## Abstract

***Background***
Cervical screening helps prevent cervical cancer (NHS, 2019). Women who have experienced sexual assault have lower cervical screening attendance, however no theory-driven research explores reasons for this. The Health Action Process Approach (HAPA) explains intention and ongoing attendance to health-promoting behaviours.

***Aims***

The HAPA was used to identify and explore how sexual assault impacts cervical screening uptake.

***Method***

An online study of 247 women aged 21-63 explored whether HAPA variables (task, maintenance and recovery self-efficacy, outcome expectancies, risk perception, action and coping planning), trauma variables (nature and age of abuse, and level of PTSD symptoms) and other potentially confounding factors related to cervical screening uptake in women who have experienced sexual assault. Regression and mediation analyses were conducted to explore predictive variables of intention and attendance.

***Results***

Self-efficacy beliefs predicted both intention and attendance of cervical screening. Task self-efficacy predicted intention and mediated relationships between HAPA variables and intention. Maintenance self-efficacy predicted attendance and mediated relationships between HAPA variables and attendance. Trauma variables did not predict more variance in intention or attendance over HAPA variables.

***Limitations***

The cross-sectional nature of the study means causality was not established.

***Conclusion***

Self-efficacy develops understanding of cervical screening in women with experience of sexual assault, over and above the trauma variables of type of assault and PTSD symptoms. Focusing on self-efficacy to improve cervical screening uptake in women who have experienced sexual assault is considered for clinical implications.

**KEYWORDS**: cervical screening, sexual assault, HAPA model, trauma, self-efficacy

## Introduction

Over 3000 women are diagnosed with cervical cancer yearly in the UK (Cancer Research UK, 2015). Since 1998, the National Health Service’s cervical screening programme, which screens cells which could potentially become cancerous (NHS, 2020), has noticeably reduced these figures as data suggests mortality could be over three times higher without screening (Landy, Pesola, Castañón, & Sasieni, 2016). Declining rates of cervical screening attendance between 2011-2018 (NHS Digital, 2020), which is recommended to be every three years for 25-49 year-olds and every five years for 50-64 year-olds (NHS, 2019), are concerning. Women who have experienced sexual assault, particularly childhood sexual assault (CSA), penetrative abuse or abuse by multiple perpetrators (Farley, Golding & Minkoff, 2002) have a lower attendance rate (42%) compared to the English average (72%, Cadman, Waller, Ashdown-Barr & Szarewski, 2012) and Europe average (50.7%, Ponti, Anttila, Ronco, & Senore, 2017). Understanding the barriers within this population is important as 14% of adults in England and Wales have experienced sexual assault (Office of National Statistics, 2021).

Emotional distress (Weitlauf et al., 2010), feelings of shame and vulnerability (Robohm & Buttenheim, 1996), and anxiety about feeling out of control (Watson, 2016) are barriers to cervical screening attendance in this population. Women who experienced CSA report PTSD symptoms such as intrusive thoughts, reliving or detachment, triggered by aspects such as insertion of the vaginal speculum, or lying on their back (Robohm & Buttenheim, 1996; Watson, 2016). Understanding the mechanisms of how trauma variables relate to cervical screening attendance is therefore important.

Health behaviour models such as the Health Belief Model and Theory of Planned Behaviour only explain a small amount of variance in understanding cervical screening uptake (Bish, Sutton & Golombok, 2000; Gillam, 1991; Rosenstock, Stretcher, & Becker, 1988) potentially due to not accounting for emotional factors (Walsh, O’Reilly & Treacy, 2003). These models also fail to explain why women may intend to but not attend their screening due to focusing purely on behavior, not intention (Godin & Kok, 1996) and implying a linear pattern of behaviour (Schwarzer & Luszczynska, 2008). The Health Action Process Approach helps understand ongoing engagement in health behaviours (HAPA, Schwarzer, 2008) by combining elements of continuum and stage models by looking at intention and ongoing attendance (Hamilton, Smith, Keech, Moyers, & Hagger, 2020). The HAPA was developed to focus on health behaviour change (Schwarzer & Luszczynska, 2015). The inclusion of multiple variables and an adaptable questionnaire means the model can inform targeted approaches to improve uptake, rather than more general ideas suggested by other behaviour models. The HAPA model includes recognising the risks associated with not engaging in a health behavior (risk perception), considering the outcome as more beneficial than damaging (outcome expectancies) and believing in their capability to perform the behaviour (task self-efficacy) all help intention (Schwarzer, Lippke, & Luszczynska, 2011). This transforms into behaviour by making a detailed plan to do the behaviour despite barriers (action and coping planning) and believing they can persist if faced with potential challenges, including negative emotions or missing a cervical screen (maintenance and recovery self-efficacy). As such, the HAPA helps understand why attendance may decline after assault.

Self-efficacy is a key predictor of initiating and maintaining health behaviors despite emotional reactions (Bandura, 1977; Perkins & Jenkins, 1998; Rosenstock, Stretcher, & Becker, 1988) which is relevant to screening uptake. The inclusion of self-efficacy in the HAPA aids understanding of the drivers behind attendance, particularly in this population where emotional barriers may exist (Cadman et al., 2012). The model has been successfully applied to a range of preventative health behaviours (Schwarzer, 2016; Schwarzer & Hamilton, 2020) including mammography attendance (Pourhaji, Delshad, Pourhaji, & Ghofranipour, 2021). It has been applied to interventions to increase cervical screening attendance (Luszczynska, Goc, Scholz, Kowalska, & Knoll, 2011) indicating it can identify factors related to intention and attendance of cervical screening. Finally, it has been successfully used in cross-sectional correlational designs to understand engagement in health behaviour (Hamilton et al., 2020; Mohammadi Zeidi, Morshedi, & Shokohi, 2021; Pourhaji, et al., 2021).
Figure 1: HAPA model (based on Schwarzer, 2008)This study therefore aimed to provide a theory-driven understanding of cervical screening uptake in women who have experienced sexual assault. Based on the literature, it was hypothesised that:
1) Task self-efficacy will be a key predictor of intention;
2) Maintenance and recovery self-efficacy will be key predictors of attendance;
3) Trauma-related variables will explain uptake more than other HAPA variables.

