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Primary Care Physicians' Ability to Detect PTSD

John Michael Della Porta

Philadelphia College of Osteopathic Medicine, della.porta.jm@gmail.com

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Philadelphia College of Osteopathic Medicine

Department of Psychology

PRIMARY CARE PHYSICIANS' ABILITY TO DETECT PTSD

By John Michael Della Porta, M.S.

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Trust the process.

Abstract

Posttraumatic stress disorder (PTSD) is a complex condition that has many medical and mental health sequelae. Research has shown that PTSD patients are often not accurately identified, particularly in primary care settings. The result of this underdetection is that these patients often utilize more health care resources. This investigation sought to determine whether the complex nature of PTSD, particularly the frequent presence of comorbid physical symptoms that may overshadow PTSD, makes the disorder difficult to detect in primary care settings. Other factors that could contribute to this underdetection were also investigated. A two-group between-subjects design was utilized for this investigation, using a sample of 144 primary care physicians. Participants were randomly assigned to respond to two different vignettes to assess their ability to accurately diagnose PTSD in a straightforward (PTSD symptoms only) or a complex (PTSD symptoms and several other physical complaints) presentation. Primary care physicians overwhelmingly were able to accurately diagnose PTSD across both conditions. Furthermore, factors such as experience in the primary care and knowledge of PTSD did not significantly contribute to the ability to detect PTSD. These results suggest that primary care physicians are fully capable of accurately identifying PTSD when it presents, regardless of whether the presentation is straightforward or complex. However, limitations must be taken into consideration when interpreting the results, including lack of variance in detection rates. Future studies can apply this design to standardized or live patients to ascertain if the results generalize.

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Chapter 1: Introduction

Statement of the Problem

The lifetime risk of meeting the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*) criteria for posttraumatic stress disorder (PTSD) in the United States by the age of 75 is estimated to be approximately 8.7% (American Psychiatric Association [APA], 2013). Efforts to assess the prevalence of PTSD in primary care offices have generally found that approximately 9% to 11% of samples meet criteria for PTSD (Gillock, Zayfert, Hegel, & Ferguson, 2005). However, there appears to be variability in prevalence rates, depending on the population being assessed, as a recent systematic review of PTSD prevalence in primary care identified a range of 2.0% to 39.1% (Greene, Neria, & Gross, 2016). Samples in urban primary care settings have yielded PTSD prevalence rates of 22% to 33% of adults (Alim et al., 2006; Kartha et al., 2008; Liebschutz et al., 2007). In a study that identified a prevalence rate of 23% of adults who met criteria for PTSD, the researchers noted that only 11% of these individuals actually had a diagnosis of PTSD in their charts (Liebschutz et al., 2007). These results suggest there may be a large subset of individuals in primary care clinics with PTSD who are not being accurately diagnosed, such as patients residing in urban settings.

There is growing evidence that individuals affected by trauma utilize a higher number of health care resources than the general population (Deykin et al., 2001; Elhai, North, & Frueh, 2005). A study of individuals in an urban primary care setting found that patients with PTSD had significantly more hospitalizations and were much more likely to utilize mental health services than patients who were not diagnosed with PTSD

(Kartha et al., 2008). An earlier investigation into the relationship between levels of PTSD and health care service utilization found similar results, in that individuals with partial- and full-PTSD had more medical visits, more severe physical symptoms, and poorer health functioning in multiple domains over a 3-month period (Gillock et al., 2005). An investigation of women with differing levels of PTSD severity determined that those with higher levels of PTSD had annual health care costs twice as high as women with low PTSD scores (Walker et al., 2003). This may be explained in part by evidence suggesting that individuals with PTSD report more physical health conditions than individuals without PTSD (Lauterbach, Vora, & Rakow, 2005).

There is a significant population of individuals with PTSD who are utilizing more health care services than individuals without PTSD. However, there is a variety of empirically supported treatments that have been shown to effectively treat the condition, including prolonged exposure therapy (PE) and cognitive processing therapy (CPT) (Lenz, Bruijn, Serman, & Bailer, 2014; Powers, Halpern, Ferenschak, Gillihan, & Foa, 2010). Furthermore, there is recent evidence that shows these treatments may reduce not only PTSD symptoms, but health care costs as well (Tuerk et al., 2013). Specifically, there was a 30% reduction in the 12 months following treatment in veterans who received PE at an urban VA medical center in the 12-months following treatment. Those who completed the PE had a 45% reduction in mental health utilization. If individuals who would benefit from these treatments could be identified at an earlier stage of their entry into the health system, health care costs could be reduced by connecting these individuals with treatments that can address their PTSD symptoms. However, failure to detect PTSD in these individuals may result in costly and possibly unnecessary medical expenses.

Given the evidence of a potential gap or deficit in physician ability to detect PTSD in primary care settings (Liebschutz et al., 2007), physician knowledge about PTSD was assessed to determine its impact on ability to accurately diagnose the disorder. It is the goal of this investigation to shed light on factors that might lead to underdetection of PTSD. Such factors may contribute to the creation of incomplete illness scripts that fail to provide reliable templates for what constitutes PTSD. *Illness scripts* refers to the encapsulation of knowledge about specific conditions and disorders that allow physicians to narrow down potential diagnoses during patient encounters (Custers, 2015). The use of this mental shortcut seems to be an apt strategy for the time-limited nature of primary care, as prior studies have found that individuals under time pressure use a limited amount of available information when making decisions (Rothstein, 1986). Given the evidence that PTSD is at times undetected (e.g., Liebschutz et al., 2007), this study sought to assess whether physicians' knowledge of PTSD could potentially explain deficiencies in detecting the condition.

In addition to the ways physicians make diagnostic decisions in the primary care setting, there is also the matter of how much impact factors such as experience and knowledge of PTSD, or mental health disorders in general, would have on the ability to make effective diagnoses. Efforts to investigate physicians' ability to diagnose depression in primary care settings have found that they are only able to correctly identify the conditions in half of their patients (Mitchell, Vaze, & Rao, 2009). Experience has been posited as a factor that allows physicians to better conceptualize their illness scripts of medical conditions (Schmidt & Rikers, 2007), although this has not yet been investigated with a condition such as PTSD. Testing physicians' ability to accurately

diagnose cases of PTSD likely to be encountered in primary care settings would provide information on how these factors impact their ability to identify and accurately diagnose the disorder.

Purpose of the Study

The purpose of this study was to determine whether the complex nature of the primary care setting, where physicians are tasked with treating both medical and mental health conditions, may cause PTSD symptoms to be overshadowed by other medical complaints. Prior investigations have found that fewer than half of patients in primary care with PTSD are being accurately identified as having the condition (Greene et al., 2016). Therefore, this investigation sought to determine how well primary care physicians are able to accurately identify PTSD, which would allow them to make an appropriate referral to mental health services that could more effectively address the disorder. This study could help shed light on the factors contributing to a physician's ability to identify PTSD, such as knowledge about PTSD, experience working in the primary care field, and the presence of other comorbid symptoms. Given the many conditions that are often comorbid with PTSD, patient vignettes were used to best simulate the complex cases physicians are likely to see in a primary care setting, thus serving as a better test of their diagnostic abilities.

Chapter 2: Literature Review

Posttraumatic stress disorder (PTSD) is a condition characterized by a constellation of symptoms that develop in response to experiencing one or more traumatic events (APA, 2013). It is a condition that 6.8% of Americans are expected to develop in their lifetimes, with an individual having a 8.7% risk of meeting criteria for PTSD by the time they are 75 years old, making it the third most common anxiety disorder in the U.S. (Kessler, Chiu, Demler, & Walters, 2005). It is estimated that 3.5% of adult Americans meet criteria for PTSD over a 12-month period (Kessler, Berglund et al., 2005). Prevalence of exposure to a traumatic event is as high as 90% of individuals in the U.S., based on the *DSM-5* criteria for a traumatic event (Kilpatrick et al., 2013).

History of PTSD Diagnosis

PTSD was officially recognized as a mental health disorder in 1980, when it was included in the *DSM* for the first time (APA, 1980). However, the medical literature contains references to adverse reactions to traumatic events dating back centuries. Symptoms that are now associated with PTSD were reported by individuals involved in railroad accidents, a condition that became known as “railway spine” (Harrington, 2003). Physicians were perplexed by the condition, and there was much debate as to the causes of the symptoms (Cohen & Quintner, 1996). A similar array of symptoms was observed around this same period in soldiers, particularly during the Civil War (Da Costa, 1871; Myers, 1870). World War I has been identified as another historical event that led to increased attention to the adverse reactions to traumatic events, which was termed “shell shock” at the time (Birmes, Hatton, Brunet, & Schmitt, 2003). There is evidence that the medical community was beginning to recognize the psychological origin of these

symptoms, although it should be noted that individuals who experienced these same symptoms without directly serving in combat were believed to be with a neurological condition as a result of concussions (Lamprecht & Sack, 2002)

PTSD in the *DSM*. When PTSD was first included as a diagnosis in the *DSM-III*, the first criterion was the “existence of a recognizable stressor that would evoke significant symptoms of distress in almost anyone,” which reflected a sense of ambiguity regarding what would qualify as a trauma (Turnbull, 1998). There were 12 total symptoms for PTSD in the *DSM-III*, in addition to the experience of a trauma, with the symptom clusters reexperiencing of the trauma, numbing of responsiveness or reduced involvement, and a heterogeneous collection of symptoms that were not present before the trauma (APA, 1980). This classification focused primarily on the overt symptoms of the disorder (Ray, 2008).

With the publication of the *DSM-III-R*, the avoidance symptom that was present in the final cluster was established as its own criterion and expanded into three specific symptoms of avoidance (Turnbull, 1998). Also of significance was the change of the stressor criterion to now specify the trauma as an event “outside the realm of usual human experience” and the inclusion of specific examples of what would be considered a trauma. There were now 17 total symptoms of PTSD, and they were divided into the clusters of reexperiencing, avoidance, and hyperarousal (APA, 1987). With the reorganization of the symptoms into the new clusters, more symptoms were also required within each cluster in order to meet criteria, as an individual had to have at least one reexperiencing symptom, three avoidance symptoms, and two symptoms of hyperarousal.

The publication of *DSM-IV* contained an additional requirement for the stressor criterion, as the traumatic experience also had to induce intense fear, terror, and helplessness (Ray, 2008). The number of total symptoms and required symptoms from each cluster remained the same. One minor change was that the symptom of physiological reactivity when exposed to internal or external cues was moved from the hyperarousal cluster to the reexperiencing cluster (APA, 1994). In order to meet diagnostic criteria, the symptoms had to cause clinically significant distress or impairment in social, occupational, or other important areas of functioning. Specifiers of *acute* and *chronic* were added for duration of symptoms that was less than or greater than 3 months, respectively (APA, 1994).

The diagnosis of PTSD was virtually unchanged with the development of the *DSM-IV-TR* (APA, 2000). However, there were multiple changes made to the diagnosis in *DSM-5*. The stressor criterion was altered to include repeated indirect exposure to traumatic events, such as what military mortuary workers might encounter or what individuals may be exposed to through electronic media (Friedman, 2013). Furthermore, the experience of fear, horror, or hopelessness as a reaction to the event was eliminated. The clusters were expanded to five and the total symptoms to 20. The numbing symptoms in the *DSM-IV* diagnosis were changed with the creation of the alterations in cognition and mood cluster (Friedman, 2013). Two symptoms from this cluster are required for the diagnosis of PTSD. For the arousal and reactivity cluster, symptoms of behavioral reactivity have been included (APA, 2013).

