

**Using Insights From Sports Psychology to Improve Self-Efficacy during
Management Of Acutely Unwell Patients by Recently-Qualified Doctors : A
Mixed–Methods Study**

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Abstract

Problem

Doctors experience a range of negative reactions when managing acutely unwell patients. These may manifest as emotions, such as under-confidence, anxiety, frustration, or behaviors, such as tremors, fidgeting or even paralysis. Without appropriate coping strategies, such emotions and behaviors can impede optimal clinical performance, which directly impacts patient management. Elite athletes use Performance Enhancing Routines (PERs) to minimize the impact of their negative emotions and behaviors on competitive performance. This study investigated whether PERs could similarly improve recently-qualified doctors' emotional and behavioral control during management of acutely unwell patients and whether the doctors perceived any impact on clinical performance.

Approach

12 doctors within 2 years of graduation from Medical School implemented PERs using the PERFORM (Performance Enhancing Routines for Optimisation of Readiness using Metacognition) model. The doctors' perceptions of PERFORM's impact on their patient management was evaluated using self-reported mixed-methods data, including Think Aloud commentaries, semi-structured interviews and self-efficacy scores.

Outcomes

Doctors reported that PERFORM improved their ability to control negative emotions or behaviors during an acutely unwell patient in situ simulation, showing a statistically significant improvement in self-efficacy scores ($p=0.003$, effect size=0.89). Qualitative data revealed perceived improvement in aspects of clinical performance such as enhanced knowledge-recall and decision-making. These performance attributes appeared to positively

impact interprofessional relationships and patient care. Doctors individualized their PERs and supported the wider implementation of PERFORM in healthcare education, particularly during the transition from student to qualified physician.

Next Steps

This is the first study to employ individualized PERs based on sport psychology in a medical context. Given the above findings PERFORM could be introduced into existing acute patient management courses to provide emotional regulation coaching alongside clinical skills training. Further research might investigate PERFORM's impact in other environments where emotional and behavioral control is paramount to patient management, such as surgery.

Problem

Doctors of all seniority levels can feel unprepared to manage their own negative emotional and behavioral experiences. This is most problematic for recently-qualified doctors,¹ such as interns or United Kingdom (UK) Foundation Trainees (who graduated from Medical School less than two years ago), who lack their senior counterparts' wealth of clinical experience. This unease often occurs during management of acutely unwell patients, especially during out-of-hours shifts when the level of senior support is at its lowest.² Doctors' negative emotional and behavioral experiences are associated with difficulty in accessing and applying the knowledge and skills gained during training within a complex clinical environment. Doctors lacking experience and confidence may respond to this clinical complexity by avoiding situations deemed beyond their control.³ Unsurprisingly, newly qualified doctors frequently identify the 'management of the acutely unwell patient' as a domain in which they feel least prepared for clinical practice.

Despite multiple reports of the effects of stress on acutely unwell patient management, there remains "surprisingly little evidence concerning the strategies that doctors within their first few months of practice use to handle emotions associated with clinical experiences".¹

The deleterious effect of negative emotional and behavioral reactions on performance is well-established in sport. To minimize these reactions, athletes are coached to implement Performance Enhancing Routines (PERs) during high-stakes competition.⁴ PERs are defined as a "sequence of task relevant thoughts and actions which an athlete engages in systematically prior to his or her performance of a specific sport skill".⁵ Although PERs serve many purposes, including increasing focus, alleviating stress and/or 'choking' in a high-stakes situations, their precise mechanism has not been established.⁴

Sport and medicine share many similarities. Both are embedded in busy, distraction-filled environments where focus and attention are paramount for successful task completion. Consequently, surgeons have trialled the use of mental rehearsal to optimize clinical performance.⁶ However thus far, mental rehearsal has generally been applied during a specific skill, e.g. suturing or knot-tying, rather than to optimize overall performance and have tended to adopt a prescribed, ‘one size fits all’ approach. Sport psychologists have indicated that individualized PERs, regulated through application of metacognition, could benefit performance optimisation.⁴

Metacognition has been simply described as ‘thinking about thinking’⁷ with individuals self-monitoring their emotions and behaviors whilst performing a task and making adaptive changes to their behavior to reach the desired goal of a task.⁴ Coaching individuals to apply metacognition during tasks has been demonstrated to improve academic ability across a range of different tasks (e.g. reading, mathematics and problem solving), ages and cognitive abilities,⁸ including medical education.⁹

The PERFORM (Performance Enhancing Routines for Optimisation of Readiness using Metacognition) model was designed as a conceptual model to illustrate how PERs might be applied to medical education.. The metacognitive components of the PERFORM model (metacognitive feeling, knowledge, justification and skills) were based upon descriptions by Efklides.¹⁰

(Figure 1: Conceptual PERFORM model, adapted from Church et al⁹)

Figure 1 illustrates the PERFORM model, outlining the interplay of metacognitive monitoring and control over the use of PERs.