## Method

Ethical approval was granted by NHS London South East Ethics Research Committee for online recruitment. *Participants*

Participants were women who reported experience of sexual assault and received one or more invitations for cervical screening in any country. Based on Bish et al. (2000) a calculation using effect size (Pearson correlation 0.09, 0.8 for power and .05 for alpha) for the relationship between attendance and self-efficacy, generated a sample size of 190. To ensure a reliable measurement of intention, an upper age limit of 65 years old was used. No lower limit was set as age of first invitation differs between countries and participants may have lived outside of the UK as the study was online. Recruitment occurred via social media and websites of charities and support groups for women who have experienced sexual assault. Eighteen organisations advertised the study and these posts were further re-shared. 503 women logged into the survey and 285 consented to participate. One participant was excluded for not having experienced sexual assault and 37 dropped out after completing demographic data leaving a final sample size of 247. There were no significant differences in any of the demographic details collected of participants who completed the study from those who did not. Participants’ age range was 21-63 years, normally distributed with a mean age of 38 years. 86% (N=212) were White British, 90% (N=223) were born in the UK and 57% (N=138) were in a relationship. Bivariate analyses were conducted between HAPA and demographic variables to inform multivariate and mediation analyses.

*Measures*

The study consisted of five measures. Demographic details associated with cervical screening uptake (Ackerson, Pohl, & Low, 2008; Chang et al., 2017; Elit et al., 2013; Savage & Clark, 2001) were collected. The *HAPA Inventory* consisted of nine subscales, rated using 7-point Likert scales. Previous research informed questions and service user feedback informed language content. Cronbach’s alpha for each subscale ranged from α=.596-958.

‘Cervical smear’ was used in questionnaires as a more conversational term. Three items measured *attendance* to ensure validity and reliability: (1) Likert scale indicating agreement with *“In the past, I have gone for my cervical smear when invited”* (adapted from Sandberg & Conner, 2009); (2) proportional item derived by the percentage of screenings attended from number invited to; (3) time since last screening (0-3 years; 3-5 years; 5+ years) (adapted from Eaker, Adami, Granath, Wilander & Sparén, 2004). A correlation between measures was highly significant (*r*(212)=.783, *p*<.001) and multiple regression showed the continuous variables significantly predicted the categorical variable (*F*(2,208)=38.1, *p*<.001), indicating high levels of reliability. As a percentage could not be calculated for individuals who selected “don’t know” for number of invitations (37 participants, 15%) the Likert scale item was used.

*Intention* was measured using two items (based on Orbell, Hagger, Brown, & Tidy, 2006) *“How much do you agree with the following statement: I plan to attend a cervical smear in the next 5 years”;* and *“How likely is it that you will attend your next cervical smear?”*(extremely unlikely to extremely likely). To allow for both behavioural intention and estimation to be calculated (Sheppard, Hartwick, & Warshaw, 1988), a total score of intention was calculated.

Two *risk perception* items measured absolute and relative risk e.g. *“I believe that the likelihood of me developing cervical cancer at some point in my life is* (extremely likely – extremely unlikely)*”* based on Arbour-Nicitopoulos, Duncan, Remington, Cairney and Faulkner (2014) and Schwarzer(2008). *Outcome expectancies* measured level of agreement of six potential positive and negative affective outcomes, informed by Cadman et al., (2012) e.g. *“For me, attending a cervical smear in the next 5 years would be: important/embarassing”. Task self-efficacy* identified confidence in overcoming two difficulties that may arise *e.g. “How certain are you that you can attend cervical smear tests regularly?”* adapted from Schwarzer (2008)*. Maintenance self-efficacy* identified an individual’s beliefs in their ability to cope with five potential barriers to ongoing attendance e.g. *“I feel confident I can regularly attend cervical smears even if it causes me physical pain”*. *Recovery self-efficacy* consisted of two items focused on an individual’s belief in their ability to resume attendance after not attending *e.g. "I am confident I can continue to attend cervical smear tests even if I don't attend/cancel my first booking"*. Three *action planning* items, based on Lippke, Ziegelmann and Schwarzer (2005) asked individuals whether they knew: *“when/where/how they would get their next smear”. Coping planning* included four items based on Arbour-Nicitopoulos, et al. (2014) focusing on an individual’s ability to predict barriers and consider possible actions, for example: *"I feel confident I know how to cope if I get reminders of my trauma during or after the smear test".*

The *Cervical Cancer Awareness Measure* (CCAM, Cancer Research, 2007) was included as lack of knowledge of the importance and purpose of cervical screening, and risk factors for cervical cancer, relate to lower attendance (Ackerson, 2012; Bahmani, Baghianimoghadam, Enjezab, Mahmoodabad, & Askarshahi, 2016; Mamon et al., 1990). This includes three sections looking at warning signs (e.g. *“Do you think persistent lower back pain could be a sign of cervical cancer?”)*, risk factors (e.g. *“How much do you agree that each of these can increase a woman’s chance of developing cervical cancer: Having many children?”*) and knowledge of cervical cancer.