PTSD in DSM-5. Following the most recent update of the diagnostic criteria in the *DSM-5*, PTSD is now recognized as a disorder with five specific symptom clusters:

stressor, intrusion symptoms, avoidance, alterations in cognitions and mood, and alterations in arousal and reactivity (APA, 2013). For the stressor criterion, an individual must be exposed to actual or threatened death, serious injury, or sexual violence by directly experiencing the event, witnessing the event occurring to others in person, learning of the traumatic event happening to a close friend or family member, or experiencing repeated or extreme exposure to aversive details of the traumatic event. In the intrusion symptoms criterion, individuals must experience one of the following symptoms: recurrent, involuntary, intrusive distressing memories of the trauma, recurrent distressing dreams in which the affect or content is similar to the traumatic event, dissociative reactions that cause the individual to feel or act as if the traumatic event was occurring again, intense or prolonged psychological distress when exposed to internal or external cues that resemble or symbolize an aspect of the trauma, or marked physiological reactions to those internal or external cues. The avoidance criterion consists of two components, of which one or more symptoms is required: persistent avoidance of reminders of the trauma and avoidance of thoughts and feeling related to the trauma. For the avoidance of trauma reminders, the avoidance can be of activities, places, or physical reminders that bring back memories of the trauma or avoiding people, conversations, or interpersonal situations that elicit memories of the trauma.

Regarding the alterations in cognitions and mood criterion, it can consist of increased experience of negative emotional states, decreased interest or engagement in significant activities, including constriction of play, socially withdrawn behavior, or a decrease in the expression of positive emotions. The alterations in arousal and reactivity criterion consists of symptoms representing alterations in arousal and reactivity

associated with the traumatic event, of which two are more are required for a diagnosis. These symptoms are irritable behavior and anger outbursts that often take the form of verbal or physical aggression, hypervigilance, exaggerated startle response, concentration impairment, and sleep disturbances. The final three criteria required are that the symptom duration is more than 1 month, the disturbances cause significant distress or impairment in relationships or with school behavior, and that the symptoms are not due to the physiological effects of a substance or other medical condition.

In summary, the understanding of the impact trauma has on individuals has grown substantially from general narratives to a formalized collection of symptoms. As this knowledge base has progressed, the criteria for PTSD in the *DSM* has evolved from the 12 symptoms within three clusters of primarily overt behaviors in the *DSM-III* to a total of 20 symptoms within five distinct clusters containing both overt behaviors, in addition to symptoms that may not be readily discernible. Researchers involved in the development of the new diagnostic criteria acknowledge that they opted for a more broad definition of the disorder as opposed to narrowing down the diagnosis to essential symptoms, as the broader definition was believed to have greater clinical utility (Friedman, 2013). With the creation of an additional cluster and three additional symptoms, there are now even more possible combinations of symptoms that could meet criteria for a PTSD diagnosis.

Impact of PTSD

Functional impairment. Although the symptoms of PTSD can cause distress on their own, there is a growing body of evidence that the condition can have far-reaching effects on an individual's ability to function, both directly and indirectly. A review of the

functional impairment associated with PTSD, among other anxiety conditions, across research studies identified a moderate association in the domains of social ($r = .37$), occupational ($r = .44$), physical ($r = .30$), global ($r = .33$), and overall ($r = .35$) functioning (McKnight, Monfort, Kashdan, Blalock, & Calton, 2016). An investigation on steelworkers who witnessed a fatality at work and were assessed for probable PTSD determined that those workers who scored above the cutoff on symptom severity reported lower overall life functioning and well-being compared to those with subthreshold- or non-PTSD scores (Blake, Lating, Sherman, & Kirkhart, 2014). A recent study that found a strong association between posttraumatic symptom severity and functional impairment also identified evidence suggesting that valued living, which was negatively associated with PTSD symptom severity and functional impairment, moderated the relationship between the two variables (Donahue, Khan, Huggins, & Marrow, 2017).

Individuals with PTSD have also been shown to demonstrate deficits in executive functioning relative to individuals who do not meet criteria for PTSD. In a meta-analysis of 18 studies and 1080 subjects, individuals with PTSD performed significantly worse on various assessments of executive functioning than individuals without PTSD, with the greatest discrepancy being between individuals with PTSD and individuals exposed to trauma who did not develop PTSD (Polak, Witteveen, Reitsma, & Olf, 2012). The specific executive functioning domains in which performance of individuals with PTSD was worse than in trauma-exposed controls were planning, working memory, cognitive flexibility, and slower reactions in response inhibition (Olf, Polak, Witteveen, & Denys, 2014). However, depressive symptoms mediated the relationships between PTSD and poorer executive functioning, which is consistent with previous research on the

neuropsychological impact of depressive symptoms (e.g., Gohier et al., 2009).

Nevertheless, these deficits in executive functioning have been shown to be associated with impaired occupational functioning (Kalechstein, Newton, & van Gorp, 2003).

Multiple investigations utilizing self-report measures point to the role of PTSD in negative health outcomes. PTSD, among other anxiety disorders, has been associated with a significant increase in days missed from work due to disability, increased physician visits, and significantly lower ratings of functional status compared to individuals with no anxiety disorder diagnosis (Kroenke, Spitzer, Williams, Monahan, & Löwe, 2007). Similar results were found in a primary care sample that included individuals with PTSD, in that individuals meeting criteria for the condition had poorer mental health functioning and an increased probability for missing work each month (Stein et al., 2005). Another study that utilized a primary care sample determined that individuals with PTSD had poorer self-reported ratings of health and more medical appointments over a 3-month period than individuals who did not meet criteria for PTSD (Gillock et al., 2005).

Health care utilization and costs. Congruent with the research findings that individuals with PTSD report have poorer health, these patients utilize more health care resources. It has also been suggested that individuals with a lifetime history of PTSD have more physical health conditions than individuals with no lifetime history of PTSD, based on the results of a large-scale survey study (Lauterbach et al., 2005). Those with PTSD had a significantly higher rate of lifetime and current medical complaints, and this difference could not be explained by the presence of other mood or anxiety disorders, lifestyle factors, history of trauma, or history of physical injury (Weisberg et al., 2002).

A study conducted at the Department of Veterans Affairs (VA) primary care clinics determined that high users of health care were almost twice as likely to meet criteria for active PTSD and that these individuals averaged 30% more health care visits than individuals with partial PTSD or no PTSD (Deykin et al., 2001). The relationship between PTSD, physical health, and medical utilization is complex, and these findings do not prove causation (Gillock et al., 2005). The use of self-reported health outcomes could also result from certain biases that could threaten the validity of these results. Nevertheless, reviews of multiple studies investigating the relationship of trauma and PTSD to mental and medical health care use suggest that PTSD is associated with increased utilization of these services (Elhai et al., 2005). A recent large-scale study examining the effect of medical illness burden of PTSD service utilization determined that those with more medical issues were more likely to utilize mental health services, highlighting the bidirectional relationship between medical and mental health issues faced by this population (Sripada, Pfeiffer, Valenstein, & Bohnert, 2014).

In an effort to gather more objective evidence about the impact of PTSD on health care utilization, some investigations have assessed the actual costs of services used by individuals with varying degrees of PTSD. One study examined the costs associated with health care for women with low, medium, and high PTSD severity, as determined by scores on the PTSD Checklist (PCL; Walker et al., 2003). Women with medium scores of PTSD severity had median annual health care costs that were 38% higher than women in the low-PTSD group, and women in the high-PTSD group had costs that were twice as high as the low-PTSD group on an annual basis. Only a small percentage of the costs were associated with mental health services, and steps were taken to control for chronic

illness and depression. Although the study used a female-only sample of women of higher socioeconomic status (SES), similar results were found regarding elevated health care use for individuals in PTSD in an urban, low-SES sample. Individuals in this sample who met criteria for PTSD used more health care services than individuals who did not meet criteria for PTSD (Klassen, Porcerelli, & Markova, 2013). Specifically, it was determined that women who met criteria for PTSD, as determined by responses on the PTSD Checklist–Civilian Version (PCL–C), had a significantly higher number of complaints per primary care visit, laboratory tests ordered, and medications prescribed. The researchers did note that the small sample size and the reliance on self-report measures to determine the diagnosis of PTSD for participants were limits of this study (Klassen et al., 2013). However, the results do suggest that the increased use of health care services by individuals who meet criteria for PTSD is common across the socioeconomic spectrum.

Another study focused exclusively on individuals with PTSD as a result of a motor vehicle accident. Individuals with PTSD were found to have higher total health care costs over a 2-year period than individuals who did not meet criteria for PTSD (O'Donnell, Creamer, Elliott, & Atkin, 2005). However, PTSD was not found to independently contribute to the higher health care costs, as individuals without PTSD and low physical functioning incurred similar costs. PTSD was predictive of higher costs for mental health services in the study.

Even for individuals who may not meet criteria for PTSD but have experienced a traumatic event, there is evidence that trauma exposure can lead to increased use of health care resources. In a longitudinal 7-year study that included women who have

experienced intimate partner violence (IPV) at any point in their life, it was found that these women had a 19% increase in health care costs compared to women with no history of IPV over the course of the study (Rivara et al., 2007). The increased use of health care services was observed even for those women who had not experienced an act of IPV in over 5 years. Although it is unknown how many of the women in this sample met criteria for PTSD, whether from IPV or another traumatic event, it suggests that exposure to a traumatic event alone can be associated with increased use of medical and mental health services.

However, some studies have found the opposite regarding the use of health care resources, at least for IPV. A study of African American college females who experienced IPV found that fewer than half of the victims accessed health care services for their injuries and fewer than 3% met with a mental health professional (Amar & Gennaro, 2005). These numbers are relatively similar to an earlier study examining help-seeking behavior among adult women whose rape occurred when they were an adult. The study found that there was an approximately 71% chance that a woman would seek medical care if the rape was reported to the police or other authorities, whereas the percentage of women who sought medical care following a rape decreased to 15% if they did not report the assault to the authorities (Resnick et al., 2000). This could be interpreted as meaning that women who are victims of a traumatic event, albeit one of a sexual nature, may be less likely to seek out medical care, at least for injuries related to the assault. However, previous investigations have found evidence that victims of rape had twice as many physician visits and incurred outpatient costs two and a half times

higher than those of women who were not victims of rape (Koss, Koss, & Woodruff, 1991).

Many of the aforementioned studies discuss the cost of services that may be directly or indirectly influenced by PTSD within a limited timeframe. However, it should be noted that PTSD often has a chronic course. There are indications that full PTSD lasts approximately 11 years, on average (Pietrzak, Goldstein, Southwick, & Grant, 2011). The same study determined that even in cases of partial PTSD, symptoms persisted for an average of 10 years. Results from multiple investigations suggest that PTSD symptoms can persist for years in a substantial number of individuals who meet criteria for PTSD, regardless of the trauma (McFarlane, 2000). Approximately half of adolescent and young adults with PTSD were still experiencing symptoms 3 years after the trauma (Perkonig et al., 2005). A 1994 investigation found that 27% of males and 20% of females in a sample of Dutch resistance fighters who served in World War II were still experiencing PTSD symptoms over 40 years after the conflict (Hovens, Falger, Op den Velde, De Groen, & Van Duijn, 1994).

In short, these investigations provide multiple indications of how exposure to trauma and the development of PTSD can significantly interfere with an individual's ability to function (Kroenke et al., 2007). The cost of this condition is quite literal, as these individuals are more likely to have decreased work productivity and more frequent medical visits (Elhai et al., 2005; Gillock et al., 2005), regardless of socioeconomic status, gender, and type of trauma. Although the complex relationship of trauma and these adverse outcomes makes it difficult to make definitive statements, the collection of studies discussed previously suggests that PTSD is implicated to some degree in these

negative outcomes. Furthermore, the long-term nature of the condition suggests that these effects are present years after the trauma has occurred (Pietrzak et al., 2011).