In action, the PERFORM model is initiated by a **metacognitive feeling**, an affective, non-analytical ‘gut feeling’ which can be positive or negative. Positive feelings are associated with confidence, familiarity or ‘feeling of knowing’, indicating that the individual feels ‘on-track’ to complete a specific task and therefore a PER is not required. Negative feelings or behaviors, such as a physiological response to stress (shaking hands, sweaty palms) or a nervous physical routine (fidgeting), are associated with difficulty.¹⁰

Negative feelings or behaviors should induce a **metacognitive judgement** to explain why these feelings are present, such as anxiety due to lack of familiarity of a situation, or a loss of focus due to distraction. Once identified, a PER, including the techniques listed in Metacognitive Knowledge box in Figure 1, is selected from the **metacognitive knowledge bank**, informed by self-, task-, and experience-specific knowledge. Once implemented, the PER is evaluated using **metacognitive skills**.

If the PER does not resolve the negative emotion or behavior, two pathways are triggered. Firstly, this information is fed back into the metacognitive knowledge bank to inform future selection of PERs within specific contexts. Secondly, an alternative PER is selected and implemented. This select-implement-evaluation cycle continues until a positive outcome, judged by alleviation of the negative emotion or behavior, is reached. At this point, two different pathways input the positive PER experience into the metacognitive knowledge bank for future reference, and return the individual to the entry point (top) of the model, where they continue to monitor their **metacognitive feelings** throughout the remainder of the task.

In this way, metacognitive experiences refine the metacognitive knowledge bank by adding, deleting or revising the PERs and their associations to certain situations.⁷

Study aim

This study had the aim to understand how the application of PERs using the PERFORM model could improve recently-qualified (within two years of graduation from Medical School less than two years ago) doctors' emotional and behavioral control during their management of the acutely unwell patient in both in-situ simulation and clinical practice.

Approach

A multiple case study design was adopted to gain an in-depth understanding of participants' experiences. The unit of analysis was an individual doctor, bound within a single 4-month clinical placement within the study period April to December 2017.

Mixed methods were used in the study to contend with the “complexity and messiness” of social research and aided validity through the ability to triangulate the research findings.

Recruitment and study sites

Doctors within two years of graduation from medical school were recruited from two study sites, a large central academic teaching hospital (CTH) and a smaller peripheral district general hospital (DGH), to allow for potential differences in levels of supervision and training. Participants were recruited via emails and face-to-face contact. Convenience sampling maximised the number of cases given doctors' limited availability due to busy work schedules.

The study content and timelines were identical over both sites and ran sequentially over two, four-month periods.

Study overview

The study was organised into three stages. Stage 1 participants were coached to use the PERFORM model (Figure 1) in simulation, mirroring the strategies used in sport to build a PER in a practice environment. Each participant selected routine from a list of PERs taken directly from the sport psychology literature (shown in Metacognitive Knowledge box in Figure 1) and applied it during an acutely unwell patient simulation.

Stage 2 transferred this initial coaching to the real clinical environment. Participants self-directed opportunities to apply the PERFORM model during a patient encounter. A reflective log, which encouraged personal evaluation and modification of their model, was completed after each encounter.

Stage 3 evaluated both the processes and outcomes of the study. Firstly, each participant attended an acute upper gastrointestinal haemorrhage in-situ simulation involving a high-fidelity manikin and multidisciplinary staff (nursing and health-care assistants) within a ward devoid of patients. The simulation was video-recorded and participants conducted a Think Aloud commentary (TAC), narrating over the video-recording of their simulation. TACs were transcribed verbatim and analysed using framework analysis based on the metacognitive facets of the PERFORM model.

Participants reported their perceived ability (self-efficacy) to gain control over a negative emotional and/or behavioral reaction during the in-situ simulation, where 0=no control and

100=full control over emotions and behaviors immediately prior to, and after, the use of a PER. Wilcoxon-signed rank test and ANCOVA were used to analyse change in pre-/post-PER self-efficacy and influence of variables using SPSS 25 for Mac (IBM, New York, United States of America). As the data was non-parametric, effect size was calculated using the formula $r = z/\sqrt{N}$. Post-hoc tests were carried out where indicated.

A final semi-structured interview (SSI) (protocol in Appendix 1) evaluated participants' perceptions of using the PERFORM model, and explored their suggestions for its future application. SSIs were transcribed verbatim prior to inductive thematic analysis using NVIVO 12 for Mac (QSR International, Melbourne, Australia).

Outcomes

Of the 12 participants that enrolled in the study (female=4, male=8), four participants were in their first year post-graduation and eight were in their second year. Seven worked in the DGH, whilst five worked in the CTH. The clinical specialties in which they worked were acute medicine (n=4), general medicine (n=5), surgery (n=2) and academic with mixed clinical shifts (n=1).

(Table 1: Statistical Results from In-situ Simulation)

(Table 2: Results of thematic analysis: topic, themes and subthemes with illustrative quotations from participants)

Quantitative outcomes

Eleven of the 12 participants implemented a PER during the Stage 3 in-situ simulation. Self-efficacy scores were reported relating to the control of negative emotions or behaviors immediately prior (pre-PER) to and following (post-PER) the use of their PER during the in-situ simulation (Table 1).