The *Sexual and Physical Abuse Questionnaire* (SPAQ) (Kooiman, Ouwehand, & ter Kuile, 2002) was included to confirm inclusion criteria (experience of sexual assault), age assault occurred and type of assault. Participants were asked whether they had experienced different types of sexual assault, as defined in the questions, “As a child (15 years or younger)”; “As an adult (16 years or older)”; and “No”. This was edited from the original questionnaire following service-user consultation. The nature of experiences included exhibitionism *(e.g. “Has anyone ever exposed the sex organs of their body to you when you did not want it?”)* and rape *(e.g. “Has anyone ever forced you to have sex when you did not want this?”).* Participants were grouped according to age abuse occurred (childhood, adulthood, both) and nature of their assault (sexual assault involving rape or not).

The *PTSD Checklist for DSM-V* (PCL-5) (Weathers et al., 2013) is a self-report measure of 20 PTSD symptoms in the DSM-V (American Psychiatric Association, 2013). The PCL-5 was included because PTSD responses, such as flashbacks, relate to lower levels of screening attendance (Weitlauf et al., 2010). Participants were asked if they have been bothered by selected PTSD symptoms within the past month e.g. *“Repeated, disturbing, and unwanted memories of the stressful experience?”* on a five-point Likert scale from “Not at all” to “Extremely.” A total score to indicate symptom severity was used.

*Procedure*

Service user consultation on the proposed design and measures of the study was gained through a support group for women who had experienced sexual assault. Questionnaires were uploaded onto Qualtrics. One hundred and seven support groups and charities for women who have experienced sexual assault were contacted regarding advertising the study and a total of 18 consented to advertise. Recruitment occurred between August 2017 and February 2018 and the study was described as ‘understanding cervical smear uptake in women who have experienced sexual assault’. The study could be re-entered and completed until close of recruitment. No payment was offered.

*Analysis*

Checks for normality and descriptive statistics were calculated for each measure and HAPA subscale using SPSS 21. Bivariate analyses were carried out between demographic and HAPA variables with both outcome measures. Multiple regression analyses were conducted for exploration, and hierarchical regression to determine each variable’s predictive ability over and above other variables. Intention and attendance were entered into separate models as outcome measures, and HAPA variables entered as predictor variables. Mediation analyses using the PROCESS approach were conducted to explore the potential mediating role of self-efficacy on relationships between the HAPA variables and outcome measures, and between PTSD symptoms and outcome measures. Due to a technical error in entering the questionnaires in Qualtrics, the final PCL-5 question was not recorded, therefore mean imputation was chosen as a conservative method for managing missing data (Meyers, Gamst, & Guarino, 2016).

## Results

*Bivariate analyses*
39% of participants said they had 100% attendance, 16.8% had never attended and 24% had not attended for over 5 years. Age was not significantly related to intention or attendance, but did relate to action planning (*r*(244)*=*.138, *p*=.030),indicating older participants engaged in action planning. Intention and attendance were significantly correlated to each other (*r*(245)=.609, *p*<.001), task self-efficacy (intention: *r*(245)*=*.804, *p*<.001; attendance: *r=*(245).681, *p*<.001)and maintenance self-efficacy (intention: *r*(243)*=*.809, *p*<.001; attendance: *r*(243)*=*.662, *p*<.001). CCAM (awareness measure) only significantly related to positive outcome expectancy (*r*(233)=.131, *p*=.043)and task self-efficacy (*r*(236)*=*.180, *p*=.005). Based on the SPAQ, 86% reported they had experienced rape, 13% reported not and 1% chose to not answer. For age of abuse, 23% reported experiencing sexual assault in childhood only, 22% reported experiences only in adulthood and 52% reported both (3% did not answer). Bivariate analysis showed no significant relationship between either type or age of abuse, with either intention or attendance. The majority of women (71%) reported symptoms over the cut off of the PCL-5 of 33. Women who had experienced rape had significantly higher levels of PTSD than individuals who did not experience rape (t(229)=4.063, p<.001). No significant difference was found between age abuse occurred and level of PCL-5 score (F(2,230)=1.479, p=.230).PCL-5 negatively significantly correlated to all HAPA variables, except for positive outcome expectancy and risk perception. These results suggested that higher levels of PTSD symptoms related to lower levels of intention, attendance and self-efficacy. Demographic variables and CCAM were excluded from multivariate analyses due to limited significant bivariate relationships***.

Multivariate Analyses: Intention variables (task self-efficacy, outcome expectancies, risk perception***Multiple regression showed HAPA variables explained a significant amount of the variance in intention (R2= .760; adjusted R2=.752; (*F*(8,239)=91.50, *p*<.001). Hierarchical regression (Table 2) showed although attendance variables explained a significant amount of the variance in intention (R2 =.705; adjusted R2 =.700; *F*(4,239)=140.14, *p*<.001) intention variables contributed a significant increase in the variance explained from 71% to 76% (R2 = .760; adjusted R2 =.752; *F*(8,239)=91.50, *p*<.001). Model 2 identified task self-efficacy (*β*=.303, *p*<.001), maintenance self-efficacy (*β*=.294, *p*<.001), positive outcome expectancy (*β*=.148 *p*<.001), recovery self-efficacy (*β*=.143, *p*=.001) and action planning (*β*=.116, *p*=.004) as independent significant predictors. This supports the hypothesis that women who have a history of sexual assault will be more like to go for cervical screening if they believe they can complete it, recognise the risk of not attending, and believe the potential benefits outweigh any costs.