Mental Health in Primary Care

Statistics show that approximately 20% of visits to primary care clinics result in the screening for or treatment of mental health diagnoses, whether for psychotherapy or psychotropic medication (Cherry & Schappert, 2014). This makes sense when considering the significant proportion of patients seen in primary care settings who meet criteria for a mental health disorder. One of the first investigations on the topic found that approximately 26% of patients screened met criteria for a diagnosable mental health condition (Spitzer et al., 1994). Since then, many studies have been conducted across the world to assess the prevalence of mental health conditions in primary care, and one quarter to half of patients seen in primary care have a subthreshold or full criteria psychiatric disorder (Ansea et al., 2004; Grandes, Montoya, Arietaleanizbeaskoa, Arce, & Sanchez, 2009; Roca et al., 2009). Individuals with mental disorders in primary care report poorer quality of life and greater disability (Grandes et al., 2009).

Changing patterns in treatment and quality of care. Primary care physicians are often the first point of contact for patients seeking treatment for a health condition (Forrest, 2003). This appears to be the case for patients with mental health conditions, as well. Almost half of individuals with poor ratings of mental health quality receive treatment from only a primary care provider (Pettersen, Miller, Payne-Murphy, & Phillips, 2014). An examination of patterns of mental health service use found that receiving treatment from only general medical providers, such as primary care physicians, has seen the greatest increase and is now the most common treatment setting

for mental health conditions (Wang et al., 2006). A more recent study of trends in mental health treatment found that from 1995-1998 to 2007-2010, there was a significant increase in primary care visits involving a mental health complaint or mental health diagnosis. However, there was not a significant increase in psychiatrist visits involving a mental disorder; in fact, there was a significant decrease in psychiatrist visits for mental health complaints (Olfson, Kroenke, Wang, & Blanco, 2014). This again underscores the fact that primary care providers in the United States are seeing a higher proportion of patients needing mental health treatment.

Although there is a significant number of people with mental health needs who are receiving treatment from their primary care provider, studies suggest that a large portion may not be receiving adequate care. An investigation of patients with depression or an anxiety disorder treated in primary care in a 1-year period found that only 30% received appropriate therapy or medication; 80% of those seeking treatment from their primary care physician received inappropriate care or no treatment at all (Young, Klap, Sherbourne, & Wells, 2001). A recent longitudinal study that tracked patients with anxiety disorders in primary care over a 5-year period found that at the beginning of the study, only 28% were receiving treatment that would be considered potentially adequate (Weisberg, Beard, Moitra, Dyck, & Wells, 2014). Although the number of patients receiving potentially adequate care increased over the duration of the study, approximately 31% of patients with anxiety disorders were not receiving appropriate care at the end of the 5-year period. This is congruent with results of an earlier study, in which patients with an anxiety disorder were seen approximately six times by general and specialty medical providers before receiving a referral to a specialty anxiety clinic

(Deacon, Lickel, & Abramowitz, 2008). Another study of patients meeting criteria for depression who were seen in a primary care center with co-located mental health treatment found that although 83% of them were receiving some form of treatment, only 53% were receiving minimally adequate treatment for their condition (Uebelacker, Smith, Lewis, Sasaki, & Miller, 2009).

Physician diagnostic ability. The retrospective, cross-sectional designs used by the aforementioned studies do not establish why such a significant proportion of patients were not being treated or were not receiving minimally adequate care; however, one reason could be an inability to correctly diagnose mental health conditions. Although there does not appear to be a plethora of investigations into primary care physician ability to detect mental health conditions, several studies have been conducted to ascertain their ability to identify major depression, which is considered a relatively common disorder. The results cast doubts about physicians' ability to accurately diagnose these conditions. A meta-analysis of non-psychiatric physicians determined that providers generally diagnosed depression less than half of the time when a patient met criteria (Cepoiu et al., 2008). A large-scale meta-analysis examining primary care physicians' ability to identify depression yielded similar results, in that approximately half of cases meeting either International Statistical Classification of Diseases and Related Health Problems (ICD) or *DSM* criteria for depression were correctly identified (Mitchell et al., 2009). However, physicians only referenced a criteria for depression roughly one third of the time. Primary care physicians were better able to rule out individuals who did not meet criteria for depression (81.3%), although the analysis determined that physicians were more

likely to apply false-positive diagnoses of depression than false-negatives (Mitchell et al., 2009).

Considering depression is a fairly common mental health condition, it raises questions as to how well more complex disorders, such as PTSD, would be detected in primary care. It is clear that a significant proportion of the population of patients seen in primary care have a mental health condition, yet a large number of them are not receiving adequate treatment. Limited knowledge of mental health conditions may be one factor that can account for this discrepancy, but more studies are needed to determine if this is actually the case.

PTSD in Primary Care

Similar to the overall trends regarding the settings in which individuals with mental health disorders are receiving treatment, a large proportion of individuals with PTSD are being seen in primary care. In fact, a study of treatment patterns determined that approximately 31% of individuals with PTSD receive treatment from a general medical practitioner, such as a primary care physician, which is only slightly less than the percentage of individuals with PTSD who receive treatment from a mental health practitioner (Wang et al., 2005). This increased rate of contact in primary care makes sense when examined in the context of medical utilization, as there is evidence that individuals with PTSD utilize more health care resources, even if they only meet partial criteria for PTSD (Gillock et al., 2005). Yet despite the increased contact in primary care, evidence suggests that over 40% of individuals meeting criteria for PTSD do not receive mental health treatment of any kind (Wang et al., 2005).

Discrepancies in prevalence rates. Thus far, it has been unclear why such a high proportion of individuals with PTSD are not being adequately detected and treated in primary care. Investigations of PTSD prevalence in primary care may exemplify this issue, as identified rates have been inconsistent across samples (e.g., Greene et al., 2016). Some studies observe rates of PTSD consistent with the national average of approximately 9% (e.g., Gillock et al., 2005). However, certain populations appear to have higher rates of PTSD, such as individuals from minority ethnic groups, those who live in urban areas, and veterans. A study in predominantly African American primary care patients determined that approximately 33% of the 617 participants met criteria for PTSD (Alim et al., 2006). Another investigation that utilized a primary care sample in an urban setting identified a 23% current prevalence rate for PTSD (Liebschutz et al., 2007). It would be difficult to determine exactly why the discrepancy in PTSD rates exist across these various primary care samples, but a valid conclusion from the research is that certain populations may be more vulnerable to developing the condition. Therefore, targeted assessment of those individuals with higher susceptibility would be appropriate in order to identify those with PTSD who are in need of treatment.

Although, researchers using standardized assessment tools are able to identify patients who meet criteria for the condition, there is evidence that PTSD is not being correctly identified by medical providers. In the study in which 23% of the patients were found to meet criteria for PTSD, only 11% had a formal diagnosis in their medical charts (Liebschutz et al., 2007). Furthermore, 43% of those who only met criteria for PTSD were instead diagnosed with major depression, suggesting a shortcoming in differentiating between mental health diagnoses. It is possible that due to missed or

incorrect detection, there is a significant proportion of patients who are not receiving appropriate care. Evidence of this has been found among the veteran population, as a study conducted in VA primary care clinics determined that only 46.5% of individuals who met criteria for PTSD in the past 12 months were identified as having the condition, and only 47.7% of the sample was receiving mental health services (Magruder et al., 2005). Almost identical results of lack of mental health services for individuals with PTSD was observed in a civilian population, as 48% of the primary care sample who met criteria for PTSD were receiving no mental health treatment (Rodriguez et al., 2003). Further clouding the picture, there is more recent evidence suggesting that PTSD may be overdiagnosed in primary care settings within the VA (Gravelly et al., 2011).

Physician diagnostic ability. Although thus far, there is limited research in assessing primary care physicians' ability to accurately diagnose PTSD, several investigations have been conducted. A review of four studies that measured detection rates of PTSD in primary care found that 46.5% of patients who met criteria for PTSD, based on the use of various screening instruments, had been actually diagnosed by their physician as having PTSD (Greene et al., 2016). Other attempts have been made using vignettes to assess diagnostic skills. The first used a sample of general practitioners from England who were presented with a series of vignettes, one of which was considered a "textbook" case of PTSD (Munro, Freeman, & Law, 2004). For the PTSD vignette, 28.3% of practitioners accurately diagnosed the condition and appropriately prescribed a selective serotonin reuptake inhibitor (SSRI). Only 10.2% of general practitioners followed best practice guidelines for PTSD, defined as accurate differential diagnosis, prescribing an SSRI, and appropriate psychotherapy referral. This was significantly less

accurate than the vignettes for major depression, for which general practitioners had higher rates of making the correct diagnosis (94.4%), prescribing an appropriate class of medication (89.8%), and following best practice guidelines (47.7%). A second study used an avatar to simulate a patient encounter, and the researchers assessed how well primary care clinicians were able to correctly diagnose the PTSD (Satter et al., 2012). They found that although primary care physicians could determine PTSD was in the differential diagnosis, they could not diagnose it definitively. The researchers ultimately concluded that primary care clinicians may be lacking the skills and/or knowledge to detect the nuanced aspects of PTSD. Based on this, there are calls for medical school curriculums to be revised in order to accommodate more training in behavioral health to improve patient care (Smith et al., 2014).

These studies indicate that PTSD is not being effectively identified in primary care settings. As a result, affected individuals are not being referred to mental health services that could reduce their symptoms. This could lead to the condition persisting for a number of years in individuals with PTSD and therefore result in the aforementioned increased susceptibility to adverse physical and mental health outcomes. Whereas it is clear that this issue exists, it is still unclear why these individuals are not being accurately identified as meeting criteria for PTSD. Therefore, there is a need for more research to determine what deficiencies exist in physician awareness or knowledge of PTSD.

Underdetection and Misdiagnosis in Primary Care

Diagnostic error has been shown to be a significant issue in medicine, with reviews of studies on the subject estimating that it occurs in 10% to 15% of cases (Schiff et al., 2009). Researchers posit that it can be due to a variety of factors, such as

overconfidence in the role of the physician, lack of opportunity for feedback about diagnostic decisions, and an overall lack of understanding of the topic as a whole (Graber, 2005). Although reviews have demonstrated that diagnostic error can occur for a variety of reasons, one of the most common has been found to be the failure to consider the correct diagnosis, or hypothesis generation (Schiff et al., 2009). A survey of primary care physicians about missed diagnoses found that a large proportion determined that their errors taught them to broaden the diagnoses considered when presented with specific complaints, based on a common tendency to prematurely stop considering alternative diagnoses (Ely, Kaldjian, & D'Alessandro, 2012).

These decision-making errors on the part of physicians are often attributed to reliance on heuristics, or mental shortcuts. (Ely et al., 2012). These heuristics aim to reduce complex cognitive tasks to simpler judgments, but can lead to errors and certain biases (Tversky & Kahneman, 1974). Heuristics are theorized to be used in primary care settings because they are often correct and do not require extended deliberation, which is often not possible in the primary care setting (Redelmeier, 2005). In this way, they can be viewed as an adaptive approach in clinical settings, although they can lead to errors in certain situations (Eva & Norman, 2005).

A systematic review of misdiagnosis in primary care suggested that one of the culprits of missed diagnosis is “overshadowing,” in which the presence of one particular disorder makes it difficult for clinicians to reconceptualize symptoms and consider alternative explanations (Kostopoulou, Delaney, & Munro, 2008). Evidence of this overshadowing has been found in studies of individuals with intellectual disabilities, although usually when mental health conditions overshadow and are used to explain

physical symptoms (Nash, 2013). Reviews of the literature have revealed no studies to assess whether physical symptoms overshadow mental health symptoms. It is possible that the anchoring bias or overshadowing would be present in individuals with PTSD, given the number of aforementioned comorbidities in this population. Specifically, given the physical symptoms of many of the comorbidities in individuals in PTSD and the areas of training for primary care physicians, it is posited that the physical symptoms may overshadow the PTSD symptoms that may be present. Researchers have previously suggested this, going so far as to recommend screening for PTSD in the presence of multiple symptoms of pain (Liebschutz et al., 2007).

