**TITLE: THE PATHWAY TO THE DEVELOPMENT AND MAINTENANCE OF PTSD AMONG HEALTHCARE WORKERS IN THE FIRST FIVE MONTHS OF THE COVID-19 PANDEMIC IN EKITI STATE, NIGERIA**

ABSTRACT

**AIMS:** The Coronavirus declared as a pandemic has been taking untold mental health challenges among healthcare workers (HCWs) in the past five months in Ekiti State, Nigeria. The pandemic cut the Ekiti State Government unprepared considering inadequate testing facilities. Researchers have suggested that the health belief model (HBM) is a preventive method in the wave of a pandemic outbreak and is the best behavioral safety precaution for HCWs in the wave of a pandemic outbreak. However, we perceived that some components of HBM (perceived severity, susceptibility, and barriers) are emotional laden and could correlate with experiential avoidance to develop Posttraumatic stress disorder among the HCWs. There is a dearth of literature associating HBM, experiential avoidance (EA), and PTSD among HCWs. Therefore, the aims of this current study were to assess the predictive strength of HBM on PTSD as well as asses if EA predicts HBM and PTSD. We also aimed to investigate the mediating effects of HBM and EA on PTSD.

**METHOD:** We used exploratory research design to collect data using the measures of HBM, acceptance and action questionnaire-II (AAQ-II), and PTSD Checklist (Civilian Version) among 474 HCWs in Ekiti State, Nigeria.

**RESULTS**: The results show that some components of HBM predict PTSD, and EA predicted the three components of HBM and PTSD. The study also found that HBM partially mediated the relationships between EA and PTSD and HBM has indirect relationships with EA and PTSD.

**CONCLUSION**: Working in healthcare facilities and being a female are associated with PTSD and its symptomology. High level of PTSD among HCWs can be explained by components of HBM. We therefore recommended that the treatment of HCWs should focus on increasing psychological flexibility, and Healthcare practitioners should consider HBM cautiously during pandemic.

**KEYWORDS**: Nigeria, PTSD, Experiential avoidance, Health belief model, Covid-19, Ekiti State,

**INTRODUCTION**

The Coronavirus was pronounced a pandemic by the World Health Organization (WHO) on March 11, 2020, and it is spreading like wide fire across the world over 187 nations. This virus has infected more than 90,000 Health Care Workers (HCWs), including 260 nurses who lost their lives in just five months in 30 nations (International Council of Nurses 2020). Nigeria, which has been identified as the 13th top high-risk nation for Covid-19 importation due to its high travel volume to and from China (WHO April 24, 2020), has had over 113 HCWs infected (Primer Time June 20, 2020) in the past five months. In Ekiti State, South West Nigeria, the Government has set up a 40-man Task Force to include an infection prevention control team, case management team, laboratory scientists, epidemiologists and researchers, and psychologists, among others, to trance, test, and treat anyone suspected of the virus.

The State experienced her first confirmed case of Covid-19 on March 19, 2020, as the result of a death of a 27-year-old American (Vanguard March 19, 2020). Her first indigene Covid-19 death occurred on April 22, 2020, and the same patient infected a medical doctor. It is not sure if this doctor will survive or if his family or co-workers will be infected. Elsewhere in Nigeria, a medical doctor acquired the disease and died. His wife and children tested positive for the Coronavirus (Premium Time April 10, 2020) and are now fighting for survival. Nigeria has witnessed the death of 10 medical doctors, with 816 (6% of all infected cases) infected cases of healthcare workers nationwide, and this might create mental health problems such as posttraumatic stress disorder (PTSD).

 Many studies in Nigeria or Ekiti State have focused on the physical or material causes of health worker death in the State or the nation (Anyanwu et al., 2020; Miner et al., 2020). Moreover, they have identified inadequate facilities for testing Covid-19 patients, shortages of a test, reagents, kits, primers, aprons, hair covers, face masks, face shields, and shoe covering (Anyanwu et al., 2020; Amzat et al., 2020; Miner et al., 2020). In addition, others have identified that it takes over six hours to complete a test and 24 to 48 hours for a patient to get results ( Akor et al., 2020). Unfortunately, we are unaware of the psychological or mental health effects of these material or physical inadequacies on HCWs in the State during the first five months of this pandemic.

 Research has demonstrated that medical doctors and allied health workers who experienced these nosocomial and psychological traumas might have Posttraumatic stress disorder (PSD) (detour et al. 2020). It is documented that PTSD stands to be the most common mental health problem of healthcare workers (HCWs) doing this Covid-19 (Tan et al., 2020) which is estimated as high as 2.1% to 73.4% in a recent Covid-19 survey in 14 selected articles conducted in Singapore (Tan et al., 2020). Those who suffer from this disorder more often avoid places, people, and events or suffer from the social relationship, flashbacks, nightmares, watchfulness, oversensitivity, fear of safety, and shame (American Psychiatric Association 2020; Ehlers & Clark, 2000; Nolen-Hoeksema, 2018; Sue, Sue and Sue 2006; Yarsearh & Adegoroye, 2019). Furthermore, research has demonstrated that a factor that contributes to the maintenance and development of PTSD is experiential avoidance (EA). EA is an essential evolutionary foundation for achieving relief from emotional and psychological distress in a time of life-threatening phenomena but has the paradoxical effects of upholding the ongoing fear (Ehlers & Clark, 2000; Hayes et al., 1996; Hayes et al., 2006). EA is often employed in the wave of life-threatening situations as a coping strategy to control or escape from negative experiences or emotions, but paradoxically it contributes to the development and maintenance of PTSD (Blackledge & Barnes-Holmes, 2009; Hayes et al., 2006) and its symptoms (Hochbaum, 1985). This mental health problem is believed to be very common among women (James, 2015; Mealer et al., 2009), and women are made up almost half of HCWs in Ekiti State.

Healthcare policymakers often recommend the health belief model (HBM) as a health prevention and control strategy (Janz & Becker, 1984; Rosenstock, 1974). Researchers believe that HBM is the best behavioral safety precaution for HCWs in traumatic situations without which health services might fail (Hochbaum, 1985; Janz & Becker, 1984; Janz & Marshall, 1994). A perception that we adduced is contestable and obsolete and might not necessarily be applicable, especially at the initial stage of a disease outbreak. Therefore, we perceived that HBM has predictive power over PTSD and EA and could serve as paths through which PTSD could be developed and maintained. However, to our knowledge, there is a dearth of research assessing HBM, EA, and PTSD among HCWs. Indeed, a study that will assess relationships among these variables is currently needed to assist policymakers in the health sectors in mitigating the mental health effect of the covid-19 among HCWs in the earlier stage of this pandemic. In particular, we attend to assess whether HBM will mediate the relationship between EA and PTSD among HCWs in the first five months of the pandemic. This will help us understand how PTSD is developed and maintained among HWCs in Ekiti State. Therefore the main objective of this current study was to assess the relationship between HBM and PTSD, EA and HBM , EA and PTSD, as well as to assess the mediating effects of HBM, experiential avoidance, and PTSD among healthcare workers in Ekiti State since five months of the COVID-19.