A model exploring the mediation of task self-efficacy on the relationship between outcome expectancy and intention (Figure 2) explained a significant 68% of the variance (R2= .683; adjusted R2=.680; *F*(2,243=259.43 *p*<.001). Positive outcome expectancy (*β*=.195, *p*<.001) and task self-efficacy (*β*=.692, *p*<.001) maintained significance, indicating task self-efficacy partially mediated the relationship between positive outcome expectancy and intention. A Sobel test and bootstrapping indicated the partial mediation was significant (*z*= 3.98, *p*<.001; 95%CI .086-.357). This shows that weighing up the pros and cons will influence intention more if women believe they can complete the cervical screening.

### Multivariate Analyses: Attendance variables (maintenance and recovery self-efficacy, action and coping planning)

An initial multiple regression model showed HAPA variables significantly predicted attendance (R2 = .513; adjusted R2 = .494; *F*(9,239)=26.97, *p*<.001). A hierarchical regression model (see Table 3) explained a significant amount of the variance in Model 1 (R2 = .485; adjusted R2 = .474; *F*(5,239)=44.00, *p*<.001). The addition of attendance variables explained a significant increase in the variance of attendance from 49% to 51% (R2 = .513; adjusted R2 = .494; *F*(9,239)=26.97, *p*<.001). Independent significant predictors were task self-efficacy (*β*=.287, *p*=.003), maintenance self-efficacy (*β*=.278, *p*=.009), and action planning (*β*=.149, *p*=.011), therefore supporting the hypothesis and the application of HAPA to cervical screening attendance.

A model exploring the mediation of maintenance self-efficacy on the relationship between action planning and attendance was significant (R2= .459; adjusted R2=.454; (*F*(2,243=102.193 *p*<.001) and both action planning (*β*=.178, *p*=.001) and maintenance self-efficacy (*β*=.574, *p*<.001) remained significant indicating partial mediation (Figure 3). A Sobel test and bootstrapping indicated the partial mediation was significant (*z*= 4,123, *p*<.001; 95%CI .091-.243). This shows plans to attend are more likely to lead to attendance if women believe in their ability to go, even if faced with barriers.

### Multivariate Analyses: Trauma variables (level of PTSD symptoms, age and nature of abuse)

A multiple regression was calculated with PCL-5 and nature of abuse as predictor variables, and intention as the outcome variable. The model explained a significant amount of the variance (R2 = .029; adjusted R2 = .020; *F*(2,230)=3.41, *p*=.035) with the PCL-5 total score as the only independent significant predictor (*β*=-.165, *p*=.015). A second multiple regression with PCL-5 and age of abuse as predictor variables, and intention as the outcome variable explained a significant amount of the variance (R2=.034; adjusted R2=.022; *F*(3,230)=2.70, *p*=.046) with PCL-5 score as the independent significant predictor (*β*=-.163, *p*=.014), showing higher PCL-5 score related to lower intention.

Due to neither SPAQ groupings being independent predictors, only PCL-5 score was entered into the hierarchical regression (Table 4). The addition of PCL-5 did not increase the amount of variance explained (Model 1 R2 = .682; Model 2 R2 = .682), however the final model did explain a significant amount of the variance in intention (R2 = .682; adjusted R2 = .675; *F*(5,225)=94.58, *p*<.001). PCL-5 was not a significant predictor in Model 2, indicating the hypothesis was not supported and trauma variables did not predict intention over and above HAPA variables.

The analyses were repeated with attendance as an outcome variable. The model explained a significant amount of the variance (R2 = .031; adjusted R2 = .023; *F*(2,230)=3.67, *p*=.027), however only PCL-5 was a significant independent predictor (*β*=-.178, *p*=.009). A second multiple regression with age of trauma and PCL-5 as predictor variables, and attendance as the outcome variable was significant (R2 = .037; adjusted R2 = .024; *F*(3,230)=2.91, *p*=.036), however only PCL-5 was a significant independent predictor (*β*=-.185, *p*=.005) indicating higher PCL-5 score significantly predicts lower attendance levels.

As neither SPAQ categorical variables were independent predictors of attendance, only PCL-5 score was entered into the hierarchical regression model (Table 5). The inclusion of PCL-5 did not explain additional variance in attendance (47.3% to 47.4%) however the final model was highly significant (R2 = .474; adjusted R2 = .462; *F*(5,227)=39.97, *p*<.001). Maintenance self-efficacy (*β*=.610, *p*<.001), and action planning (*β*=.195 *p*=.001) were the only independent significant predictors, indicating PTSD symptoms do not increase the amount of variance explained for attendance, over and above HAPA variables.

### Mediation Analyses of self-efficacy on trauma, intention and attendance

PCL-5 score was a significant predictor of intention (*β*=-.170, *p*=.010) and task self-efficacy (*β*=-.191, *p*=.004), and task self-efficacy as a significant predictor of intention (*β*=-.804, *p*<.001). Regression to explore mediation found PCL-5 score was no longer a significant predictor of intention (*β*=-.018, *p*=.663) however the model was significant (R2= .636; adjusted R2=.633; (*F*(2,230)=199.06, *p*<.001). A Sobel test and bootstrapping indicated full mediation was significant (*z*= -2.91, *p*=.004; 95%CI -.055-.-012).This indicates task self-efficacy fully mediated the relationship between PCL-5 and intention (Figure 4).