There are many efforts in the medical literature to explain physician decision-making, including the factors that impact abilities in this domain. One of the theories to explain diagnostic ability is the presence of knowledge structures known as *illness scripts*. Illness scripts are conceptual knowledge structures that represent general disease comprehension and guide physicians in making sense of patient-oriented clinical information (Custers, 2015). As posited by the original developers of the theory, the illness script has three components: the enabling conditions, the fault, and the consequence (Feltovich & Barrows, 1984). In short, the enabling conditions are the contextual and patient factors that affect the probability that a patient will develop a particular disease, the fault is the underlying pathophysiological mechanism, and the consequence is the symptoms, complaints, and signs that are the manifestation of that process (Custers, 2015). Researchers have hypothesized that medical practitioners develop their expertise through the process of encapsulation, in which subsets of detailed lower-level, interrelated concepts become grouped under higher-level concepts that have

the ability to explain just as much as the combined lower-level concepts (Schmidt & Rikers, 2007). An example of this would be a collection of individual symptoms subsumed under a single syndrome or disease. This theory suggests that as practitioners gain more experience working with patients, their illness scripts become richer in detail, in part through a greater understanding of the enabling conditions (Schmidt & Rikers, 2007). In this way, practical experience can be viewed as an important variable in determining how well physicians can detect certain diseases or conditions.

In addition to the aforementioned pitfalls in making diagnoses in the primary care setting, there is the difficulty in differentiating PTSD from other diagnoses. Clinicians have identified common difficulties in assessing PTSD, such as differentiating flashbacks from psychotic hallucinations and avoidance due to agoraphobia from trauma reminders and disentangling the overlap of symptoms with depression (Schillaci et al., 2009). With the expanded number of symptom clusters and overall symptoms that constitute PTSD, factor analysis has been used to determine that there are over 636,000 possible combinations of symptoms that would meet criteria for PTSD in the *DSM-5*, indicating the overall heterogeneity in presentation (Galatzer-Levy & Bryant, 2013). These factors, in conjunction with the aforementioned pitfalls in clinical decision making, are hypothesized to lead to missed detection of PTSD, even when the criteria for the disorder are met.

Integrated Primary Care for Mental Health

Given the aforementioned difficulties in detection and the burden placed on the health care system when conditions such as PTSD are not adequately detected and treated, integrated primary care has been viewed as a potential solution to this issue

(Collins, Hewson, Munger, & Wade, 2013). Although a comprehensive examination of integrated health care is beyond the scope of the present study, it is sufficient to state that integrated care can be defined as “the care that results from a practice team of primary care and behavioral health clinicians, working together with patients and families, using a systematic and cost-effective approach to provide patient-centered care for a defined population” (Peek & the National Integration Academy Council, 2013, p. 2). It is viewed as a solution to the increasing number of behavioral health needs that are being seen in primary care settings (Petterson et al., 2014).

Within the Veterans Affairs health system. The largest integrated health care system in the U.S., and one that has taken significant strides in addressing behavioral health needs in primary care, is the Department of Veterans Affairs (VA) healthcare system (Performance and Accountability Report, 2014). The integrated primary care program is known within the VA as Primary Care-Mental Health Integration (PC-MHI). This initiative has targeted a variety of mental health conditions seen in primary care, including PTSD. Early PC-MHI programs resulted in an increase in access to mental health services, increased physician comfort in treating mental disorders, and an increase in the number of prescriptions for antidepressant medications in the primary care clinic (Brawer, Martielli, Pye, Manwaring, & Tierney, 2010). An analysis of the rate of diagnosis of mental health conditions in VA primary care from the 2007 fiscal year to the 2008 fiscal year revealed a significantly greater increase in the number of diagnoses of depressive disorders, PTSD, anxiety disorders, and alcohol use disorders for PC-MHI clinics than for non-PC-MHI clinics (Zivin et al., 2010).

Perhaps most importantly, there is evidence that this integrated health care system is leading to more patients receiving appropriate treatment. In an investigation of a precursor to the system-wide integration of primary care and mental health, an integrated clinic approach resulted in a significant increase in the number of patients who screened positive for depression and received treatment for the condition, as well an increase in those who received treatment that satisfied criteria for optimal depression treatment (Watts, Shiner, Pomerantz, Stender, & Weeks, 2007). One investigation specifically examined the role of PC-MHI in increasing access to care of Operation Iraqi Freedom/Operation Enduring Freedom/Operation New Dawn (OIF/OEF/OND) veterans who screened positive for PTSD. The results did not reach a level of significance; however, the researchers did find that the PC-MHI team provided more referrals to specialty care services, had a higher-rate of patient follow-through for referrals, and demonstrated increased accuracy in diagnosing PTSD, compared to primary care physicians from a nonintegrated clinic in the VA system (Brawer et al., 2011). The researchers also noted that PC-MHI team members were able to generate a referral for veterans to OEF/OIF PTSD clinics after an average of one session with the veteran. Although there are surely many factors that need to be taken into consideration when making comparisons in timeliness of referrals, in other studies, an average of six appointments with general and specialty medical providers were required before patients were referred to an anxiety clinic (Deacon et al., 2008).

Similar results have been found in patients with disorders other than PTSD. Receiving PC-MHI services on the same day as a positive screen for depression was found to be a significant predictor for follow-up treatment (psychotropic medication or

psychotherapy) at both 12 weeks and 6 months (Szymanski, Bohnert, Zivin, & McCarthy, 2012). Another investigation determined that among veterans who received a mental health diagnosis during an initial primary care visit, 74% of those who received PC-MHI services on the same day had a provider encounter for a mental health condition within 90 days, compared to only 45% of those veterans who did not receive PC-MHI services during the initial visit (Bohnert, Pfeiffer, Szymanski, & McCarthy, 2013). It should be noted that in both these studies, fewer than 10% of patients were able to access the PC-MHI services, suggesting that these same-day visits are not always available.

Nevertheless, it does suggest that access to services that are part of integrated primary care in the VA system appears to be a contributing factor to better follow-through with mental health services.

Within the civilian population. A review of the literature to date does not contain as many investigations into integrated primary care outcomes outside of the VA system. However, some studies have been conducted to determine the role of integrated care in improving patient outcomes. Integrated behavioral health care was found to include strong support for diagnosis-consistent interventions delivered in the primary care setting (Bridges et al., 2015). As mentioned previously, this has not always been a consistent finding in stand-alone primary care clinics (e.g., Weisberg et al., 2014). Providers also seem satisfied with integrated primary care programs, as one study at a university health clinic found that providers identified the use of behavioral screening instruments as a positive addition to their clinical practice (Funderburk, Fielder, DeMartini, & Flynn, 2012). Given the importance of accurate detection in providing appropriate interventions for behavioral health issues, this could bode well for greater

implementation of integrated health care practices in the future. Similar results of provider satisfaction with increased behavioral health services in primary care has also singled out the role of patient consultations as well as improved patient access to care as important features of the integrated system (Vickers et al., 2013). Furthermore, increased interaction with behavioral health consultants in primary care was associated with increased provider comfort in discussing behavioral health issues with patients (Torrence et al., 2014). Primary care physicians tend to report more positive ratings regarding the necessity for behavioral health consultations when they work in an integrated setting than when there are no behavioral health services on site (Beacham, Herbst, Streitwieser, Scheu, & Sieber, 2012). Perhaps most importantly, a comprehensive review and meta-analysis of 32 studies identified that patients receiving treatment for depression reported significant satisfaction with integrated primary care services (Thota et al., 2012).

Most of the research to date has been on the VA health care system, but more is needed within the civilian population to determine the effectiveness of integrated care. Although the evidence thus far seems to suggest that providers who work in integrated settings feel more comfortable discussing behavioral health needs with patients than their counterparts who work in nonintegrated settings, it is unclear if their knowledge of specific mental health disorders, such as PTSD, is superior to that of primary care physicians in nonintegrated settings.

Comorbidity of PTSD

With other mental health conditions. Large-scale epidemiological studies indicate that individuals with PTSD have elevated lifetime odds of mood disorders, anxiety disorders, substance use and dependence disorders, and suicide attempts (Pietrzak

et al., 2011). Latent class analysis has revealed specific comorbidity clusters among individuals with PTSD, including the absence of a cluster of PTSD and without other mood episodes, anxiety, or substance use disorders (Galatzer-Levy, Nickerson, Litz, & Marmar, 2013). The most prevalent cluster was PTSD with a moderate probability of a major depressive episode, followed by high comorbidity with mood and anxiety disorders and lifetime prevalence of a substance use disorder, and finally a higher comorbidity of mood and anxiety disorders and low probability of substance use or conduct disorders (Pietrzak et al., 2011). Even individuals who met only partial criteria for PTSD were found to have elevated lifetime odds of the aforementioned disorders and behaviors.

Comorbidity with substance use disorders has also been a common finding among individuals with PTSD, as an estimated 46.4% of individuals who meet full criteria for PTSD will also meet criteria for a drug or alcohol use disorder in their lifetime, which represents elevated odds compared to individuals who do not meet criteria for PTSD (Pietrzak et al., 2011). Approximately one third of individuals with PTSD are estimated to meet lifetime criteria for alcohol dependence (Blanco et al., 2013). These findings are relatively similar to those of a large-scale survey conducted in Australia that found that 34.4% of individuals with PTSD also had a substance use disorder (Mills, Teesson, Ross, & Peters, 2006). Certain symptom clusters of PTSD have been shown to predict alcohol use, as reexperiencing symptoms were shown to predict problematic drinking among U.S. military members serving on a peacekeeping mission (Maguen, Stalnaker, McCaslin, & Litz, 2009). PTSD symptoms have been found to predict both same-day and next-day cravings among individuals with co-occurring alcohol use disorders (Simpson, Stappenbeck, Varra, Moore, & Kaysin, 2012). These findings suggest that PTSD can

produce more deleterious outcomes among individuals with comorbid drug and alcohol use disorders.

With physical health conditions. In addition to the aforementioned adverse effects PTSD can have on functioning and quality, there is evidence that this population is susceptible to physical health conditions that could require further health care utilization and cost (Boscarino, 2004). These findings appear to apply with both civilian and military populations, regardless of trauma type (Stam, 2007). Although studies into the relationship between PTSD and physical disorders have been identified as lacking (Qureshi, Pyne, Magruder, Schulz, & Kunik, 2009), there has been increased research on physical sequelae of PTSD in recent years. Among the early investigations into the relationship between trauma exposure and physical health was a study of Vietnam veterans (Boscarino, 1997). When controlling for SES variables, hypochondriasis, and behavioral risk factors, an association was found between PTSD and elevated lifetime prevalence of circulatory, musculoskeletal, digestive, respiratory, nervous system, and non-sexually transmitted infectious diseases more than 20 years after the participants had served in the military. The researcher cautioned that the factors involved in the development of these diseases are complex and that the results are correlational, not causal. Nevertheless, the findings suggest a possible link between trauma exposure and physical illness.

A connection between PTSD and pain and somatic syndromes has also been found in the literature (Gupta, 2013). Researchers have found increased comorbidity of PTSD with multiple types of pain, including multiple studies that cite pain as the most common physical symptom among individuals with PTSD (Moeller-Bertram, Keltner, &

Strigo, 2012). One study of veterans with PTSD found that 86% of the sample reported problems with pain (Porter, Pope, Mayer, & Rauch, 2013). Another investigation using a civilian sample determined that PTSD symptoms were significantly associated with pain ratings and pain-related impairment (Phifer et al., 2011). This comorbidity seems to also contribute to greater health care costs among patients with PTSD, as this study also determined that a diagnosis of PTSD was significantly associated with increased opioid analgesic use (Phifer et al., 2011). A meta-analysis of 71 studies also determined that individuals with PTSD are 2.7 times more likely to have functional somatic syndromes, such as fibromyalgia, chronic pain, chronic fatigue, temporomandibular disorder, or irritable bowel syndrome (Afari et al., 2014). The increased prevalence of these functional somatic syndromes in patients with PTSD could certainly contribute to the aforementioned elevated rate of medical visits and health care costs (Klassen et al., 2013).