HEALTH BELIEF MODEL AND PTSD

Indeed, HBM has six components, but for this current study, three of its components were considered to be appropriate for this study. These are Perceived susceptibility, perceived severity, and perceived barriers considered the original components of HBM that are reliably measured across all cultures compared to the rest of the components (Champion and skinner 2008). Perceived susceptibility is a subjective assessment of the risk of contracting and becoming harmed by a disease (Rosenstock, 1974). Research demonstrates that individual with high perceived susceptibility is likely to take relevant actions to reduce the level of danger, while those with low perceived susceptibility are not likely to engage in health promotion behavior to mitigate the level of perceived danger ( Kim & Kim, 2020). Also, Perceived severity, known as perceived seriousness, is a subjective assessment of the potential danger imposed by disease and its consequences (Rosenstock, 1974). In a study on Covid-19 in Iran, Duan et al. ( 2020) found that perceived severity was significantly associated with the public adoption of health promotion measures. Again, during the 2003 SARS in Hong Kong, respondents with a high risk of perceptions were more likely to take comprehensive precautionary measures against the infections (Leung et al., 2003). At the same time, a perceived barrier is individual assessments of obstacles to behavior change, including inconveniences, danger, medical procedures, discomfort, social consequences, and expenses (Glanz et al., 2008Janz, Marshall, and Becker, 1984).

On the other hand, PTSD is an anxiety disorder that one experiences after exposure to a traumatic event like COVID-19. According to Peters, Slade, and Andrews (1999), PTSD is a mental health disorder classified into three groups: re-experiencing avoidance hypervigilance (American Psychiatric Association 2020; Nolen-Hoeksema, 2018; Sue, Sue and Sue 2006). Considering these three clusters of PTSD, studies show that women reported high levels of re-experiencing symptoms of PTSD than men after a motor vehicle accident (Fullerton et al., 2001). Studies have shown that the estimate of PTSD symptoms among healthcare workers is high than the general population, and it ranges from 6-10% in a recent Covid-19 survey conducted in Singapore (Tan et al. 2020), 18% from nurses working in hospitals in general (Mealer et al., 2009). Research shows that past infectious

disease outbreaks, including severe acute respiratory syndrome (SARS) the Middle East respiratory syndrome (MERS), were associated with mental health issues among HCWs (Bai et al., 2004; Lee et al., 2018) primarily PTSD and Posttraumatic stress symptom (d’Ettorre et al. 2021). Demographic factors like gender, age, education level, and service length have been associated with PTSD among HCWs (d’Ettorre et al., 2021). Being a woman has been associated with PTSD, most especially doing health crises (Breslau, 2009; Bright and Bowland, 2008; James, 2015).

To our knowledge, there is no direct link between HBM and PTSD in the scientific literature. There is a consensus that the outbreak of the coronavirus pandemic is a traumatic event (perceived severity, susceptibility) that is perceived as a negative emotion. Furthermore, the cognitive theory of emotion states that negative cognition leads to negative emotion (Banks & Kems, 1996; Beck et al., 1998; Lazarus & Folkman, 1998). leading to a significant increase in anxiety, depression, and stress ( Corrigan, 2014 and Davidson, 1997) that overlapped with PTSD (Breslau et al., 1999; Renck, Weisacth and Skarbo, 2002) and comorbid with PTSD (Breslau et al., 2002; Mayou, Bridget, and Ehlers, 2001Tull, 2009). With the general perception that HBM is a health protection and prevention method (Carpenter, 2010; Janz & Becker, 1984; Rosenstock, 1974), we hypothesized that an increase in a high level of three components of HBM would lead to an increase in PTSD and its components among HCWs five month since the inception of the COVID-19 pandemic

**EXPERIENTIAL AVOIDANCE (EA) AND HEALTH BELIEF MODEL (HBM)**

Experiential avoidance occurs when an event takes place, and an individual does not want to remain in contact with the private emotions (bodily sensations, thoughts, emotion, thinking, memories and behavior prediction ) associated with the event and does everything possible to prevent feelings from occurring (Kashdan & Kane, 2011). Theory suggests that EA is a valuable evolutionary foundation for achieving relief from emotional and psychological distress in times of life-threatening phenomena (Hayes et al., 1996). However, research has found that efforts to avoid unwanted thoughts and feelings often paradoxically increase the severity of the event as well as increase maladjusted behavior ( Max & Sloan, 2002)). Despite the adverse effects of EA, people often embark on this strategy when faced with life-stressing events because of its immediate positive outcome in reducing emotional experiences. Therefore, EA has been associated with adaptive coping styles for trauma victims (Wenzlaff & Wegner, 2000). However, EA has often been associated with prolonged suffering (Hayes et al., 1996), a key process in emotional disorder, depressive symptoms Kashdan et al., 2010, trauma (Lewis & Naugle, 2017), and PTSD ( Kashdan & Kane, 2011; Thompson & Waltz, 2010). Additionally, EA often deprives people of the opportunity to experience positive feelings and emotions, making them believe that anything trauma related is terrible and unwanted (Thomson & Waltz, 2000).

It is presently unknown if experiential avoidance predicts the HBM model. Researchers conceived that when one faces an observable threat (perceived severity), his/her risk level rises (perceived susceptibility) ( Kim & Kim, 2020). When there is no means of mitigating the threat ( perceived barriers), he/she feels vulnerable and tries to minimize the effects of the threat by escaping from its sensations (Hayes et al., 1996). Thus, the perpetual nature of EA to alter unwanted feelings or sensations may negatively affect HBM among HCWs in Ekiti State. These thoughts and findings inform further studies that invite specific covid-19 EA to assess its predictive power on HBM. Hence considering the changing nature of the virus and its nosocomial transmission rate, HCWs might operate on a high level of Perceived threat ( susceptibility and severity) and barriers due to a high level of inability to assess resources (Anyanwu, 2020). EA has been observed as a short-time strategy for managing emotional expression (Kashdan et al., 2005). Other studies have demonstrated that fear of being infected negatively affects public mental health, reporting increased depression and anxiety (Fitzpatrick, Draw, and Harris, 2020; Ornell et al., 2020; 2020; Shigemura et al., 2020). We, therefore, hypothesized that experiential avoidance would predict the three components of HBM among HCWs in Ekiti State in the past five month

**Experiential Avoidance (EA) and posttraumatic Stress Disorder (PTSD)**

Independence of the comorbidity of PTSD, one area of concern among PTSD researchers is experiential avoidance. EA is an umbrella term for cognitive avoidance, emotional avoidance/numbing behavior avoidance, avoidance coping, thought suppression, alexithymia, and other emotional regulation strategies (Mayou and Ehlers and Bryant, 2002; Sifneos, 1973; Thompson & Waltz, 2010). Although EA is a widely researched component of psychological inflexibility (Bardeen, Fergus, and Orcutt, 2013; Gerhart et al., 2014; Monestes et al., 2017), and given that EA contained elements of PTSD and in the three clusters of PTSD, the avoidance cluster is noticed to be the primary predictor required by the DSM-V for the existence of PTSD (APA, 2013). Considering that theory has found that at the initial stage of a catastrophic event, experiential avoidance would be unavoidably employed as a coping mechanism (Hayes et al. 1996 and Thompson and McCracken 2011), we perceived that HCWs could use this variable as it relief and it might have some predictive power of PTSD.