As PCL-5 score was a significant predictor of attendance (*β*=-.177, *p*<.001) and maintenance self-efficacy (*β*=-.246, *p*<.001), and maintenance self-efficacy was a significant predictor of attendance (*β*=.662, *p*<.001), this supported the hypothesis that mediation was occurring. After controlling for maintenance self-efficacy, PCL-5 was no longer a significant predictor (*β*=-.010, *p*=.840). The model (Figure 5) was significant and accounted for 44% of the variance in attendance (R2= .442; adjusted R2=.437; (*F*(2,228)=89.56, *p*<.001). A Sobel test and bootstrapping indicated full mediation of maintenance self-efficacy on the relationship between PCL-5 score and attendance was significant (*z*= -3.66, *p*=.0003; 95%CI -.031-.-009). The above analyses indicate PTSD symptoms influence intention and attendance because of the impact they have on an individual’s belief in their ability to attend and continue to attend despite barriers.

## Discussion

The HAPA successfully predicted self-reported level of intention and attendance of cervical screening in women who have experienced sexual assault. HAPA variables, specifically self-efficacy, were more predictive of cervical screening uptake than trauma variables including PTSD symptoms, age and nature of assault.

The sample size enabled adequate statistical power for analysis. Task self-efficacy and positive outcome expectancy predicting intention supports previous research (Teng & Mak, 2011) and is consistent with HAPA theory (Schwarzer, 2008). So intention is higher if women believe in the benefits and in their ability to complete the screening. Consistent with findings for engagement with breast self-examination (Luszczynska & Schwarzer, 2003) risk perception was not an independent predictor suggesting this should not be the focus of interventions. Contrary to previous research showing embarrassment as a barrier (Murray & McMillan, 1993) negative outcome expectancy was a non-significant predictor. Mediation analysis found that endorsing the benefits of cervical screening relates to higher intention if women believe they can successfully complete the screening. This suggests self-efficacy helps intention to attend screening in women who have experienced sexual assault (Bandura, 1997; Schwarzer et al., 2003) as per the HAPA model.

Maintenance self-efficacy, action planning and task self-efficacy predicted attendance, meaning attendance related to confidence to attend despite barriers and planning how to attend. Maintenance self-efficacy is particularly important in this client group due to the number of barriers identified in previous research (Cadman et al., 2012; Robohm & Buttenheim, 1996). Interestingly, recovery self-efficacy only related to attendance, not predicted it. This could be due to construct overlap, shown by the significant relationships between the types of self-efficacy, or women attending cervical screening before but not after their assault, therefore reducing its predictive ability. As age assault and screening attendance occurred were not collected, this cannot be fully explored.

Coping planning, which requires simulating potential barriers to attendance, did not predict attendance, potentially due to the role of avoidance in PTSD symptoms and the high levels of PTSD in participants. The mediation of maintenance self-efficacy on the relationship between action planning and attendance, indicates that translating plans to attend into actual attendance is more likely when women hold a high level of self-belief they can persevere when confronted with barriers. A trauma-informed approach including empowering practice and psychoeducation can increase self-efficacy (Sullivan, Goodman, Virden, Storm & Ramirez, 2017) which could improve quality of plans (Schwarzer & Fuchs, 1996) and attendance.

Less aligned with the HAPA model, maintenance self-efficacy predicted intention and task self-efficacy predicted attendance. A potential explanation is the time lapse between screenings, as this requires higher levels of self-efficacy as more barriers are likely to arise (Luszczynska, Mazurkiewicz, Ziegelmann, & Schwarzer, 2007). The predictive abilities of both maintenance and task self-efficacy for reported intention and attendance highlights the importance of self-efficacy in difficult situations (Schwarzer, 1992) and how support to help women believing they can attend cervical screening despite barriers is key to increase cervical screening uptake in women who have experienced sexual assault.

Contrary to previous findings (Farley et al., 2002), neither age assault occurred nor the nature of assault were predicted intention or attendance. This supports theories highlighting the role of thoughts, emotions and psychosocial factors in trauma (Benight & Bandura, 2004; Nijdam & Wittmann, 2015) rather than the nature of the trauma itself (Kendall-Tackett, Williams, & Finkelhor, 1993). However as 86% of participants experienced rape, this could have biased the results as group sizes were not comparable.

Trauma variables (e.g. PTSD) did not explain more of the variance in intention or attendance above HAPA variables and PCL-5 score became a non-significant predictor. Further analysis showed self-efficacy fully mediated the relationships between PTSD symptoms and intention and attendance. This suggests self-efficacy influences how PTSD symptoms impact on intention and attendance. This could be due to the association between PTSD and self-efficacy, as high self-efficacy relates to lower PTSD and perceived control over recovery (Benight & Midboe, 2002; Ullman, Filipas, Townsend & Starynski, 2007). Furthermore, low coping self-efficacy predicts higher PTSD symptoms (Benight et al., 1999) through impacting on perceived ability to cope (Diehl & Prout, 2002). Despite uncertainty in the direction of the relationship, a clear association between self-efficacy and PTSD symptoms indicates the importance of self-efficacy in understanding the impact of sexual assault, and its role in improving cervical screening uptake. Supporting women who experience PTSD to feel empowered to overcome challenges could help attendance.

Only 39% of participants had attended all of their screenings and 24% had not attended for over 5 years, which is below average attendance (72%). This is lower than previous research in this area (Cadman et al., 2012) highlighting the need for research into this area and the declining uptake rates.