Not all reviews of the literature have found a strong association between PTSD and physical disorders, as one review of seven studies determined that a significant association existed between PTSD and musculoskeletal disorders, such as arthritis, for the general population, but not in a veteran population (Qureshi et al., 2009). Although support for associations was also found for circulatory and digestive disorders, conflicting evidence was found for diabetes, congestive heart disease, and stroke, whereas no association was found between PTSD and thyroid disease. The researchers did cite limitations in the interpretation of these findings, such as the heterogeneity in the methodology of studies included in the review, lack of control for potential confounding factors, older age of many of the samples included, and different methods used to

diagnose both PTSD and physical illnesses. Furthermore, the review consisted of a relatively small number of studies. While acknowledging the negative impact PTSD can have on physical health, they concluded that the association between PTSD and specific disorders is complex and that larger, prospective epidemiological studies are needed to better understand this relationship (Qureshi et al., 2009).

Meta-analysis of data from six studies allowed other researchers to determine that there is an independent association between PTSD and increased risk for coronary heart disease, even when controlling for other variables (Edmondson, Kronish, Shaffer, Falzon, & Berg, 2013). A large-scale investigation into PTSD and cardiovascular disease concluded that the findings seemed to support a link between the two conditions, although the researchers acknowledged that further research was necessary (Dedert, Calhoun, Watkins, Sherwood, & Beckham, 2010). Longitudinal data from a study of disaster victims in the Netherlands found that individuals who met criteria for PTSD 18 months following a disaster had nearly double the risk of developing new vascular health problems, as diagnosed by a physician, 2 years later than individuals who did not develop PTSD following the disaster (Dirkzwager, van der Velden, Grievink, & Yzermans, 2007). This association was found when controlling for demographics (gender, age, immigrant status, type of health insurance), smoking behavior, and physical health prior to the disaster. Another investigation determined that PTSD was significantly associated with high blood pressure in a large national sample and that this association was independent of the presence of depressive symptoms, which also have been found to be associated with hypertension (Kibler, Joshi, & Ma, 2008). A 14-year prospective study determined that women with five or more symptoms of PTSD had three times the risk of developing

coronary heart disease than women with no symptoms of PTSD, even when coronary risk factors, depression, and trait anxiety were controlled for (Kubzansky, Koenen, Jones, & Eaton, 2009).

Studies in the veteran population have also identified an association between PTSD and cardiovascular conditions. A large-scale study of OEF/OIF/OND veterans determined that those with PTSD had a 24% to 46% greater risk for incident hypertension than veterans without a PTSD diagnosis (Burg et al., 2017). Furthermore, there was evidence in the study that those veterans who received treatment for PTSD in the form of an SSRI or psychotherapy had a lower risk of hypertension than those with PTSD who did not receive treatment. An earlier study that compared World War II prisoners of war (POWs) to other soldiers determined that POWs with PTSD had a statistically significant increased risk of hypertension, circulatory disorders, and chronic ischemic heart disease compared to non-POWs or soldiers without a diagnosis of PTSD (Kang, Bullman, & Taylor, 2006). Surprisingly, POWs with PTSD were also found to have a significantly lower risk for stroke. However, this study did not control for confounding factors; thus, other factors could explain this relationship. A large-scale review of mortality rates among Vietnam-era veterans revealed that Army veterans who served in Vietnam and met criteria for PTSD had higher rates of death due to cardiovascular disease (Boscarino, 2006). In addition, higher rates of death were also found for cancer and external causes, which consisted of homicide, suicide, unintentional poisoning, and unintended injury. Some confounding variables were accounted for, such as alcohol and illicit drug use while in the Army, and cigarette smoking habits were controlled for in the cancer mortality rate. However, a weakness of this study was the use of *DSM-III* criteria to

diagnose PTSD, as the criteria had been revised. Nevertheless, these studies suggest that PTSD could negative influence cardiovascular outcomes within a civilian, military, or veteran population.

Research has also explored the link between PTSD and metabolic syndrome. Metabolic syndrome consists of symptoms such as obesity, hyperglycemia, hypertension, and hyperlipidemia and is often viewed as a significant risk factor for multiple medical conditions, such as cardiovascular disease, diabetes, and stroke (Weiss et al., 2011). Individuals with metabolic syndrome have been shown to have a higher risk of death from coronary heart disease, cardiovascular disease, and total causes of mortality (Malik et al., 2004). In a sample of male and female veterans, an association was found between severity of PTSD and metabolic syndrome after controlling for demographic, psychiatric, and behavioral variables (Heppner et al., 2009). There is also evidence that PTSD is a risk factor for being overweight and for obesity, based on an investigation of male military members (Vieweg et al., 2007). Police officers with severe PTSD were found to have a threefold increased risk of metabolic syndrome compared to officers with subclinical scores of PTSD symptom severity (Violanti et al., 2006). In an urban, highly traumatized sample, researchers determined that individuals who currently met criteria for PTSD had a significantly higher incidence of metabolic syndrome (Weiss et al., 2011). However, history of PTSD did not have a significant association with current metabolic syndrome, suggesting that the symptoms may need to be active in order to influence the biomarkers that are characteristic of metabolic syndrome. Therefore, untreated PTSD could lead to the metabolic disruption.

One factor that could explain the link between PTSD and negative health conditions, such as cardiovascular disease and metabolic syndrome, is health behaviors. One cross-sectional study determined that a diagnosis of PTSD was associated with a number of poor health behaviors, including physical inactivity, medication nonadherence, and smoking behaviors (Zen, Whooley, Zhao, & Cohen, 2012). However, the authors indicated that these associations might be due to other psychosocial factors, including the presence of depression and income. An examination of male veterans with PTSD revealed that 58% exercised less frequently than the national guidelines of three times per week and that the rate of veterans with PTSD who smoked was nearly twice the national average (Buckley, Mozley, Bedard, Dewulf, & Greif, 2004).

In summary, there is a growing body of evidence to support an association between PTSD and various negative physical health outcomes. There is even recent evidence that this relationship may be bidirectional, as one study with a nationally representative sample determined that physical health conditions impacted PTSD symptoms (Sripada et al., 2014). Although the studies conducted thus far do not allow for an assertion that PTSD can cause these physical disorders, the ability of many of these studies to find a link between the two when controlling for other variables that could also explain the relationship does offer the possibility that PTSD is contributing to these health outcomes in a significant way. There are some common limitations in the literature, specifically the reliance on retrospective studies and the use of self-report measures to determine PTSD diagnosis, which may affect the accuracy of some patient data (Tolin & Foa, 2006). There have been calls for more prospective, longitudinal

studies that would offer more evidence on the causal role of PTSD (e.g., Heppner et al., 2009; Qureshi et al., 2009).

Summary

The evidence is clear that PTSD has a far-reaching impact on physical and mental well-being, and that individuals with PTSD are frequently presenting for treatment in primary care settings. Furthermore, the research also indicates that PTSD is frequently undetected, which means that these patients may not be receiving necessary care for a condition that is impacting aspects of their mental and physical health. Given that there are currently multiple empirically supported treatments to reduce symptoms in individuals with PTSD (e.g., Lenz et al., 2014; Powers et al., 2010), accurate diagnosis is imperative in treating the condition to reduce the burden on the health care system. It is unclear if experience in the field is one of the factors that allows physicians to better detect mental health conditions, such as PTSD. Another important factor that could impact diagnostic ability is knowledge of PTSD, including the symptoms that comprise the disorder. Therefore, this study sought to determine whether primary care physicians are able to accurately diagnose PTSD when patients present with symptoms that meet the diagnostic criteria, whether the presence of physical complaints that are frequently comorbid with PTSD may overshadow and obscure the detection of PTSD, if physician experience improves diagnostic ability for PTSD, and whether knowledge of PTSD and other factors may influence ability to correctly diagnose PTSD. Therefore, three hypotheses were tested: (a) there will be a significant main effect regarding the vignette types, in that rates of diagnosing PTSD across the vignettes will differ significantly. Specifically, a higher proportion of physicians assigned to the straightforward PTSD

vignette (PTSD-S), in which a patient presents with symptoms of PTSD and a minimal number of additional complaints, will accurately diagnose PTSD than those assigned to the PTSD with physical symptoms vignette (PTSD-P), in which a patient presents with symptoms of PTSD in addition to several physical complaints; (b) more experienced physicians, defined as those physicians with more years practicing in the field, will accurately diagnose PTSD more frequently than less experienced physicians across both vignettes; (c) knowledge of PTSD, defined by score on a knowledge of PTSD measure, will predict ability to accurately diagnose PTSD across both vignettes.

Chapter 3: Method

Design

This study utilized a two group between-subjects design with vignettes to assess the ability of primary care physicians to detect PTSD. Participants were randomly assigned to one of two groups: (a) a straightforward PTSD presentation (PTSD-S) with minimal symptoms to overshadow the PTSD presentation and (b) a PTSD with physical complaints (PTSD-P) presentation, in which there were multiple physical symptoms endorsed to potentially overshadow the PTSD symptoms. Each prospective participant answered three screening questions to determine eligibility. Eligible participants completed three measures for this online study: demographics questionnaire, diagnosis from the vignette, and a knowledge of PTSD measure.

Participants

Participants in this study were physicians and medical residents who work in primary care settings. *Primary care* was defined as a primary care, family medicine, or internal medicine clinic. A power analysis estimating a medium effect size of .4, using a critical value of .05, indicated that a sample size of approximately 120 was required to provide statistical power of .80. Inclusion criteria for participants were (a) graduation from medical school in the U.S.; and (b) majority of time in a primary care setting (defined as primary care, family medicine, and internal medicine clinic). Exclusion criteria for this study were: (a) not graduating from medical school at all; (b) being a pediatrician, pediatric resident, psychiatrist, or psychiatric resident; and (c) working predominantly in a setting other than primary care.

Recruitment

Subjects were recruited from physician and primary care organizations through social media, e-mails, electronic newsletters, and website forums. An e-mail or post was sent through the aforementioned mediums asking for participation in an online study seeking to investigate decision-making in primary care physicians. A link to the SurveyMonkey page was included in all postings. Potential participants who clicked on the link were taken to a SurveyMonkey page that provided information about what the study would consist of, eligibility criteria, and the option for participants to enter a raffle. Participants were required to indicate that they did want to participate in the study before being asked for demographic information and presented with the vignette. Contact information for the investigator was provided in all recruitment materials.

Measures

Demographics questionnaire. Participants were required to complete a 5-item demographics measure after they indicated they chose to participate in the study. The questions asked were participant age, gender, ethnicity, setting of their medical clinic, and years practicing in the field since graduation from medical school. For age, the participants selected into one of five groups: 24-29, 30-39, 40-49, 50-59, and 60+. For gender, they selected from a list of three options: male, female, and other. Regarding ethnicity, participants were able to select from a list of seven options: White/Caucasian, Black/African American, Hispanic/Latino/a, Asian American/Pacific Islander, Native American, Middle Eastern, and biracial. When selecting the setting of their primary care clinic, participants selected one of three options: urban, rural, or suburban. For the

variable of years practicing in the field, participants were able to identify as being in one of three groups: 1-5 years, 6-10 years, or 11 or more years.

Diagnosis. Participants had the option to enter up to three diagnoses for the patient in their vignette. The number of allowable diagnoses was chosen because previous studies have found that when primary care physicians are faced with unknown causes for symptoms, they can develop a large number of possible diagnoses (Kiderman, Ilan, Gur, Bdolah-Abraham, & Brezis, 2013). However, studies suggest that generally, physicians will ultimately consider 3.05 problems per primary care encounter, although that number decreases to 2.4 for a new patient encounter (Beasley et al., 2004). The diagnoses were manually entered.