 EA often occurs when an individual is unwilling to remain in touch with private thoughts, emotions, feelings, sensations, and memories and take actions to change the experience of these events ( Hayes et al., 1996). The avoidance aspect of EA is made out of subsequent attempts to reduce negative private experiences. In this way, EA has been considered a negative form of emotional or avoidance coping strategy which is linked to psychopathology (Hayes et al., 1996). However, EA is part of our daily life, as humans are most often socialized to contain specific behavior in order to enhance social approval, especially in like of the

COVID-19 to enhance safety. In this like, EA is often adaptive for the traumatic victim if it helps victims to identify and avoid similar traumatic events (Thompson & Waltz, 2010), and EA has been found to have positive and short time outcomes when it used thought suppression only once (Haves & Wilson, 1996), and again, EA has been associated with recovery from a traumatic event and several of life-threatening experiences (Creamer, Burgess and Pattison 1992; Joseph, Yule and Williams 1994; 1995). In this way, EA might not have any predictive strength on PTSD but whether this perception is applicable to health workers within the earlier stage of this pandemic is yet to be proven.

On the other hand, PTSD is a mental health disorder with clusters of emotional numbness/ avoidance, which has been diagnosed to be high among healthcare workers that, range from 2.1% to 73% (Gazzaro et al., 2020) due to the increased risk of contagiousness in the hospital, working in unsafe settings, lack of personal protective equipment and health belief systems (d’Ettorreet al. 2020). Prevention of PTSD among HCWs has been noticed to be very challenging (d’Ettorre et al. 2020) because of avoidance and re-experiencing nature that is found within the unconscious nature of the victims.

Indeed, EA has demonstrated the predictive power of PTSD total symptoms of severity (Meyer et al. 2013, Orcutt, Pickett, and Pope, 2005), and in addition, EA has been found to maintain PTSD intrusion and symptoms (Blackledge & Barnes-holmes 2009; Hayes et al., 2006). And many researchers in PTSD development have demonstrated many different relationships between PTSD and EA, and some research suggests that attempts to avoid negative emotional experiences can not only maintain but also worsen PTSD symptomatology (Badour et al., 2012; Max & Sloan, 2005; Plumb et al., 2004).

Considering that those who suffer from PTSD more often avoid places, people, and events and notice the effects of EA on PTSD, it is timely to examine the effects of EA on PTSD among HCWs in Ekiti, especially so when EA has been noticed as an evolutionary approach to catastrophic events.

**The Mediating effects of HBM and EA on PTSD**

As it is, the purpose of HBM is to explain why people do not respond ahead to health promotion strategies (Rosenstock, 1974b) &

Rosenstock, Derryberry, and Carriger (1959).) (not wearing masks, not using hand sanitizer, and PPE) and how to encourage people to engage in preventive and promotion measures (Rosenstock 19974b). The health belief model is a cognitive strategy, which is the perception that the pandemic is severe; therefore, one is susceptible to it, and there are obstacles or impediments (barriers) in preventing its contractions. For example, studies project that when people are convinced about the severity of a disease, they perceive that they are highly susceptible to it and perceive the low costs of adopting precautionary behavior. They are more willing to adopt recommended behavior (Branstrom, Kristjansson & Ullene, 2006; Brug, Aro, Richardus, 2009 Park et al., 2010; Durham, Cashman and Albert, 2010; Leppin & Aro, 2009). However, we observed that this perception is contestable, especially in the earlier stage of a pandemic, where it has overwhelmed entire developed and developing nations, and the virus has no treatable treatment and vaccines. We, therefore, perceived HBM could be a painful catastrophic factor that inhabits PTSD due to its cognitive and emotional content. This perception has yet to be investigated in the literature, thereby creating a knowledge gap. In Investigating and closing this research gap, this study could contribute to knowledge and help policymakers to revisit the appropriate timing and circumstances regarding the suitability of HBM in an earlier pandemic outbreak.

**METHOD**

 Design

This research employed an exploratory research design. The design is necessary, especially when dealing with problems in a preliminary stage, like this new novel Coronavirus, and the data is challenging to collect considering the contagious nature of the disease.

**Setting and participants**

We conducted this in Ekiti State, Southwest Nigeria, a nation with the highest infection rate in West Africa and the 5th highest in Africa (BBC, 2020). We conducted the study among healthcare workers involved in treating covid-19 patients. The HCWs include medical doctors, nurses, and allied health workers (pharmacists, laboratory scientists, epidemiologists, environmental health workers, community health extension workers, x-ray, psychologists, and physiologists in Ekiti State. The study took place in primary, secondary, and tertiary institutions. We collected data between May 5 and June 18, where each respondent (HCW) gave informed consent before participating in the survey.

EXPERIENTIAL AVOIDANCE (EA)

Experiential avoidance was measured using The Acceptance and Action Questionnaire-II (AAQ-II). The AAQ-II (Bond et al., 2011) is a 7-item that measures psychological flexibility with a 7-point scale ranging from never true (1) to away true (7), with a high score indicating lower psychological flexibility and a lower score of psychological inflexibility/ experiential avoidance. The content of the items included participants'’ willingness to be in contact with adverse private events, the acceptance of these events, and how effectively they can pursue their goals in life. The summation of the scores resulted in a total score ranging from 7 to 49, whereby a higher score indicates lower psychological flexibility. The AAQ-II was reported to have a mean alpha coefficient of .84 (ranging from .78 to .88) and a strong test-re-test reliability of .81 and .79 after 3-12 months (Bond et al., 2011). In addition, the AAQ –II has recently been reported high with measures of the constructs of neuroticism compared to another measure of experiential avoidance (Grande, Chimielewiski, et al. 2011).

2. HEALTH BELIEF MODEL SCALE

 Victoria champion developed the Scale, which was adopted and used based on her recommendation ( Champions, 1984). The questionnaire originally consisted of 42 items addressing the health belief model. In this current study, we used 37 items; eleven examine perceived susceptibility, 11 on perceived seriousness/severity, and sixteen on perceived barriers. These constraints include Perceived susceptibility, which was measured with 11 items assessing responding views of how likely Covid-19 was affecting them; perceived severity was measured with ten items assessing responding views of how serious the covid-19 is to them and perceived barriers were measured with 16 items assessing responding views of the obstacles they face in fighting the covid-19.

    All items for the three subscales used in this current study were formulated with a 5-point Likert-type scale from strongly disagree (1) to strongly agree (4). The Scale is scored so that a higher score means greater perceived barriers.

    The scales were assessed for content validity by a panel, and the results show that perceived susceptibility, severity, and barriers have a Cronbach’s alpha of 0.90, 0.80, and 0.80, respectively, and with a test re-test of 0.70,0.45 and 0.45 (Champion, 1993)

1. Posttraumatic Stress Disorder Checklist (Civilian Version) (PCL) C.

The PTSD Checklist Civilian Version PCL-C/S was developed by Weathers et al. (1994), and it is used to assess trauma symptoms that are more in line with the 4th ed of the Diagnostic and Statistical Manual of Mental Disorders. The Scale contains 17 items that ask respondents how often they have been bothered by each symptom in the past months on a five points severity scale. The scoring of this instrument is done by adding up all the items for a total severity scale. A total score of 44 is considered to be PTSD-positive. The statement in the PCI-S was made to address three areas of the DSM IV. The IB item is re-experiencing symptoms 1-5; the three items are the emotions avoidance symptoms 6-12, and the 2D, which is the hyper-vigilance symptoms (13-17).