*Clinical implications*

The emphasis on self-efficacy should occur in a trauma-informed approach to reduce risk of victim-blaming. For women with low intention, supporting self-belief and explaining positive outcomes could be beneficial. Ideas for interventions can be drawn from Bandura’s social learning theory (1997) like recalling mastery experiences and expectancy-value theory to increase focus on the positive outcome of cervical screening (Atkinson, 1964). The study suggests encouraging social support, sharing successful experiences (Schunk, 1990), reassurance from friends (Jo’s Cervical Cancer Trust, 2017) and identifying personal benefits for attending cervical screening would be more beneficial than focusing on potential negative outcomes for failing to attend.

For women who intend to go but have low attendance, supporting them to decide when, where and how they will attend their cervical screening, with help from printed materials or healthcare professionals, and helping them plan for potential barriers through identifying available coping strategies could improve uptake. Opportunities for achievement and a sense of control, such as HPV self-sampling, could also help.

The recent publication containing advice for cervical screening attendance (Public Health England, 2021) which recommends choice, setting a reminder, making a plan, social support and being in control relate to the importance of self-efficacy, action and coping planning as found in this study.

*Theoretical implications*

This was the first time the HAPA was used in this population exploring cervical screening uptake. This research provides support for the emphasis on self-efficacy included in the HAPA model and adds to our understanding of the relationship between intention and attendance. It supports criticisms of social-cognitive models, which fail to distinguish between different and fluid levels of intention and attendance (Bish et al., 2000). The model highlights targeted approaches by increasing understanding of which factors help intentions develop into attendance.

*Limitations*

The cross-sectional nature of the study means causality and direction of association cannot be established and the HAPA could not be used as a predictive model. The self-report nature opens answers up to interpretation differences, self-sampling and social-desirability bias. As avoidance is a symptom of PTSD (NHS, 2018), the self-selection nature could have led some women to avoid participation of this study, however, online recruitment is a confidential means of assessing maltreatment history (DiLillo, DeGue, Kras, Di Loreto-Colgan, & Nash, 2006). The advertisement of research into cervical screening may have prevented individuals with strongly negative opinions from participating, potentially meaning a less representative sample. Finally, participants were not asked if they had engaged in psychological therapy, which may have reduced PTSD symptoms or increased self-efficacy beliefs (Butler, Chapman, Forman, & Beck, 2006). The current study was open to only women eligible for cervical screening therefore further research could involve transgender men to develop our understanding.

*Conclusion*

This study provides an understanding of cervical screening uptake in women who have experienced sexual assault, highlighting the role of self-efficacy beliefs over and above factors related to the sexual assault itself. Support for women to attend cervical screening should therefore focus on increasing confidence in overcoming difficulties in completing cervical screening and for services to help women cope with potential barriers to on-going attendance.

**REFERENCES**

Ackerson, K. (2012). A history of interpersonal trauma and the gynaecological exam. *Qualitative Health Research*, *22*(5), 679-688.

Ackerson, K., Pohl, J., & Low, L. K. (2008). Personal influencing factors associated with pap smear testing and cervical cancer. *Policy, Politics & Nursing Practice*, *9*(1), 50-60.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Atkinson, J.W. (1964). *An introduction to motivation.* Oxford, England: Van Nostrand.

Bahmani, A., Baghianimoghadam, M. H., Enjezab, B., Mahmoodabad, S. S. M., & Askarshahi, M. (2016). Factors affecting cervical cancer screening behaviors based on the precaution adoption process model: a qualitative study. *Global Journal of Health Science*, *8*(6), 211.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological review*, *84*(2), 191.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Benight, C. C., & Bandura, A. (2004). Social cognitive theory of posttraumatic recovery: The role of perceived self-efficacy. *Behaviour Research and Therapy*, *42*(10), 1129-1148.

Benight, C. C., Ironson, G., Klebe, K., Carver, C. S., Wynings, C., Burnett, K., ... & Schneiderman, N. (1999). Conservation of resources and coping self-efficacy predicting distress following a natural disaster: A causal model analysis where the environment meets the mind. *Anxiety, Stress and Coping*, *12*(2), 107-126.

Benight, C. C., & Midboe, A. (2002). Coping self-efficacy as a target variable in the treatment of psychological distress in domestic violence survivors. Unpublished manuscript.

Bish, A., Sutton, S., & Golombok, S. (2000). Predicting uptake of a routine cervical smear test: A comparison of the health belief model and the theory of planned behaviour. *Psychology & Health,* *15(*1), 35-50.

Butler, A. C., Chapman, J. E., Forman, E. M., & Beck, A. T. (2006). The empirical status of cognitive-behavioral therapy: a review of meta-analyses. *Clinical Psychology Review*, *26*(1), 17-31.

Cadman, L., Waller, J., Ashdown-Barr, L., & Szarewski, A. (2012). Barriers to cervical screening in women who have experienced sexual abuse: An exploratory study. *Journal of Family Planning and Reproductive Health Care*, *38*(4), 214-220.

Cancer Research (2007). *Cervical Cancer Awareness Measure.* Accessed from: http://www.cancerresearchuk.org/health-professional/awareness-and-prevention/the-cancer-awareness-measures-cam#CAM0. Accessed on: 19th January 2018.

Cancer Research UK (2015). *Cervical Cancer Statistics.* Accessed from: http://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/cervical-cancer#heading-Zero. Accessed on 29th March 2018.