Knowledge of PTSD measure. Following the completion of the vignette, participants were asked to complete a measure testing knowledge of PTSD. This measure consisted of 15 items to assess how much the physicians knew about PTSD symptoms and the impact the disorder has on individuals. Items were developed using similar measures constructed for primary care providers working with a veteran population (Veterans Health Initiative, 2002) and based on criteria from the *DSM-5* (APA, 2013) and ICD-10 (World Health Organization, 2012). Their score on the measure was determined by the number of items they answered correctly. Similar measures have been developed for use in assessing provider knowledge of PTSD within the VA system (e.g., Samuelson et al., 2013).

Vignettes

The vignettes were constructed after consulting the *DSM-5*, ICD-10, research on symptom presentation and comorbidities, and consultation with a primary care physician

and a psychologist to ensure face validity regarding the realistic nature of the patient presentation. Symptom presentation for the straightforward PTSD vignette used the *DSM-5* and ICD-10 to ensure that the symptoms presented would pass the clinical threshold for PTSD diagnosis. For the physical symptoms and PTSD presentation, effort was made to incorporate symptoms that are commonly comorbid in individuals with PTSD, specifically, chronic pain and irritable bowel syndrome (Afari et al., 2014). The vignette design was used to provide control over patient presentation variables so that a valid, reliable examination of how certain factors influence the likelihood of a PTSD diagnosis could be performed.

For this study, two separate vignettes were used, both of which involved a motor vehicle accident. The patients depicted in the vignettes were randomly assigned as being male or female to control for any gender effects. The first vignette involved a straightforward case of PTSD with little information to distract from the diagnosis (PTSD-S). The second vignette involved a patient with similar symptoms of PTSD, as well as several physical complaints (PTSD-P). The vignettes provided information on the patients' presentation, including height, weight, and vital signs that would be recorded at a primary care visit. Consecutive participants were randomly assigned to receive one of the two vignettes in order to remove threats to internal validity. Accurate detection of PTSD was determined by the inclusion of "PTSD" or "Posttraumatic stress disorder" in the diagnosis section. Responses such as acute stress disorder or adjustment disorders were accepted because both reflect distress related to the occurrence of a traumatic or distressing event.

Procedure

A total of 144 participants were recruited for the study and asked to click on the link to the SurveyMonkey page if they wanted to participate. Further information about the study was provided, including the purpose of the study and eligibility criteria. Screening questions were asked to determine eligibility, with ineligible participants taken to a page thanking them for their interest and informing them that they would be unable to participate. Eligible participants were taken to a page asking if they wanted to participate. Those who answered *Yes* were directed to the demographics questionnaire, whereas those who chose not to participate were taken to a page similar to that for ineligible participants.

After participants completed the demographics questionnaire, they were given a brief overview of the vignette procedure and asked to complete the vignette in one sitting, not to consult any outside resources in providing a diagnosis, and to submit a diagnosis within 18 minutes. These criteria were used to simulate the average amount of time of a primary care visit for an established patient (Mechanic, 2001). After reading this overview, participants were then randomly assigned to one of the four vignettes. After the vignette, they were prompted to record up to three preliminary diagnoses.

After they submitted their responses for the vignette, participants were asked to answer questions about their knowledge of PTSD. Items were provided one at a time, and participants were not allowed to go back to a previously answered question, as some items contained information that could be used to answer to items that appeared earlier in the test.

Following the completion of this measure, participants were provided with debriefing information about the study. They were informed about what the study was seeking to assess and why they were not told of the true intention of the study prior to answering the questions. The researcher's contact information was provided in the event they had questions or were interested in the results of the study. Finally, participants who wished to be entered into a raffle for a \$100 Amazon gift card had the option of entering their e-mail address.

Chapter 4: Results

Demographic Analysis

A total of 144 physicians participated in this research study. Of these participants, 45.8% were male and 54.2% were female (see Table 1). Regarding the age of participants, 20.8% were 24 to 29, 29.9% were 30 to 39, 18.8% were 40 to 49, 16.7% were 50 to 59, and 13.9% were 60 years of age or older. Of physicians who completed the study, 82.6% identified as White/Caucasian, 1.4% were Black/African American, 2.1% were Hispanic/Latino/a, 9.7% were Asian American/Pacific Islander, 0.7% were Native American, 0.7% were Middle Eastern, and 2.8% identified as biracial. Regarding the setting in which the participants practiced in primary care, 25.0% practiced in an urban setting, 33.3% practiced in a rural setting, and 41.7% practiced in a suburban setting. In terms of the experience of the physicians who took part in the study, 41.0% had 1 to 5 years of experience, 12.5% had 6 to 10 years, and 46.5% had 11 or more years of experience in the field.

Table 1

Demographic Variables' Descriptive Statistics With Randomization Check

Variable	<i>n</i> (%)	PTSD-P (<i>n</i> = 55)	PTSD-S (<i>n</i> = 89)	χ^2	<i>p</i>
Age		55 (38.2%)	89 (61.8%)	1.539	.820
24-29	30 (20.8%)	14 (25.5%)	30 (33.7%)		
30-39	43 (29.9%)	14 (25.5%)	29 (32.6%)		
40-49	27 (18.8%)	10 (18.2%)	17 (19.1%)		
50-59	24 (16.7%)	9 (16.4%)	15 (16.9%)		
60+	20 (13.9%)	8 (14.5%)	12 (13.5%)		
Gender				0.173	.677
Male	66 (45.8%)	24 (43.6%)	42 (47.2%)		
Female	78 (54.2%)	31 (56.4%)	47 (52.8%)		
Ethnicity				6.357	.384
White/Caucasian	119 (82.6%)	46 (83.6%)	73 (82.0%)		
Black/African American	2 (1.4%)	0 (0%)	2 (2.2%)		
Hispanic/Latino/a	3 (2.1%)	2 (3.6%)	1 (1.1%)		
Asian American/Pacific Islander	14 (9.7%)	4 (7.3%)	10 (11.2%)		
Native American	1 (0.7%)	0 (0%)	1 (1.1%)		
Middle Eastern	1 (0.7%)	0 (0%)	1 (1.1%)		
Biracial	4 (2.8%)	3 (5.5%)	1 (1.1%)		
Setting				1.659	.436
Urban	36 (25.0%)	14 (25.5%)	22 (24.7%)		
Rural	48 (33.3%)	15 (27.3%)	33 (37.1%)		
Suburban	60 (41.7%)	26 (47.3%)	34 (38.2%)		
Experience (years)				2.225	.329
1 to 5	59 (41.0%)	24 (43.6%)	35 (39.3%)		
6 to 10	18 (12.5%)	4 (7.3%)	14 (15.7%)		
11 or more	67 (46.5%)	27 (49.1%)	40 (44.9%)		

Randomization Check

To ensure randomization was adequate in distributing the variance across both conditions on the demographic variables, a chi-square analysis was utilized. As shown in Table 1, no significant between-group differences were found for age, $\chi^2 (4) = 1.539$, $p = .820$, gender, $\chi^2 (1) = 0.173$, $p = .677$, ethnicity, $\chi^2 (8) = 6.357$, $p = .384$, primary care setting, $\chi^2 (2) = 1.659$, $p = .436$, and experience in the field, $\chi^2 (2) = 2.225$, $p = .329$. Therefore, it can be assumed that the randomization procedure equally distributed the variance in the demographic variables measured across the two conditions.

To examine the relationship between variables, a bivariate correlation matrix was computed for physician age, gender, ethnicity, primary care setting, and experience in the field, vignette, PTSD knowledge scores, and PTSD detection. As seen in Table 2, significant associations were not found for the relationship between PTSD detection and physician age ($p = .225$), gender ($p = .375$), ethnicity ($p = .677$), primary care setting ($p = .816$), experience in the field ($p = .507$), vignette ($p = .708$), or PTSD knowledge scores ($p = .326$).

Table 2

Correlational Matrix of Demographic and Outcome Variables

Variable	Age	Gender	Ethnicity	Setting	Exp	Vignette	Detect	Know
Age	1.000							
Gender	-.093	1.000						
Ethnicity	-.298*	.051	1.000					
Setting	.055	.000	-.018	1.000				
Exp	.842*	-.050	-.320*	.109	1.000			
Vignette	-.023	.035	.024	.051	-.001	1.000		
Detect	-.102	.074	.035	-.020	-.056	-.031	1.000	
Know	.030	.075	-.192**	-.115	.065	-.103	.082	1.000

Note. Exp = Experience; Detect = PTSD Detection; Know = PTSD Knowledge Total Score

* $p < .01$; ** $p < .05$

Hypotheses

The first hypothesis was that there would be a significant main effect regarding the vignette types, in that rates of diagnosing PTSD across the vignettes would differ significantly. Specifically, a higher proportion of physicians assigned to the PTSD-S vignettes than those assigned to PTSD-P vignette would accurately diagnose PTSD.

To test this hypothesis, a 2 x 2 Pearson chi-square analysis was utilized. For this statistic to be used, the assumptions that must be met are that each observation must be independent of the others, and the expected frequencies in each cell must be greater than 5 (Field, 2013). Both assumptions were met, so the chi-square analysis was continued.

For this analysis, vignette type was the independent variable, and accurately diagnosing PTSD was the dependent variable. The results indicate that there was no significant association between vignette type and accurately diagnosing PTSD, $\chi^2 (1) = 0.143, p = .705$ (see Table 3). Therefore, it was determined that there was not a significant difference in the probability between physicians with the PTSD-Straightforward vignette (91.0%) and physicians with the PTSD-Physical vignette (89.1%) accurately diagnosing PTSD. Therefore, the first hypothesis was rejected.

Table 3

Results of Chi-Square Test for Vignette Type by PTSD Detection Rate

Vignette	PTSD Detected – n (%)	
	Yes	No
PTSD – Straightforward	81 (91.0%)	8 (9.0%)
PTSD – Physical Complaints	49 (89.1%)	6 (10.9%)
Total	130 (90.3%)	14 (9.7%)

Note. $\chi^2 = .143, df = 1, p = .705$

The second hypothesis was that there would be a higher proportion of physicians with more experience who accurately diagnosed PTSD than physicians with less experience across both vignettes.

To test this hypothesis, a 2 x 2 Pearson chi-square analysis was utilized. For this statistic to be used, the assumptions that must be met are that each observation must be independent of the others, and the expected frequencies in each cell must be greater than

5 (Field, 2013). Both of these assumptions were met, therefore the chi-square analysis was continued.

In this analysis, experience was the independent variable and accurately detecting PTSD was the dependent variable. The experience variable was collapsed into 2 levels: 1 to 10 years in the field; and 11 or more years. As with the previous hypothesis, the PTSD diagnosis variable had two outcomes: accurately detecting PTSD or not accurately detecting PTSD. The results did not indicate that there was a significant association between experience level and ability to accurately detect PTSD in the vignettes, $\chi^2(1) = 0.075, p = .784$ (see Table 4). Therefore, it was determined that physicians with more experience after medical school, specifically those with 11 or more years of experience, did not demonstrate a significantly better ability to detect PTSD across the vignettes. The proportion of primary care physicians in the 11 or more years of experience group who accurately detected PTSD (89.6%) was not significantly different than the proportion of physicians in the 1 to 10 years of experience group (90.9%) who accurately detected PTSD across the vignettes. Therefore, the second hypothesis of this investigation was rejected.

Table 4

Results of Chi-Square Test for Experience Level by PTSD Detection Rate

Experience Level	PTSD Detected – <i>n</i> (%)	
	Yes	No
1 to 10 Years	70 (90.9%)	7 (9.1%)
11 or More Years	60 (89.6%)	7 (10.4%)
Total	130 (90.3%)	14 (9.7%)

Note. $\chi^2 = 0.075$, $df = 1$, $p = .784$

The third hypothesis was that knowledge of PTSD, defined by score on knowledge of PTSD measure, would predict ability to accurately diagnose PTSD across both vignettes.