The reliability of the PCL-C or PCL-5 has been found by researchers to be very strong in a sample of motor vehicle accident and sexual victims, of which 18 were found to have PTSD. Blanchard et al. (1996) found an alpha of. 94, Ventura et al. (2002) reported a validity of .86 and a test-re-test of .80 for individuals in France who had experienced the severity of traumatic events.

**Validation and reliability of the Instrument**

The questionnaire was designed based on previous studies (Weather et al., 1994; Champion, 1984; Bond et al. (2011). To increase the validity and reliability of the questionnaire, seven experts reviewed and revived them after conducting a cognitive test in order to ensure that the questionnaire was suitable to measure its intended purpose. At the same time, the reliability was obtained through a test-re-test that yielded Cronbach alpha values of 0.89.

**Results**

Data regarding the socio-demographics of participants are presented in table 1. There were more females (64%) than males (36%). The majority of the sample were aged 25-35 (46.7%), married (76.4%), held a first degree/higher national diploma certificate (45.3%), had between 1 to 5 years of work experience and work in public health settings (81.9%). An almost equal number of participants work in primary (41.9%) and tertiary healthcare settings (40.4%).

**Table 1:** Social-demographics data

|  |  |  |
| --- | --- | --- |
| N = 475  Variables | n | % |
| Sex |  |  |
| Male | 171 | 36 |
| Female | 304 | 64 |
| Age (in years) |  |  |
| 25-35 | 222 | 46.7 |
| 36-46 | 133 | 28 |
| > 46 | 120 | 25.3 |
| Marital status |  |  |
| Married | 363 | 76.4 |
| Not Married | 112 | 23.6 |
| Education |  |  |
| Postgraduate | 117 | 24.6 |
| First degree/Higher National Diploma | 215 | 45.3 |
| Midwifery and Nursing Certificate | 93 | 19.6 |
| OND | 50 | 10.5 |
| Designation |  |  |
| Doctors | 108 | 22.7 |
| Nurses | 177 | 37.3 |
| Others | 190 | 40 |
| Years of practice |  |  |
| 1-5 | 153 | 32.2 |
| 5-10 | 111 | 23.4 |
| 11-15 | 94 | 19.8 |
| > 15 | 117 | 24.6 |
| Type of healthcare setting |  |  |
| Primary | 199 | 41.9 |
| Secondary | 84 | 17.7 |
| Tertiary | 192 | 40.4 |
| Ownership of healthcare setting |  |  |
| Public | 389 | 81.9 |
| Private | 86 | 18.1 |

**Table 2:**  Means, standard deviations and bivariate correlations

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| N = 475 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Sex (1) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Age (2) | -.20\*\* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Marital status (3) | .09 | -.34\*\* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Education (4) | .32\*\* | -.20\*\* | .21\*\* |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Designation (5) | .35\*\* | -.06 | .02 | .23\*\* |  |  |  |  |  |  |  |  |  |  |  |  |
| Job tenure (6) | -.22\*\* | .64\*\* | .28\*\* | -.15\*\* | -.06 |  |  |  |  |  |  |  |  |  |  |  |
| Healthcare setting (7) | -.13\*\* | .08 | -.05 | -.23\*\* | -.32\*\* | .08 |  |  |  |  |  |  |  |  |  |  |
| Ownership of setting (8) | .09\* | -.30\*\* | .18\*\* | .18\*\* | .07 | -.26\*\* | -.40\*\* |  |  |  |  |  |  |  |  |  |
| Experiential avoidance (9) | .01 | .02 | .14\*\* | -.04 | .18\*\* | .08 | -.11\* | -.10\* |  |  |  |  |  |  |  |  |
| Perceived susceptibility (10) | -.07 | .04 | -.06 | -.10\* | -.10\*\* | .03 | .22\*\* | -.18\*\* | .07 |  |  |  |  |  |  |  |
| Perceived severity (11) | .06 | .04 | -.19\*\* | -.06 | -.04 | .07 | .07 | -.08 | .08 | .51\*\* |  |  |  |  |  |  |
| Perceived barrier (12) | .07 | -.03 | -.14\*\* | -.02 | .06 | .002 | -.05 | -.14\*\* | .19\*\* | .34\*\* | .52\*\* |  |  |  |  |  |
| Re-experiencing (13) | .11 | -.02 | -.01 | .02 | .18\*\* | -.05 | -.20\*\* | .18\*\* | .40\*\* | .04 | .15\*\* | .20\*\* |  |  |  |  |
| Avoidance (14) | .21\*\* | -.15\*\* | -.11 | .08 | .20\*\* | -.14\*\* | -.13\*\* | .13\*\* | .42\*\* | .00 | .09\* | .17\*\* | .71\*\* |  |  |  |
| Hyper-vigilance (15) | .16\*\* | -.07 | .02 | .02 | .13\*\* | -.03 | -.11\* | .07 | .36\*\* | .02 | .10\* | .23\*\* | .69\*\* | .70\*\* |  |  |
| PTSD (16) | .18\*\* | -.09\* | .05 | .05 | .19\*\* | -.08 | -.17\*\* | .14\*\* | .44\*\* | .02 | .13\*\* | .22\*\* | .89\*\* | .91\*\* | .88\*\* |  |
| Mean | - | - | - | - | - | - | - | - | 14.43 | 33.12 | 23.90 | 44.91 | 9.39 | 11.16 | 9.79 | 30.34 |
| SD | - | - | - | - | - | - | - | - | 8.04 | 6.05 | 5.22 | 7.33 | 4.36 | 4.90 | 4.21 | 12.05 |

\*\*. Correlation is significant at the 0.01 level (2-tailed); \*Correlation is significant at the 0.05 level (2-tailed)

Sex (male = 0, female = 1); Age (25-35 = 0, Above 35 = 1) Marital status (married = 0, unmarried = 1); Education (first degree = 0,others = 1); Designation (doctors = 0; Nurses & others = 1); Job tenure (1-10yrs = 0, > 10yrs = 1); Healthcare setting (primary = 0, secondary = 1); Ownership of setting (public = 0; private = 1)

*Bivariate associations of socio-demographic variables with continuous variables*