Diehl, A. S., & Prout, M. F. (2002). Effects of posttraumatic stress disorder and child sexual abuse on self-efficacy development. *American Journal of Orthopsychiatry*, *72*(2), 262.

DiLillo, D., DeGue, S., Kras, A., Di Loreto-Colgan, A. R., & Nash, C. (2006). Participant responses to retrospective surveys of child maltreatment: Does mode of assessment matter?. *Violence and Victims*, *21*(4), 410.

Eaker, S., Adami, H. O., Granath, F., Wilander, E., & Sparén, P. (2004). A large population-based randomized controlled trial to increase attendance at screening for cervical cancer. *Cancer Epidemiology and Prevention Biomarkers*, *13*(3), 346-354.

Elit, L., Saskin, R., Raut, R., Elliott, L., Murphy, J., & Marrett, L. (2013). Sociodemographic factors associated with cervical cancer screening coverage and follow-up of high grade abnormal results in a population-based cohort. *Gynaecologic Oncology*, *128*(1), 95-100.

Farley, M., Golding, J., & Minkoff, J. (2002). Is a history of trauma associated with a reduced likelihood of cervical cancer screening? *The Journal of Family Practice, 51*(10), 827-831.

Gillam, S. J. (1991). Understanding the uptake of cervical cancer screening: the contribution of the health belief model. *The British Journal of General Practice*, *41*(353), 510-513.

Godin, G., & Kok, G. (1996). The theory of planned behavior: A review of its applications to health-related behaviors. *American Journal of Health Promotion*, *11*(2), 87-98Jo’s Cervical Cancer Trust (2017). *Barriers to cervical screening among 25-29 year olds.* Retrieved from: https://www.jostrust.org.uk/sites/default/files/ccpw17\_survey\_summary.pdf

Kendall-Tackett, K. A., Williams, L. M., & Finkelhor, D. (1993). Impact of sexual abuse on children: a review and synthesis of recent empirical studies. *Psychological Bulletin*, *113*(1), 164.

Kooiman, C. G., Ouwehand, A. W., & ter Kuile, M. M. (2002). The Sexual and Physical Abuse Questionnaire (SPAQ): A screening instrument for adults to assess past and current experiences of abuse. *Child Abuse & Neglect*, *26*(9), 939-953.

Landy, R., Pesola, F., Castañón, A., & Sasieni, P. (2016). Impact of cervical screening on cervical cancer mortality: Estimation using stage-specific results from a nested case–control study. *British Journal of Cancer*, *115*(9), 1140.

Luszczynska, A., Goc, G., Scholz, U., Kowalska, M., & Knoll, N. (2011). Enhancing intentions to attend cervical cancer screening with a stage-matched intervention. *British Journal of Health Psychology, 16*(1), 33-46.

Luszczynska, A., Mazurkiewicz, M., Ziegelmann, J. P., & Schwarzer, R. (2007). Recovery self-efficacy and intention as predictors of running or jogging behavior: A cross-lagged panel analysis over a two-year period. *Psychology of Sport and Exercise*, *8*(2), 247-260.

Luszczynska, A., & Schwarzer, R. (2003). Planning and self-efficacy in the adoption and maintenance of breast self-examination: A longitudinal study on self-regulatory cognitions. *Psychology and Health*, *18*(1), 93-108.

Mamon, J. A., Shediac, M. C., Crosby, C. B., Sanders, B., Matanoski, G. M., & Celentano, D. (1990). Inner-city women at risk for cervical cancer: behavioral and utilization factors related to inadequate screening. *Preventive Medicine*, *19*(4), 363-376.

Meyers, L. S., Gamst, G., & Guarino, A. J. (2016). *Applied multivariate research: Design and interpretation*. Sage Publications.

Mohammadi Zeidi, I., Morshedi, H., & Shokohi, A. (2021). Predicting psychological factors affecting regular physical activity in hypertensive patients: Application of health action process approach model. Nursing Open, 8(1), 442-452.

Murray, M., & McMillan, C. (1993). Health beliefs, locus of control, emotional control and women's cancer screening behaviour. *British Journal of Clinical Psychology*, *32*(1), 87-100.

NHS (2019) When You’ll be Invited, cervical screening. Accessed from: <https://www.nhs.uk/conditions/cervical-screening/when-youll-be-invited/>, Accessed on: 25/03/2020.

NHS digital (2020). *Cervical Screening Programme, England – 2019-2020.* Accessed from: https://digital.nhs.uk/data-and-information/publications/statistical/cervical-screening-annual/england---2019-20/section-1-call-and-recall

Nijdam, M. J., & Wittmann, L. (2015). Psychological and social theories of PTSD. In *Evidence Based Treatments for Trauma-Related Psychological Disorders* (pp. 41-61). Switzerland: Springer.

Office of National Statistics (2021). *Sexual offences prevalence and trends, England and Wales: year ending March 2020.* Accessed from: https://www.ons.gov.uk/peoplepopulationandcommunity/crimeandjustice/articles/sexualoffencesprevalenceandtrendsenglandandwales/yearendingmarch2020 Accessed on 21st May 2021.

Orbell, S., Hagger, M., Brown, V., & Tidy, J. (2006). Comparing two theories of health behavior: A prospective study of noncompletion of treatment following cervical cancer screening. *Health Psychology*, *25*(5), 604.

Perkins, S., & Jenkins, L. S. (1998). Self-efficacy expectation, behavior performance, and mood status in early recovery from percutaneous transluminal coronary angioplasty. *Heart & Lung: The Journal of Acute and Critical Care*, *27*(1), 37-46.