To test this hypothesis, a binomial logistic regression analysis was conducted to determine the effect of knowledge of PTSD on the likelihood that physicians could accurately detect PTSD. The variable included in the regression analysis was knowledge of PTSD (score on knowledge measure). The binary outcome variable was whether PTSD was accurately detected. Due to the nonsignificant correlation between demographic variables, experience, or vignette and PTSD detection, these variables were not included in the logistic regression analysis.

To use logistic regression, assumptions that must be met include are a linear relationship between continuous predictors and the logit of the outcome variable, independence of observed data points, and multicollinearity (Field, 2013). All three assumptions for the logistic regression analysis were met. Therefore, the statistical analysis was continued.

A test of the model with the one predictor of PTSD knowledge was not statistically significant, indicating that this variable was not a significant predictor of physicians' ability to accurately detect PTSD across the two vignettes, $\chi^2 (1, n = 144) = 0.946, p = .331$. As a result, the third hypothesis was rejected.

Table 5

Logistic Regression Predicting Likelihood of Detecting PTSD Based on Knowledge of PTSD

Factor	<i>B</i>	<i>SE B</i>	Wald	<i>df</i>	<i>p</i>
PTSD Knowledge	.140	0.142	0.969	1	.325

Note. Model $\chi^2 (1) = 0.946, p = .331$

Chapter 5: Discussion

Findings and Clinical Implications

This study sought to answer several questions regarding the ability of primary care physicians to detect PTSD and possible factors that could explain these results. The underlying belief, based on prior results in the research for both medical (e.g., Sibbald & Cavalcanti, 2011) and mental health conditions (e.g., Liebschutz et al., 2007), was that primary care physicians would struggle to accurately diagnose PTSD, particularly when there were physical symptoms present in addition to PTSD. The first hypothesis predicted that a higher proportion of the physicians in the straightforward PTSD vignette would diagnose PTSD than physicians in the PTSD with physical symptoms vignette. However, the results did not support this hypothesis, as the proportion of physicians who diagnosed PTSD was very similar in both conditions (91.0% vs. 89.1%). This may indicate that physicians were not distracted by the presence of additional physiological symptoms and were still able to identify PTSD. In fact, 90% of the physicians accurately diagnosed PTSD across both vignettes. This suggests that primary care physicians possess excellent ability to accurately detect PTSD when it is present and that primary care physicians in general are very capable of identifying patients with PTSD who may be in need of mental health services.

The second hypothesis posited that experience would impact physicians' ability to accurately diagnose PTSD, in that a higher proportion of more experienced physicians (11 or more years in practice) would detect PTSD than less experienced physicians (1 to 5 years or 6 to 10 years). The statistical analysis did not support this hypothesis, as there were no significant differences between physicians of different experience levels

regarding their ability to accurately diagnose PTSD in the vignettes. Therefore, primary care physicians in this investigation with more years in practice did not demonstrate a more advanced ability to detect PTSD than less experienced physicians. This raises the possibility that experience in and of itself does not improve detection ability for PTSD, based on the vignettes used in this study.

The final hypothesis was that knowledge of PTSD would influence primary care physicians' ability to detect PTSD, in that physicians with more knowledge of PTSD would accurately detect PTSD more frequently than those with less knowledge of PTSD. Knowledge of PTSD was measured by a 15-item measure created for the purpose of this study. This hypothesis was not supported by the data, in that there was no evidence that physicians who scored higher on the PTSD knowledge measure performed better in detecting PTSD within the vignettes. Therefore, this indicates that knowledge of PTSD, as least the knowledge assessed in this measure, does not significantly impact the ability to diagnose PTSD.

Based on the results of this investigation, it appears that primary care physicians are well prepared to identify patients with the effects of trauma who need mental health treatment. If this is accurate, it suggests that there may be other explanations for the underdiagnosis and underdetection of patients meeting criteria for PTSD. Furthermore, experience and knowledge, as measured in the present study, do not appear to have an impact on the diagnostic ability of primary care physicians when symptoms of PTSD are present. There may be other factors that better account for the discrepancy identified in earlier research studies between patients meeting criteria for PTSD and those who have been accurately diagnosed as having PTSD.

It is possible that the current training and clinical experience of primary care physicians allow them to enhance illness scripts for detection of conditions such as PTSD. With the aforementioned increase in the proportion of patients seeking treatment for mental health conditions such as PTSD in primary care settings, it is possible that the encapsulation process is occurring sooner as physicians gain experience treating patients with these disorders (Schmidt & Rikers, 2007). It may therefore be that increased familiarity with PTSD is allowing primary care physicians to better recognize it, thus accounting for the lack of a significant difference between vignettes for straightforward PTSD and PTSD plus multiple physical symptoms (Custers, Boshuizen, & Schmidt, 1998). However, given that the results of this investigation are in such stark contrast to those reported in other studies, the conclusion that this is entirely due to improved detection abilities in primary care physicians may need to be tempered.

Limitations

There are some limitations of this study that need to be taken into consideration. On a very basic level, the collection of data using a web-based survey introduces the possibility that the information was not completely accurate. Although precautions were taken to create inclusion and exclusion criteria, to block individuals from completing the study more than once from the same device, and to request that participants not consult outside references, there is no way to be completely certain that participants followed instructions. As a result, there may be significant variance that cannot be accounted for by this investigation, based on the method that was used.

The manner in which participants were recruited may also limit the generalizability of the results. Primary care physicians may have chosen to participate

because of their experience or interest in mental health issues, resulting in self-selection bias. Other physicians may not have responded in a similar way.

The structure of the study may have introduced potential threats to the external validity. First, the large percentage of physicians who accurately diagnosed PTSD suggests that the clinical cases were not realistic or significantly challenging to truly test physicians' diagnostic ability. The lack of overall variance restricted the ability to detect differences in PTSD diagnosis across vignettes and when factoring in other variables. This may have obscured potential findings regarding influences on physicians' ability to accurately detect PTSD. Although the structure of studies differed significantly, it is worth noting that there was a large difference in the proportion of physicians who accurately diagnosed PTSD or other mental health conditions in previous research (e.g., Mitchell et al., 2009). The manner in which the information was presented in the vignettes may have affected the results. In the present investigation, the trauma event was the identified reason for the primary care visit. In comparison, the PTSD vignette from the Satter et al. (2012) study also used a car accident as the reason the patient was presenting, but it was later revealed that the patient had been the victim of an alleged assault several months prior. Having the traumatic incident as the reason for the primary care visit may have primed the participants to identify PTSD, whereas a vignette that did not initially reveal a traumatic incident would have been more difficult to detect. Therefore, the order in which patient data was presented may have impacted the likelihood that participants diagnosed PTSD.

Vignettes do not completely simulate patient encounters, as they present participants with all of the information that is needed to make a diagnosis, instead of

requiring physicians to gather this information. In this way, it tests physicians' knowledge of the diagnostic criteria for PTSD, but does not factor in the physicians' ability to assess these symptoms on their own. Vignettes are commonly used in the medical research to assess provider behavior, although a systematic review found that the statistical methods can be improved (Bachmann et al., 2008). More pertinently, they have been found to closely approximate outcomes of using standardized patients to test physician performance (Peabody, Luck, Glassman, Dresselhaus, & Lee, 2000). Therefore, it may be premature to dismiss these results based on this limitation alone. Nevertheless, it is possible that the structure of the study did not account for other factors that may explain whether a patient is accurately diagnosed with PTSD.

It is also possible that the artificial condition of a vignette caused a reactive effect among physicians, in that they may have been primed to think of mental health diagnoses because they knew the study was being conducted by a clinical psychology student. This phenomenon is not as likely to occur in actual primary care encounters and therefore raises the possibility that the nature of this investigation may not accurately predict diagnostic performance with actual patients. Actual patient encounters are much more complex than vignettes written in paragraph form, and do not account for variables that are inherent in primary care visits, such as time constraints, potential biases or priming effects from seeing sequences of patients, interpersonal factors, and information gathering skills needed for a diagnosis such as PTSD. In this way, the vignettes in this investigation may represent a relatively straightforward and diluted scenario compared to what these physicians are likely to encounter in the course of their work.

Finally with regard to the vignettes, this particular study only included two conditions of patients with PTSD. As previously indicated, there are thousands of ways in which PTSD can present, based on the current diagnostic criteria (Galatzer-Levy & Bryant, 2013). Therefore, the conditions for this study may be insufficient in replicating the PTSD manifestations primary care physicians are likely to encounter. As a result, it calls into question what conclusions can be drawn from this investigation, due to the limited variety and even the potential that the PTSD-Physical vignette did not contain enough physical symptoms that may be experienced by individuals with PTSD. This study did not examine if there were specific symptoms that are more likely to overshadow the diagnosis of PTSD. A comparison with additional vignettes containing different combinations of symptoms would have allowed for a more in-depth examination of whether certain symptoms of PTSD are more likely to influence a primary care physician's ability to accurately detect PTSD.

Regarding the collection of demographic variables, this study utilized categorical variables in the form of groupings for age and experience. This limited the precision of the demographic data in that there may have been undetected differences within the categories. The use of continuous variables would have allowed for enhanced precision and discovery of possible nuances within the demographic variables. However, using a nominal level of measurement for experience prevented potentially richer analysis of the role of experience in detecting PTSD.

Another limitation involves the PTSD knowledge measure that was used to determine how much physicians knew about PTSD. This was a measure created for the purposes of this investigation, and therefore is not standardized. Although it allows for

comparison among physicians who participated in this study, it does not allow for generalization to primary care physicians as a whole or to mental health professionals who are well versed in PTSD. Furthermore, although the measure could best be described as assessing general knowledge of PTSD, it can be argued that this general knowledge may not have as much predictive value as more specialized knowledge (e.g., diagnostic criteria). In this way, results may not indicate firm conclusions about the role of knowledge in accurately diagnosing PTSD.

Future Directions

Based on these results, future research might focus on whether the ability of primary care physicians to accurately detect PTSD can be assessed using interactions with live patients, either through the use of standardized patients or actual patients. Previous studies have found significant underdetection and undertreatment of patients who meet criteria for PTSD (e.g., Liebschutz et al., 2007); however, it is possible that changes to the training of primary care physicians may have resulted in better ability to detect mental health diagnoses. Electronic medical records have been identified as having the potential to improve diagnostic ability in medical settings, although researchers also acknowledge that systems have not been developed that can utilize the vast amount of data contained in health records for the purpose of improved diagnostic clinical decision making (Castaneda et al., 2015). At the very least, similar investigations with more rigorous tests of primary care physicians' ability to detect PTSD may allow for better understanding of factors that influence this ability.

Future studies may also utilize standardized measures that better measure knowledge of PTSD that specifically impacts diagnostic ability. Establishing baselines of

PTSD knowledge for mental health professionals, such as psychologists and psychiatrists, may allow for comparisons with primary care physicians to determine if there is a significant knowledge gap that could account for possible differences in detection ability. Utilizing a knowledge measure that assesses for multiple constructs of PTSD knowledge could allow for a better determination of whether certain types of knowledge about PTSD are more important in accurately detecting the condition. The identification of specific knowledge of PTSD, or any mental health conditions, would assist in determining the most appropriate education and training approaches to prepare physicians for the mental health conditions they are likely to encounter in primary care settings.

If these results accurately represent the diagnostic ability of primary care physicians with a complex mental health disorder such as PTSD, then it may be beneficial for future investigations to determine factors in this advanced detection ability. If knowledge or experience are not significant factors in explaining diagnostic ability, examining other potential factors would be beneficial in understanding how to best train primary care physicians for their increasing role in treating mental health conditions. Identifying these factors could also impact the clinical education of future primary care physicians. For example, one possible factor could be the increased prevalence of integrated primary care settings in which physicians work alongside mental health professionals to best serve their patient population. Research has shown that learning alongside a mental health professional is the most effective way to gain knowledge about mental health conditions (Smolders et al., 2008), which would be expected to contribute to better ability to accurately diagnose PTSD. Furthermore, physicians in integrated primary care settings endorse that they are more comfortable talking to patients about

mental health concerns (Torrence et al., 2014), which could lead to better ability to detect mental health symptoms.