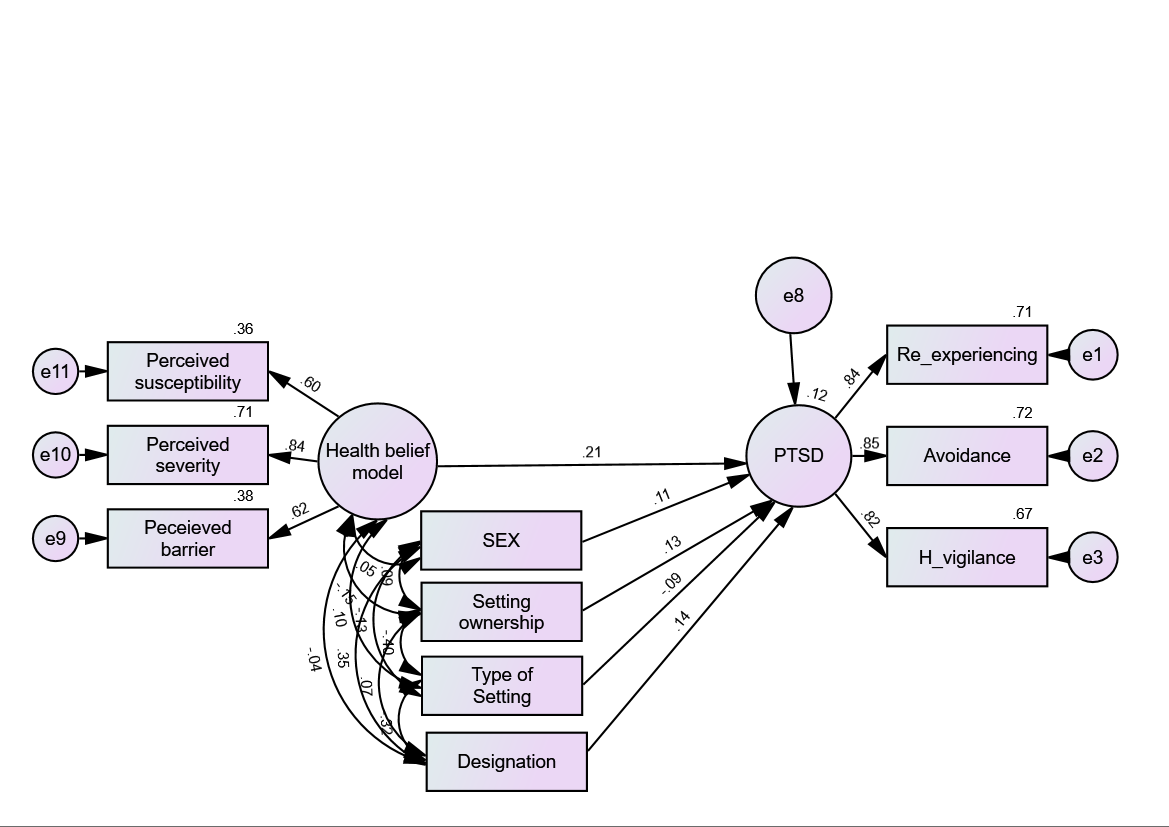
Correlations among variables are presented in table 2. Sex was significantly associated with PTSD (r = .18, p < .001) and its dimensions of avoidance (r = .21, p < .001) and hypervigilance (r = .16 p < .001). Particularly, being female was associated PTSD, avoidance and hypervigilance. Lower age was associated with avoidance (r = -.15, p = .001) and weakly correlated with PTSD (r = -.09, p = .04). Re-experiencing (r = .18, p < .001), avoidance (r = .20, p < .001), hypervigilance (r = .13, p = .006) and PTSD (r = .19, p < .001) were associated with being a nurse/other health workers. Practicing in primary healthcare setting was associated with reexperiencing (r = -.20, p < .001), avoidance (r = -.13, p = .003), hypervigilance (r = -.11, p = .02) and PTSD (r = -.17, p < .001). Working in private healthcare setting was also correlated with PTSD (r = .14, p = .002), reexperiencing (r = .18, p < .001) and avoidance (r = .13, p = .006).

*Bivariate associations among continuous variables*

Experiential avoidance was moderately and positively related with PTSD and its subscales with coefficients ranging from r = .36 to .44, p < .001. However, experiential avoidance was positively related to perceived barrier (r = .19, p < .001) but not perceived susceptibility (r = .07, p = .14) and perceived severity (r = .08, p = .07). Perceived barrier and perceived severity were positively associated with PTSD and its subscales with coefficients ranging from r = .09 to .23. However, perceived barrier showed a stronger association with PTSD than perceived severity. Perceived susceptibility was not related to PTSD and its dimensions.

***Hypothesis one*: Health belief model will significantly predict PTSD.**

In hypothesis three, health belief model (HBM) was specified as the independent variable, PTSD as dependent variable while sex, ownership of healthcare setting, type of setting and designation were included as control variables because they were related with PTSD as shown in table 1.The path diagram with standardized estimates is presented in figure 3.



***Figure 1****: Direct effect of health belief model on PTSD controlling for demographic variables*

Results of path analyses with unstandardized estimates and p-values are displayed in table 5. The model fit was very good, χ2 (24) = 94.69, p < .001; CFI = .95; RMSEA = .08 [90% CI = (.06, .10)], SRMR = .05. Results show that health belief model (β = .21, *p*< .001) significantly predicted PTSD. Specifically, an increase in health belief (perceived susceptibility, severity and barrier) predicted greater level of PTSD symptom. Sex(β = .11, *p* = .02), ownership of healthcare setting (β = .13, *p* = .01) and designation(β = .14, *p* = .01) significant on PTSD while type of setting (β = -.09, *p* = .10) did not. Being female and working in a private healthcare setting was associated with PTSD. The model explained 12% variance in PTSD.

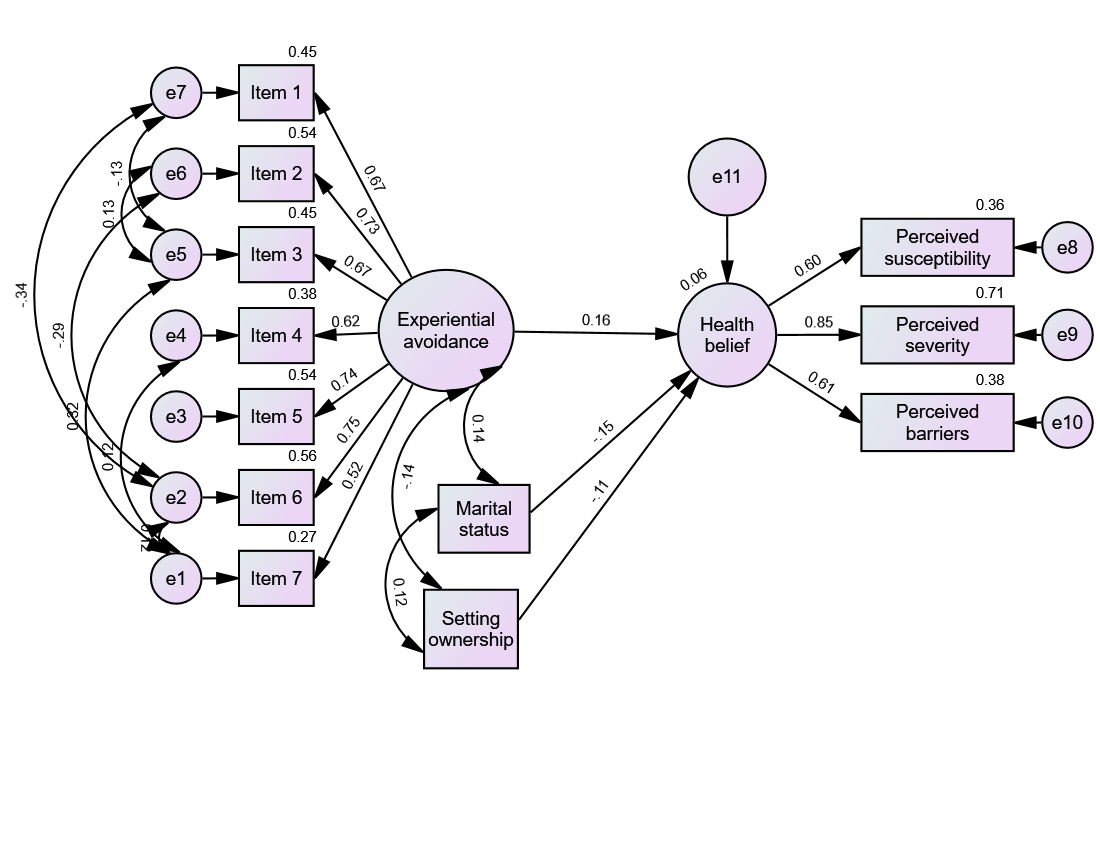
Therefore, hypothesis three is supported.