Ponti, A., Anttila, A., Ronco, G., & Senore, C. (2017). Cancer screening in the European Union (2017). Report on the implementation of the council recommendation on cancer screening. Accessed from: [2017\_cancerscreening\_2ndreportimplementation\_en.pdf (europa.eu)](https://ec.europa.eu/health/sites/default/files/major_chronic_diseases/docs/2017_cancerscreening_2ndreportimplementation_en.pdf). Accessed on: 24th August 2021

Pourhaji, F., Delshad, M. H., Pourhaji, F., & Ghofranipour, F. (2021). Application of the Health Action Process Approach Model in Predicting Mammography among Iranian Women. Accessed from: fe68dbf8-c2e4-46f4-a613-062e47e4ee95.pdf (researchsquare.com)

Public Health England (2021). Cervical Screening: support for people who feel anxious about attending. Accessed from: <https://www.gov.uk/government/publications/cervical-screening-support-for-people-who-find-it-hard-to-attend/cervical-screening-support-for-people-who-feel-anxious-about-attending>. Accessed on : 1st September 2021.

Robohm, J., & Buttenheim, M. (1996). The gynaecological care experience of adult survivors of childhood sexual assault: A preliminary investigation. *Women and Health, 24*(3), 59-75.

Rosenstock, I. M., Stretcher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief method. *Health Education Quarterly*, *13*, 73-92.

Sandberg, T., & Conner, M. (2009). A mere measurement effect for anticipated regret: Impacts on cervical screening attendance. *British Journal of Social Psychology*, *48*(2), 221-236.

Savage, S. A., & Clarke, V. A. (2001). Factors associated with breast and cervical cancer screening behaviours. *Health Education*, *101*(4), 176-186.

Schunk, D. H. (1990). Goal setting and self-efficacy during self-regulated learning. *Educational Psychologist*, *25*(1), 71-86.

Schwarzer, R. (1992) Self-Efficacy in the Adoption and Maintenance of Health Behaviors: Theoretical Approaches and a New Model. In R. Schwarzer (Eds.), *Self-Efficacy: Thought Control of Action,* (pp 217-243). New York: Routledge.

Schwarzer, R. (2008). Modeling health behavior change: How to predict and modify the adoption and maintenance of health behaviors. *Applied Psychology*, *57*(1), 1-29.

Schwarzer, R. (2016). Health Action Process Approach (HAPA) as a theoretical framework to understand behavior change. *Actualidades en Psicología*, *30*(121), 119-130.

Schwarzer, R., & Fuchs, R. (1996). Self-efficacy and health behaviours. *Predicting health behavior: Research and Practice with social cognition models*, 163-196.

Schwarzer, R., & Hamilton, K. (2020). Changing behavior using the health action process approach. The handbook of behavior change, 89-103.

Schwarzer, R., Lippke, S., & Luszczynska, A. (2011). Mechanisms of health behavior change in persons with chronic illness or disability: The Health Action Process Approach (HAPA). *Rehabilitation Psychology*, *56*(3), 161.

Schwarzer, R., & Luszczynska, A. (2008). How to overcome health-compromising behaviors: The health action process approach. *European Psychologist*, *13*(2), 141-151.

Schwarzer, R., & Luszczynska, A. (2015). Health action process approach. *Predicting health behaviours*, 252-278.

Schwarzer, R., Sniehotta, F. F., Lippke, S., Luszczynska, A., Scholz, U., Schüz, B., & Ziegelmann, J. P. (2003). *On the assessment and analysis of variables in the health action process approach: Conducting an investigation*. Berlin: Freie Universeitat Berlin.

Sheppard, B. H., Hartwick, J., & Warshaw, P. R. (1988). The theory of reasoned action: A meta-analysis of past research with recommendations for modifications and future research. *Journal of Consumer Research*, *15*(3), 325-343.

Sullivan, C. M., Goodman, L. A., Virden, T., Strom, J., & Ramirez, R. (2018). Evaluation of the effects of receiving trauma-informed practices on domestic violence shelter residents. American journal of orthopsychiatry, 88(5), 563.

Teng, Y., & Mak, W. W. (2011). The role of planning and self-efficacy in condom use among men who have sex with men: An application of the Health Action Process Approach model. *Health Psychology*, *30*(1), 119.

Walsh, J., O'Reilly, M., & Treacy, F. (2003). *Factors affecting attendance for cervical smear test: A prospective study.* Retrieved from http://www.cervicalcheck.ie/\_fileupload/ Publications/Factors%20affecting%20attendance%20at%20smear%20tests%20Sep t%2003.pdf

Watson, V. S. (2016). *Re-Traumatization of Sexual Trauma in Women's Reproductive Health Care.* University of Tennessee Honors Thesis Projects*.* Accessed from: http://trace.tennessee.edu/cgi/viewcontent.cgi?article=2983&context=utk\_chanhonoproj

Weathers, F. W., Litz, B. T., Keane, T. M., Palmieri, P. A., Marx, B. P., & Schnurr, P. P. (2013). *The PTSD Checklist for DSM-5 (PCL-5).* Scale available from the National Center for PTSD. Boston (MA): National Center for PTSD.

Weitlauf, J. C., Frayne, S. M., Finney, J. W., Moos, R. H., Jones, S., Hu, K., & Spiegel, D. (2010). Sexual violence, posttraumatic stress disorder, and the pelvic examination: How do beliefs about the safety, necessity, and utility of the examination influence patient experiences?. *Journal of Women's Health*, *19*(7), 1271-1280.