Summary and Conclusions

In conclusion, primary care physicians did not have significant deficits when tasked with accurately diagnosing PTSD based on the written-word vignettes utilized in this study. Significant differences in detection rates were not found between straightforward presentations of PTSD and PTSD with comorbid physical symptoms. Furthermore, years of experience after graduation from medical school were not related to improved ability to detect PTSD across vignettes. Physicians with 11 or more years in practice did not accurately diagnose PTSD at a significantly higher proportion than physicians with 1 to 5 or 6 to 10 years of experience. Finally, performance on the knowledge of PTSD measure was not found to be predictive of ability to detect PTSD in the vignettes, as no significant relationship was found between these variables.

Therefore, this investigation determined that primary care physicians performed exceptionally in their ability to accurately diagnose PTSD in a series of vignettes, regardless of whether the patients presented with straightforward PTSD or PTSD in addition to other physical complaints. This may indicate that detection rates for PTSD are improving or that the issue identified in previous research does not lie in physician diagnostic ability. Furthermore, experience and knowledge, as measured in this study, did not improve ability to accurately detect PTSD. The limitations of this study should be taken into consideration when interpreting these results. However, the results suggest that primary care physicians will be able to meet the increasing demands in providing integrated mental health.

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Appendix A

Knowledge of PTSD Measure

1. What of the following statements is the most accurate:
 - a. Males are twice as susceptible to developing PTSD than females
 - b. Women are twice as susceptible to developing PTSD than men**
 - c. Equal rates of PTSD in males and females
 - d. Inconsistent differences in the research
 - e. Males are three times as susceptible to developing PTSD than females
2. Exposure to traumatic stress and/or PTSD is associated with what impact on healthcare resources (e.g., visits, hospitalizations, medications, labs, etc.):
 - a. Decrease in utilization of medical and mental health resources
 - b. Increased use of medical and mental health care resources**
 - c. Increased use of mental health care resources but minimal impact on medical health care resources
 - d. Increased use of medical health care resources and withdrawal from mental health services
 - e. Increased use of mental health care resources and decreased use of medical health care resources
3. All of the following are examples of traumatic events except:
 - a. Car accident
 - b. Divorce**
 - c. Being physically attacked
 - d. Hearing about a family member being murdered
 - e. All are traumatic events
4. Which mental disorder is most commonly comorbid with PTSD:
 - a. Anorexia
 - b. ADHD
 - c. Delusional disorder
 - d. Depression**
 - e. None are comorbid with PTSD
5. Compared to the general population, PTSD sufferers more commonly use which problematic coping behavior to manage their distress:
 - a. Substance use
 - b. Avoidance
 - c. Suicide attempts
 - d. All of the above**
 - e. None of the above
6. Which of the following is NOT an effect of PTSD-associated arousal and reactivity:
 - a. Hyperventilation**
 - b. Sleep impairment

- c. Concentration difficulty
 - d. Irritability
 - e. All represent an arousal and reactivity symptom of PTSD
7. Which of the following questions would be the most diagnostic for PTSD:
- a. "Have you ever had nightmares before?"
 - b. "Have you been crying uncontrollably in the last month?"
 - c. "Have you heard or seen things that other people could not detect?"
 - d. "Have you been feeling constantly on guard, watchful, or easily startled?"**
 - e. "Have you suffered any injuries from a traumatic event?"
8. Which of the following are often avoided in PTSD:
- a. Thoughts about the trauma
 - b. Places that remind the individual about the trauma
 - c. People that remind the individual of the trauma
 - d. All of the above**
 - e. None of the above
9. Which statement is most accurate about the relationship between trauma exposure and development of PTSD:
- a. The majority of individuals who experience a traumatic event will naturally recover and not meet criteria for PTSD**
 - b. The majority of individuals who are exposed to a traumatic event will meet criteria for PTSD
 - c. Approximately half of individuals who are exposed to a traumatic event will go on to develop PTSD
 - d. All individuals who experience a traumatic event will meet criteria for PTSD
 - e. The research is inconsistent about the relationship between trauma exposure and PTSD
10. Which of the following is not an example of the re-experiencing or reliving symptoms of PTSD:
- a. Recurring dreams or nightmares related to the trauma
 - b. Involuntary re-telling of the traumatic event**
 - c. Flashbacks to the traumatic event
 - d. Distress when exposed to cues associated with the traumatic event
 - e. All of the above are examples of re-experiencing/reliving symptoms of PTSD
11. Which of the following is true about flashbacks and/or memories in PTSD:
- a. Flashbacks are a detachment from the present and are multi-sensory**
 - b. Flashbacks and memories about the trauma all describe the same experience
 - c. Memories occur while awake, while flashbacks occur while asleep
 - d. Flashbacks are more common than memories about the trauma
 - e. Flashbacks involve seizures, memories do not

12. Which of the following does NOT commonly describe the emotional experience of individuals with PTSD:
- Emotional numbness
 - Inability to experience positive emotions
 - Lack of remorse or guilt**
 - Intense outbursts of anger
 - None of the above
13. Which of the following is most prevalent in PTSD:
- Epileptic seizures
 - AIDS
 - Cirrhosis
 - Chronic pain**
 - All of the above
14. Which of the following is NOT a common symptom after trauma:
- Headaches
 - Grinding of teeth
 - Low blood pressure**
 - Nausea
 - All of the above are common physical symptoms after exposure to trauma
15. Which of the following is common after trauma:
- Decrease in alcohol or substance use
 - Excessive sleeping
 - Decreased aggression and hostility towards others
 - Social withdrawal**
 - None of the above

Appendix B

PTSD-Straightforward – Male Vignette

A 34-year-old male, appropriately dressed, presented in the primary care clinic complaining of being “stressed out” for the past month. Patient was oriented x 3. He stated that he was in a MVA 12 months ago, and complained of having difficulty sleeping for several weeks. The patient reported he was hit from behind in the accident, stating that the airbag deployed and the car was “totaled”. He was taken to the ER immediately following the accident and evaluated, but reports that he was ultimately released from the ER the same day. However, he complains of difficulty concentrating and irritable mood in the past few months. He denies driving himself since the MVA. Patient complains of poor sleep and frequent nightmares. Pt. reports full-time employment as an auto mechanic, but has not returned to work since the MVA. Pt. describes enjoying recreational activities such as bowling and softball, but has not participated since the MVA. He does not believe he was diagnosed with a traumatic brain injury and does not believe that he suffered any loss of consciousness from MVA. The patient denies significant medical conditions, denies taking any prescription medication, and denies history of substance abuse.

Vitals

Temp: 98.9 F

Blood Pressure: 129/84

Pulse Rate: 85

Respiratory Rate: 15

Height: 5' 10"

Weight: 195

PTSD-Straightforward – Female Vignette

A 34-year-old male, appropriately dressed, presented in the primary care clinic complaining of being “stressed out” for the past month. Patient was oriented x 3. She stated that she was in a MVA 12 months ago, and complained of having difficulty sleeping for several weeks. The patient reported she was hit from behind in the accident, stating that the airbag deployed and the car was “totaled”. She was taken to the ER immediately following the accident and evaluated, but reports that she was ultimately released from the ER the same day. However, she complains of difficulty concentrating and irritable mood in the past few months. She denies driving herself since the MVA. Patient complains of poor sleep and frequent nightmares. Patient reports full-time employment as an auto mechanic, but has not returned to work since the MVA. Pt. describes enjoying recreational activities such as bowling and softball, but has not participated since the MVA. She does not believe she was diagnosed with a traumatic brain injury and does not believe that she suffered any loss of consciousness from MVA. The patient denies significant medical conditions, denies taking any prescription medication, and denies history of substance abuse.

Vitals

Temp: 98.9 F

Blood Pressure: 129/84

Pulse Rate: 85

Respiratory Rate: 15

Height: 5' 7"

Weight: 179

PTSD-Physical - Male Vignette

A 34-year-old male, appropriately dressed, presented in the primary care clinic complaining of being “stressed out” for the past month. Pt. was oriented x 3. He stated that he was in a MVA 12 months ago, and complained of having difficulty sleeping for several weeks. The patient reported he was hit from behind in the accident, stating that the airbag deployed and the car was “totaled”. He was taken to the ER immediately following the accident and evaluated, but reports that he was ultimately released from the ER the same day. He reported persistent neck and back pain that he attributed to injuries sustained in the accident. He reports taking Percocet and Oxycontin briefly following the MVA for neck pain, but denies present use.

The patient complains that he was experiencing nightmares about the accident a couple nights a week, and that he would often wake up due to the pain in his back. However, he complains of difficulty concentrating and irritable mood in the past few months. The patient did report he will experience a dull headache at times, similar to ones he experiences when stressed, but they have occurred only intermittently in recent weeks. He also reported general abdominal pain and constipation. He denied any instances of hematuria. He has avoided driving himself since the MVA, stating that he is still uneasy about getting behind the wheel. Patient complains of poor sleep and frequent nightmares.

Pt. reports full-time employment as an auto mechanic, but has not returned to work since the MVA. Patient describes enjoying recreational activities such as bowling and softball, but has not had interest in them since the MVA. He does not believe he was diagnosed with a traumatic brain injury and does not believe that he

suffered any loss of consciousness from the MVA. The patient denies significant medical conditions, taking any prescription medication, history of substance abuse, or history of seizures. He reported experiencing physical discomfort, rating his pain on average as being a 6/10, and that it was an 8/10 today. The nurse reports that he was very agitated when she brought him from the waiting room, although he later apologized to you, saying he has had a short-temper in the last month of two.

Vitals

Temp: 98.9 F

Blood Pressure: 129/84

Pulse Rate: 85

Respiratory Rate: 15

Height: 5' 10"

Weight: 195

PTSD-Physical - Female Vignette

A 34-year-old female, appropriately dressed, presented in the primary care clinic complaining of being “stressed out” for the past month. Pt. was oriented x 3. She stated that she was in a MVA 12 months ago, and complained of having difficulty sleeping for several weeks. The patient reported she was hit from behind in the accident, stating that the airbag deployed and the car was “totaled”. She was taken to the ER immediately following the accident and evaluated, but reports that she was ultimately released from the ER the same day. She reported persistent neck and back pain that she attributed to injuries sustained in the accident. She reports taking Percocet and Oxycontin briefly following the MVA for neck pain, but denies present use.

The patient complains that she was experiencing nightmares about the accident a couple nights a week, and that she would often wake up due to the pain in her back. However, she complains of difficulty concentrating and irritable mood in the past few months. The patient did report she will experience a dull headache at times, similar to ones she experiences when stressed, but they have occurred only intermittently in recent weeks. She also reported general abdominal pain and constipation. She denied any instances of hematuria. She has avoided driving herself since the MVA, stating that she is still uneasy about getting behind the wheel. Patient complains of poor sleep and frequent nightmares.

Pt. reports full-time employment as an auto mechanic, but has not returned to work since the MVA. Patient describes enjoying recreational activities such as bowling and softball, but has not had interest in them since the MVA. She does not believe she was diagnosed with a traumatic brain injury and does not believe that she

suffered any loss of consciousness from the MVA. The patient denies significant medical conditions, taking any prescription medication, history of substance abuse, or history of seizures. She reported experiencing physical discomfort, rating her pain on average as being a 6/10, and that it was an 8/10 today. The nurse reports that she was very agitated when he brought her from the waiting room, although she later apologized to you, saying she has had a short-temper in the last month of two.

Vitals

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