**Table 3: Summary of direct effect of health belief model and control variables on PTSD**

|  |  |  | **Estimate** | **S.E.** | **C.R.** | **P** |
| --- | --- | --- | --- | --- | --- | --- |
| PTSD | <--- | Ownership setting | 1.24 | .49 | 2.51 | .01 |
| PTSD | <--- | Sex | .86 | .38 | 2.25 | .02 |
| PTSD | <--- | Designation | 1.19 | .46 | 2.59 | .01 |
| PTSD | <--- | Type of setting | -.66 | .40 | -1.66 | 10 |
| PTSD | <--- | Health belief model | .17 | .05 | 3.74 | <.001 |

***Hypothesis two*: Experiential avoidance (EA) will significantly predict health belief model (HBM).**

In hypothesis two, experiential avoidance was specified as the independent variable, health belief model as dependent variable while marital status and ownership setting were included as control variables because they were related with health belief model as shown in table 1. Barrier The path diagram with standardized estimates is presented in figure 2.



***Figure 2****: Direct effect of experiential avoidance on health belief model controlling for demographic variables*

Results of path analyses with unstandardized estimates and p-values are displayed in table 4. The model fit was satisfactory, χ2 (44) = 138.36, p < .001; CFI = .94; RMSEA = .007 [90% CI = (.06, .08)], SRMR = .04. Results show that experiential avoidance EA (β = .16, *p*= .005) significantly predicted health belief model. Specifically, an increase in experiential avoidance predicted greater perceived susceptibility, severity and barrier. Marital status(β = -.22, *p*< .001) was significant on health belief model while and ownership of healthcare setting was not (β = -.09, *p* = .08). Being married was associated with health belief model. The model explained 8% variance in health belief model.

Therefore hypothesis two is supported.

**Table 4: Summary of direct effect of experiential avoidance and control variables on health belief model**

|  |  |  | **Estimate** | **S.E.** | **C.R.** | **P** |
| --- | --- | --- | --- | --- | --- | --- |
| Health belief | <--- | Experiential avoidance | .673 | .24 | 2.89 | .005 |
| Health belief | <--- | Marital status | -1.81 | .46 | -3.96 | \*\*\* |
| Health belief | <--- | Ownership setting | -.83 | .47 | -1.74 | .08 |

***Hypothesis three*: Experiential avoidance will significantly predict PTSD.**

In hypothesis one, psychological inflexibility was specified as the independent variable, PTSD as dependent variable while sex, ownership of healthcare setting, type of setting and designation were included as control variables since they were associated with PTSD as shown in table 1. The path diagram with standardized estimates is presented in figure 1.

Diagram

Description automatically generated

***Figure 3****: Direct effect of experiential avoidance on PTSD controlling for demographic variables*

Results of path analyses with unstandardized estimates and p-values are displayed in table 3. The model fit was very good, χ2 (61) = 135.06, p < .001; CFI = .97; RMSEA = .05 [90% CI = (.04, .06)], SRMR = .04. Results show that experiential avoidance (β = .50, *p*< .001) significantly predicted PTSD. Specifically, an increase in experiential avoidance predicted greater level of PTSD symptom. Sex (β = .16, *p*< .001) and ownership of healthcare setting (β = .18, *p*< .001) were significant on PTSD while designation (β = -.02, *p* = .32) and type of setting (β = -.05, *p* = .73) were not. Being female and working in a private healthcare setting was associated with PTSD. The model explained 31% variance in PTSD.

Therefore hypothesis one is supported.

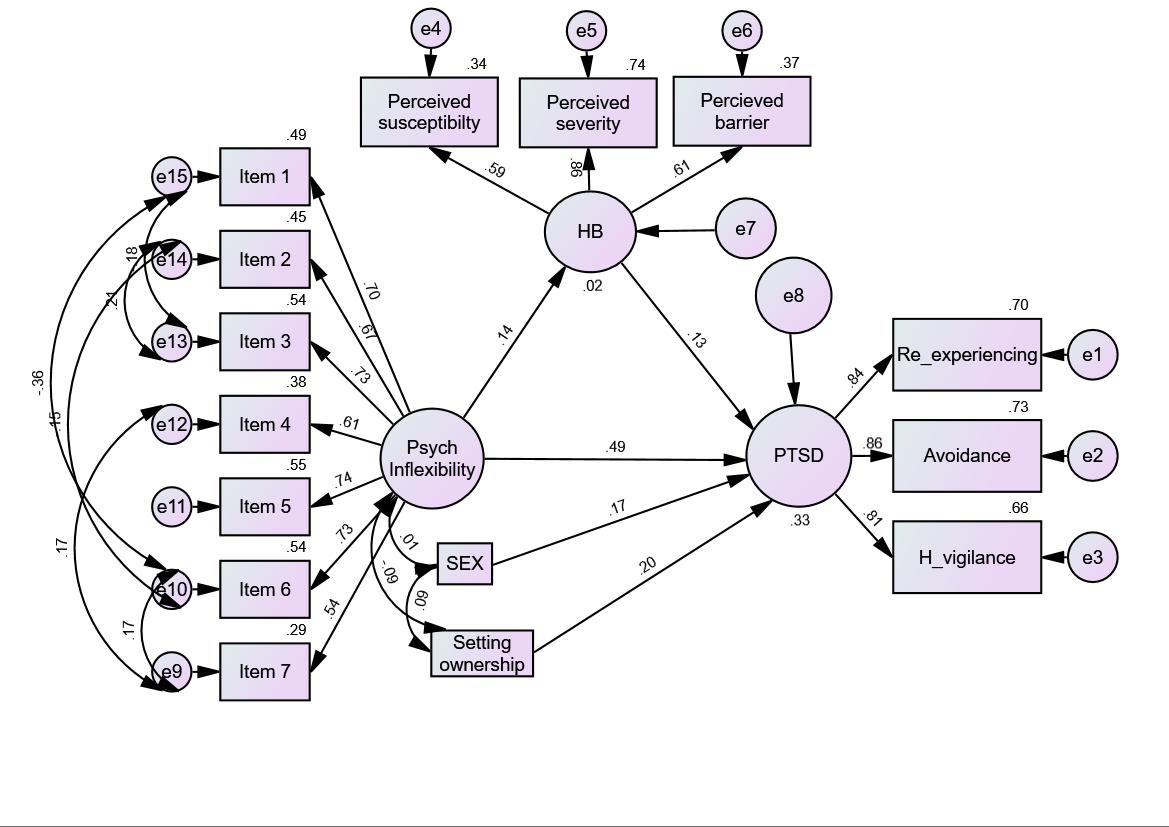
**Table 5: Summary of direct effect of experiential avoidance and control variables on PTSD**

|  |  |  | **Estimate** | **S.E.** | **C.R.** | **P** |
| --- | --- | --- | --- | --- | --- | --- |
| PTSD | <--- | Experiential avoidance | 2.18 | .27 | 8.09 | < .001 |
| PTSD | <--- | Ownership setting | 1.66 | .45 | 3.70 | < .001 |
| PTSD | <--- | Sex | 1.20 | .35 | 3.46 | < .001 |
| PTSD | <--- | Designation | .42 | .42 | .99 | .32 |
| PTSD1 | <--- | Type of setting | -.13 | .36 | -.35 | .73 |

