms compared to the control group. There were higher rates of drinking in women with TBI than in women in the general population, which may lead to future injury.
Colantonio, Mar, et al. (2010), Canada	Retrospective, cohort	Total <i>N</i> = 208; Participants with TBI (<i>N</i> = 104); Participants without TBI (controls) (<i>N</i> = 104) Mean age women with TBI = 35.2 yrs (<i>SD</i> = 7.6) Mean age controls 35.4 yrs (<i>SD</i> = 8)	Women with TBI: Face-to-face interview Women without TBI: Phone Interview Medical Outcomes Short Form-36 Reproductive health (Questions developed by authors) Canadian Community Health Survey	More women who had had a TBI were unmarried, unemployed, had more financial problems, and had less emotional support post-injury compared to controls. Of the 12 women with TBI who reported post-pregnancy difficulties after TBI, 5 also reported depression.
Alston et al. (2012), Australia	Open coding, qualitative approach	<i>N</i> = 11 women with TBI Age 24–66 All lived in rural areas	Interviews	The three major themes expressed by women with TBI were: <ol style="list-style-type: none"> 1 Altered sense of self, body, image, and being able to “pass” as normal, where the women attempted to pass as normal to avoid stigmatization, isolated themselves, and became dependent on others; 2 Power, control, and social isolation, where women were disempowered, and, at times, vulnerable to abuse; and

Author (Year), Country	Design	Sample characteristics	Data collection/analysis methods	Findings of relevance to this review
				3 Caring and scripted gender roles, where the women retained preinjury caring duties and responsibilities despite cognitive and physical impairments caused by TBI.

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TABLE 4

Data Extraction—Sex-Based Differences in Depression and TBI

Author (Year), Country	Design	Sample characteristics	Data collection/analysis methods	Findings relevant to this review
Hart et al. (2011), USA	Observational, prospective, longitudinal	<i>N</i> = 1,570 Mean age 39.9 (<i>SD</i> = 18.8) 27% women (<i>n</i> = 424)	Participant/family interviews in-person or via telephone Psychosocial history Patient Health Questionnaire-9 Participant Assessment with Recombined Tools-Objective	The rate of major depression was 26%; the rate of minor depression was 22%. Women were more likely than men to report previous mental health treatment but less likely to report substance abuse prior to injury. Women were over-represented among those with major depression.
Bay et al. (2009), USA	Retrospective, cohort	<i>N</i> = 159 Study 1 Men: <i>n</i> = 39 (47.56%) Women: <i>n</i> = 36 (46.75%) Study 2 Men: <i>n</i> = 47 (57.32%) Women: <i>n</i> = 41 (53.25%) Overall Age Men <40: <i>n</i> = 47 (57.32%) 40+: <i>n</i> = 35 (42.68%) Women <40: <i>n</i> = 34 (44.16%) 40+: <i>n</i> = 43 (55.84%)	Chart Review Center for Epidemiological Studies-Depression Scale Perceived Stress Scale-14 McGill Pain Questionnaire Short Form Neurobehavioral Functioning Inventory	Women with mild-to-moderate TBI had significantly higher levels of depressive symptoms, perceived stress, and brain injury symptoms after injury compared to men with mild-to-moderate TBI. Women reported greater chronic perceived stress, pain, and cognitive symptoms, when controlling for significant pre-injury variables compared to men.
Van der Horn et al. (2013), Netherlands	Prospective, cross-sectional cohort	<i>N</i> = 242 27% Women Age 16 to 65 years (Mean age 39.2)	Outcomes assessed by a trauma neurologist CT obtained on admission Return to work assessed by interview Vocational outcome determined by interviewer 19 Symptom Checklist Hospital Anxiety and Depression Scale	Depression reported in 18% of sample 80% of women with TBI reported post-concussive complaints compared to 62% of men 51% of women had complete return to work compared to 66% of men

Author (Year), Country	Design	Sample characteristics	Data collection/analysis methods	Findings relevant to this review
				Women with minor TBI reported emotional distress and appeared to have work related problems The female sex is a disadvantageous prognostic factor for return to work

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TABLE 5

Data Extraction—Hope and TBI

Author (Year), Country	Design	Sample characteristics	Data collection/analysis methods	Findings relevant to this review
Antelius (2007), Sweden	Narrative analysis, qualitative approach	<i>N</i> = 75 persons with TBI Age 28 to 64	Interviews, participant observation, video recordings, and field notes	Hope lies on a distant horizon of impressionable possibilities that is fragile or fixed. Participants had continuous negotiation with two possible futures: hope and foreclosure.
Wilbur and Parente (2008), USA	Effectiveness study	<i>N</i> = 14 (7 women, 7 men) Mean age 27 (<i>SD</i> = 6 years) Ethnicity: 8 White, 6 Black All had <i>DSM-IV</i> diagnosis of cognitive disorder secondary to brain injury	Pre- and post-test Domain Specific Hope Scale	Of the 6 areas of life that were measured by the hope scale, the hope training intervention was found to significantly improve the following 4 domains: <ol style="list-style-type: none"> 1 Social Relationships, 2 Romantic Relationships, 3 Work, and 4 Leisure Activities Results showed treatment affects the person's ability to envision options and affects the person's ability to implement them.
Chamberlain (2006), Australia	Qualitative content analysis, qualitative approach	<i>N</i> = 59 33% Women All 1 year postinjury Median age = 35 (Range 18–81)	Unstructured interviews	Four major themes were found: <ol style="list-style-type: none"> 1 Regret and grief within the self, where participants mourned the loss of their jobs, friends, recognizable selves, and had overwhelming grief; 2 Insensitivity of health care providers: characterized by participants looking to health care providers for validation in the symptoms they were experiencing. Hope was diminished by health care providers when patients' symptoms

Author (Year), Country	Design	Sample characteristics	Data collection/analysis methods	Findings relevant to this review
				were not validated;
				3 Invisibility of self and “stranded self,” where participants faced difficulties on their own after discharge and
				4 The recovering self: characterized by participants attempting to return to preinjury selves, expressing a need to have hope for recovery, and sharing that caregivers helped to facilitate hope for recovery.

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TABLE 6

Data Extraction—Depression, Hope, and TBI

Author (Year), Country	Design	Sample characteristics	Data collection/analysis methods	Findings relevant to this review
Peleg et al. (2009), Israel	Descriptive, correlational	<i>N</i> = 65 72.3% Male Mean age = 28.8 years (<i>SD</i> = 9)	In-person questionnaire administration (examiner assistance to read questions if needed) Beck Depression Inventory-II Hope Scale Life Orientation Test Revised	In the describing the sample, hope was significantly lower and depression was significantly higher in persons with TBI compared with the general population. Incidence of depression was 45%. Hope and dispositional optimism predicted depression severity and had a positive, moderate correlation with each other. Hope negatively correlated with depression. Hope had a direct and indirect influence on depression. Hope was a stronger predictor of depression severity than dispositional optimism.
Strom and Kosciulek (2007), USA	Path analysis	<i>N</i> = 94 62% Women Mean age = 43.91 years (range 18 to 74) Average time since injury = 48.8 months	Two data collection techniques: 60 participants completed phone interviews 34 participants completed paper and pencil surveys Perceived Stress Scale Hope Scale Problem Solving Inventory Beck Depression Inventory-II Community Integration Questionnaire Satisfaction with Life Scale	Initially, the hypothesized model did not fit the data and was modified. Higher levels of perceived stress were predictive of increased report of symptoms of depression. Higher levels of depression were predictive of lower levels of dispositional hope. Dispositional hope positively predicted both life satisfaction and work productivity.