***Hypothesis four***: Health belief model will significantly mediate the association between experiential avoidance and PTSD symptoms

In hypothesis four experiential avoidance was specified as the independent variable, PTSD as dependent variable, and health belief model as mediating variable. In a preliminary mediation model, the socio-demographic variables of sex, designation, ownership and type of healthcare settings were tested on PTSD as control variables since they were significantly correlated as presented in table 2. Results showed that sex (β= .15, p <.001) and setting ownership (β= .07, p <.001) significantly influenced PTSD while designation (β= .15, p = .12) and type of healthcare setting (β= -.03, p = .54) were not. Hence, only sex and ownership setting were included in the final mediation model.

The mediation model is presented in figure 4 with standardized estimates. The model met the acceptable criteria for relative fit, χ2 (78) = 207.82, p < .001; CFI = .95; TLI = .93, RMSEA = .059; SRMR = .05, explaining a variance of 33% in PTSD. Factor loadings of the indicators of PTSD, health belief model and experiential avoidance were all significant and high, thus demonstrating the fitness of measures. Experiential avoidance had significant direct effects on health belief model (β= .14, p = .001) and PTSD (β= .49, p <.001). Increase in experiential avoidance predicted an increase in both PTSD and health belief. The direct effect of health belief model was significant on PTSD (β= .13, p = .009). Increase in health belief predicted an increase in PTSD. The control variables of sex (β= .17, p < .001) and setting ownership (β= .20, p = .009) were also significant on PTSD.

***Figure 4****: mediating effect of health belief model on the relationship between experiential avoidance and PTSD symptoms controlling for sex and ownership setting*

*Mediation analyses:* In a structural equation modeling framework, confirming a mediating hypothesis is dependent on the statistical significance of both indirect and total effects (Preacher & Hayes, 2004), thus this is not conclusive. The model shows that the total effect of experiential avoidance on PTSD was significant (β= .51, p < .001). The indirect effect of experiential avoidance on PTSD through health belief model with 90% and 95% bias-corrected confidence intervals are displayed in table 6.

**Table 6.**Bias-corrected unstandardized 90% and 95% confidence intervals for the indirect effect of experiential avoidance on PTSD

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Mediated path | 90% CI | | Estimate | 95% CI | |
| Lower bound | Upper bound | Lower bound | Upper bound |
| Experiential avoidance > Health belief > PTSD | .02 | .19 | .08 | .01 | .22 |

Given that both the 90% and 95 confidence intervals for indirect effect did not pass through zero, it is established that health belief model significantly mediated the relationship between experiential avoidance and PTSD. This is a partial mediating effect since the direct effect of psychological inflexibility on PTSD is still significant.

Therefore, hypothesis four is supported.

**DISCUSSION**

This study aimed to assess the relationship between HBM and PTSD, EA and HBM, EA and PTSD, as well as assess the mechanism through which PTSD is developed and maintained in HCWs five months after the covid-19 pandemic in Ekiti State Our findings indicate that the prevalence of PTSD among medical doctors was 9.3 %, Nurses 18.6%, and allied health workers 14.2% The study shows that some modifying variables such as being a female, being married, lower age, working in primary health care, and working in a private hospital are strongly associated with PTSD Especially being a female is strongly associated with emotional avoidance symptoms of PTSD, while working in the primary health setting was also associated with re-experiencing symptoms of PTSD, and working in private health sectors also strongly correlates with the hypervigilance symptoms of PTSD These current findings find support in previous studies that PTSD was high among healthcare workers ranging from 2.1% to 73% (James 2015; Breslau 2009; Bright and Bowland 2008Gazzaro et al. 2020) and that avoidance cluster was noticed to be the primary predictor required by the DSM-V (APA, 2013).

The fact that the three symptoms of PTSD are high among healthcare workers in Ekiti State during the first five months of the Covid-19 pandemic and some sociodemographic variables are strongly affected could suggest that being a female, married, young, designated, working in primary and private health sectors could sever risk factors for the development and maintenance of PTSD during diseases outbreak at its earlier stage.

Indeed, our first hypothesis demonstrated that the health belief model (HBM) predicts PTSD and its symptoms. That is perceived barriers and severity individually and jointly predict PTSD. More importantly, Perceived barriers show a more robust association with PTSD than perceived severity, and inadequate facilities could inform this for testing Covid-19 patients, shortages of tests, reagents, kits, primers, aprons, hair covers, face masks, face shields, shoe covering (Amzat et al., 2020; Aanyanwu et al., 2020;; Miner et al., 2020) One of the contributing factors to the development of PTSD among HCWs could be the barriers of taking over six hours plus to complete a test and 24 to 48 hours for a patient to get results ( Akor et al., 2020) In fact, 21% of the variant in PTSD was explained by the activities of the three components of HBM.

 Although perceived susceptibility failed to predict PTSD in the current study, we were not surprised as susceptibility has slight variance with severity (Champion, 1996), and the average person sees these two constructs as inseparable (Rosenstock, Strether and Becker 1994), which have often been combined and defined as a perceived threat (Sukeri et al., 2020) So possibly, considering the emotional and psychological distress associated with the pandemic, an average HCWs could presume perceived severity for perceived susceptibility, and this could raise the level of PTSD. It explains why perceived severity and barriers predict emotional avoidance, hypervigilance, and re-experiencing symptoms of PTSD five months during the time of the covid-19.

To our knowledge, no previous research has linked HBM and PTSD. A significant relationship between HBM and PTSD aligns with depression, as research has found that HCWs who are high on HBM (severity, susceptibility, and barrier) were noticed to be high on depression (Lam et al., 2020), state anxiety (Koster, Fox and Macleod 2009; Surianti et al., 2020), negative coping styles (Li, Yang and Dou 2020). These findings are comorbid with PTSD. This current finding seems to suggest that at the earlier stage of a pandemic outbreak, usage of HBM could trigger healthcare workers' mental health and create PTSD and its symptomatology. Therefore, HBM could not be an ideal health prevention strategy in an earlier stage of a pandemic outbreak.

Our second hypothesis found that experiential avoidance ( EA) predicts HBM among Health care workers in Ekiti State for five months during the Covid-19 More so, EA predicts perceived susceptibility, severity, and barriers in HCWs The association between EA and HBM could be cemented with the emotional processing theory of (Foa and Kozah (1985,1986) that pathological fear structure which are resistance to modification due to behavior and cognitive avoidance. Healthcare workers treating patients with a virus that has a high transmissible rate and without treatment and vaccine could build a pathological fear structure. This fear structure could deny HBM's positive emotion, making it irrelevant. This perception is reported in the literature that EA often deprives people of the opportunity to experience positive feelings and emotions, making them believe that anything trauma-related is terrible and unwanted (Thomson & Waltz, 2000). Also, the fact that EA often alters and controls bodily sensations, feeling, thoughts, and emotions could explain why HBM could be dismissible cognition in the first five months of the pandemic among HCWs in Ekiti State. This explanation is justified in this current study that EA is associated with prolonged suffering (Hayes et al., 1996), an essential process in emotional disorder, depressive symptoms (Kashdan et al., 2010), a negative coping strategy that operates as a barrier to well acceptable goals/values.

The third hypothesis demonstrates that experiential avoidance ( EA) predicts posttraumatic stress disorder ( PTSD) and its symptomology even after controlling for sex, designation, ownership, and types of healthcare among HCWs for five months during the Covid-19 in Ekiti State. The result indicates that 50% of the variance in PTSD is contributed by experiential avoidance, which proves why EA predicts emotional avoidance, re-experiencing, and hypervigilance in this current study. This finding is consistence with previous studies that have found that the emotional avoidance/numbing cluster of PTSD is embedded in EA (Mayou and Ehlers and Bryant, 2002; Sifneos, 1973; Thompson & Waltz, 2010), wherewith research has found that the avoidance cluster of PTSD is the main predictor required by the DSM-V to be diagnosed with PTSD (APA, 2013; Thompson & Waltz, 2010).

This result suggests that the more HCWs  avoid/alter distressing thoughts, feelings, emotions, or sensations of Covid-19 the more their level of PTSD increase doing the first five months of the pandemic. The instance that EA predicts PTSD and its three clusters might mean that a high level of EA endangers PTSD, implying that EA could lead to the development and maintenance of PTSD among healthcare workers in Ekiti State during the covid-19 during five months of pandemic. Therefore the theory that EA is an adaptive emotion for patients in the initial stage of a life-threatening event (Hayes et al. 1996 and Thompson and McCracken 2011) is contested, especially in the earlier stage of the pandemic outbreak.

Lastly, we tested a theoretically-grounded model wherein HBM mediated the relationship between EA and PTSD. To our knowledge, this is the first study supporting the mediating roles of HBM in the relationship between EA and PTSD. Indeed, HBM fully mediates the relationship between EA and PTSD, suggesting that the level at which EA is associated with PTSD can be explained by the diminishing effects of perceived severity, susceptibility, and barriers imposed by the pandemic during its first five months. Furthermore, the results show that there are total effects of EA and PTSD without the mediating variable. At the same time, there is a direct effect of EA and PTSD in the presence of the mediating variable and indirect effects of EA and PTSD with the mediating variable of HBM.

Indeed the Mediating roles of HBM (perceived severity, susceptibility, and barriers) forming pathways between EA and PTSD can be explained by some basic tenets of the cognitive theory of emotion, which posits that negative cognition can lead to negative emotion (Banks and Kems, 1996; Beck et al., 1978; Lazarus & Folkman, 1998) This study suggests that in an acute stage of a pandemic, HBM could be emotionally laden and could possibly be a positive path to enhancing PTSD implying the HBM might not be a proper path for health prevention in the earlier stage of a pandemic outbreak The finding that components HBM explains the existence of PTSD could possibly be that during the coronavirus outbreak, HCWs perceived the pandemic to be a threat (severe and susceptible ) (Rosenstock, 1974) and being informed by barriers such as unresponsiveness unpreparedness as we as the lake of treatment and vaccines of the virus, HCWs level of PTSD increased.

**Implications and Recommendations**

Our study makes significant theoretical and empirical contributions to knowledge. The main objective of this current study was to assess the relationship between HBM and PTSD, HBM and EA, and EA and PTSD, as well as to assess the mediating effects of HBM and experiential avoidance on PTSD among HCWs in Ekiti State five months during the COVID-19. The study contributed to knowledge by articulating why HBM and EA maintain the development and maintenance of PTSD among healthcare workers in Ekiti State at the earlier stage of the coronavirus pandemic. The study unfolds that the mechanism through which PTSD is developed and maintained among HCWs is through the processes of components (perceived severity, susceptibility, and barrier) of HBM. By doing so, the study projects HBM as a pathological fear structure at the earlier stage of a pandemic outbreak among HCWs. This is particularly important since literature has always presented HBM as a health preventive and promotion method, and research is almost silent on the contributions of HBM to PTSD among healthcare workers. In doing so, this current helps to close these knowledge gaps between EA components of HBM as well as PTSD at the same time and building the concepts where EA can be seen as a transdiagnostic disorder and HBM as negative emotion which can contribute to the development and maintenance of PTSD among HCWs in an earlier stage of diseases outbreak.

 Therefore, practitioners and policymakers should exercise caution in using the perceived severity, susceptibility, and barrier of HBM as health prevention and promotion strategies. Due to its correlations with the cognitive theory of emotion Banks & Kems, 1996; Beck et al., 1999 ; Lazarus & Folkman, 1998) that have found that negative emotion produces negative emotion.

Considering that EA is often initially used to receive emotional relief from life-threatening situations (Hayes et al. and Thompson and McCracken 2011) and EA contained elements of PTSD’s avoidance cluster which have been observed as a primary predictor of PTSD (APA, 2013), healthcare workers should employ psychological flexibility to assist in reducing the effects of EA on PTSD and HBM. Furthermore, given that it is focused on value-driven behavior, employing Psychological flexibility with the integration of the ACT model, there will be a low level of negative emotion that might enhance value-oriented behavior among HCWs in Ekiti State.

**Limitations of the study**

Notwithstanding, this current study has some potential limitations First, the data were collected five months during the inceptions of the Covid-19 pandemic in Ekiti State, Nigeria, and there was a high level of anxiety and fear among healthcare workers at the time most HCWs were being infected by their patients This level of anxiety might have had a profound effect on the results of this current study, therefore, it is recommended that further studies could replicate this current study to extend it to a year or more, at which time the anxiety level of HCWs might had recited Such a study will help us give a clearer understanding of the roles of HBM on EA and PTSD Secondly, this recent study made use of an exploratory research design where most of the information about the virus was not available, and also, some of the constructs in the study have not been previously correlated Therefore it is recommended that further studies like descriptive research design could be conducted that could explain why or how HBM and EA predict PTSD and, if possible, validate and give us a descriptive understanding of these relationships Despite these limitations, this study helps contribute to filling the knowledge gaps by demonstrating how HBM mediates the relationship between EA and PTSD, and the results could be helpful in the health sectors during the wave of this coronavirus pandemic.

CONCLUSION

The objective of this current study was to assess if HBM predicts PTSD. Secondly, we examine whether EA predicts HBM, as well as assess whether EA predicts PTSD, and also to assess the mediating effects of HBM, experiential avoidance, and PTSD among HCWs in Ekiti State in the first five months of COVID-19. Our results confirm that HBM predicts PTSD while EA predicts HBM and EA predict PTSD. The study also shows that HBM mediates the relationships between EA and PTSD. There was a direct relationship between EA and PTSD during the first five months of the covid-19 outbreak.

**The reprint of this study has previously been published in Research Square (Yarseah et al, 2022).**

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