There was a statistically significant improvement in individual self-efficacy scores during an acutely unwell patient in situ simulation (median change=25, interquartile range 15.00 – 35.00, $Z=-2.94$, $p=0.003$, effect size=0.89). Multiple regression analysis revealed that no other variables were statistically significant. However, with a small number of participants, a null finding may be due to low power inherent in the statistical test. Participants working in the larger CTH demonstrated a greater improvement in self-efficacy scores compared to those working in the smaller DGH. In contrast, almost no difference was seen between participants with differing lengths of post-medical school graduation experience (one year versus two years post-graduation).

Qualitative outcomes

The underlying mechanisms by which PERs improved self-efficacy when caring for acutely unwell patients were described through themes of *Personal*, *Multidisciplinary* and *Clinical Performance*. The application of the PERFORM model was unpacked through themes of *Individualization*, *Limitations* and *Recommendations*. Quotes from the TACs and SSIs demonstrate these themes (Table 2), with alphanumerical codes denoting the hospital and enrollment number of each case.

Next Steps

This study is the first to use individualized PERs based on sport psychology in a medical context. It has contributed to an under-researched area,¹ and successfully demonstrated a perceived sense of enhanced control by doctors managing complex clinical situations in both simulation and genuine patient encounters. The study provided doctors with an opportunity to discuss emotional and behavioral reactions to starting work and may complement other, more clinically-focussed, acute patient management training programmes for medical students, recently-qualified doctors or other healthcare professionals who also practice within complex clinical environments, such as nurses. The doctors reported that the PERFORM model improved their ability to control their negative emotional and behavioral responses during complex clinical scenarios, facilitating enhanced recall and application of clinical knowledge. In the same way, PERs also facilitated the doctors' management of non-acute scenarios, e.g. difficult discussions with patients and their relatives, thereby decreasing avoidance of challenging situations.¹ Working within the complex clinical environment, doctors must be able to manage the emotional challenges of workload, uncertainty and change by developing appropriate coping strategies. Currently, doctors receive little support or guidance to develop such strategies. The PERFORM model fills this need.

This study included a small cohort of self-selecting participants. Although this limits generalisability of the outcomes, case study research such as this instead aims for *transferable* outcomes by exploring multiple variables in a small number of settings so that findings can be applied to, but are not necessarily replicated in, other contexts.

Simulation may not replicate stress in the same way as a genuine clinical environment, but its purpose in this context was to provide opportunities for participants in which to apply the PERFORM model without compromising patient confidentiality. Self-assessment data can be problematic, but was appropriate given the aims of this study to explore emotional and behavioral control, and not direct clinical performance. Observed clinical performance data was not collected because any change observed over the 4 month study period would have been multifactorial (e.g. clinical experiences, other educational activities). Therefore direct causative links between improved clinical performance and study involvement could not have been drawn without a control group.

Despite these limitations, this proof of concept merits further investigation. This might address whether PERFORM improves objectively assessed clinical performance using a case-control design. Alternatively, further research could investigate the application of PERFORM to other high-pressure clinical environments, such as surgery.

Acknowledgments

The authors wish to thank the staff of both participating hospital sites for their cooperation and support during the study and use of their clinical skills facilities.

Funding/Support

None.

Other disclosures

The authors declare no conflict of interest.

Ethical approval

Ethical approval was granted from the University of Sheffield, UK (reference 012007; approved 29/11/2016) and Health Research Authority (HRA) permission (reference 206630; approved 02/03/2017) was obtained to conduct research with doctors.

Disclaimer

None.

Previous presentations

Previous presentation of study at the Association for the Study of Medical Education (ASME) conference, Glasgow, UK, 04/07/2019. Also presented at the Undergraduate Sport and Exercise Medicine Conference, Sheffield, UK, 09/11/2019.

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Figure Legends

Figure 1: Conceptual PERFORM model, adapted from Church et al⁹ : Participants were coached to apply the PERFORM model during a clinical scenario by starting at the top central box (*Metacognitive Feeling*) and followed either the Positive or Negative Affect arrow, depending on their current emotional reaction. If positive, no further action was needed. Following the central negative pathway, participants engaged *Metacognitive Judgement* to ascertain the reason for the underlying negative affect and to choose a Performance Enhancing Routine (PER) from their *Metacognitive Knowledge* bank. Once applied, the PER was evaluated for effectiveness at relieving the negative affect through use of *Metacognitive Skills*; if the negative affect was *not* relieved (right hand curved arrow), a different PER was chosen; this was repeated until the negative affect was relieved. Once the negative affect was relieved, participants followed the left hand curved arrows to both; 1. feedback this information to the *Metacognitive Knowledge* bank for future reference, and 2. return to the top of the model to continue monitoring their affect throughout the remainder of the task. On initiation of a future negative affect, the participant would move through the central model pathway again.

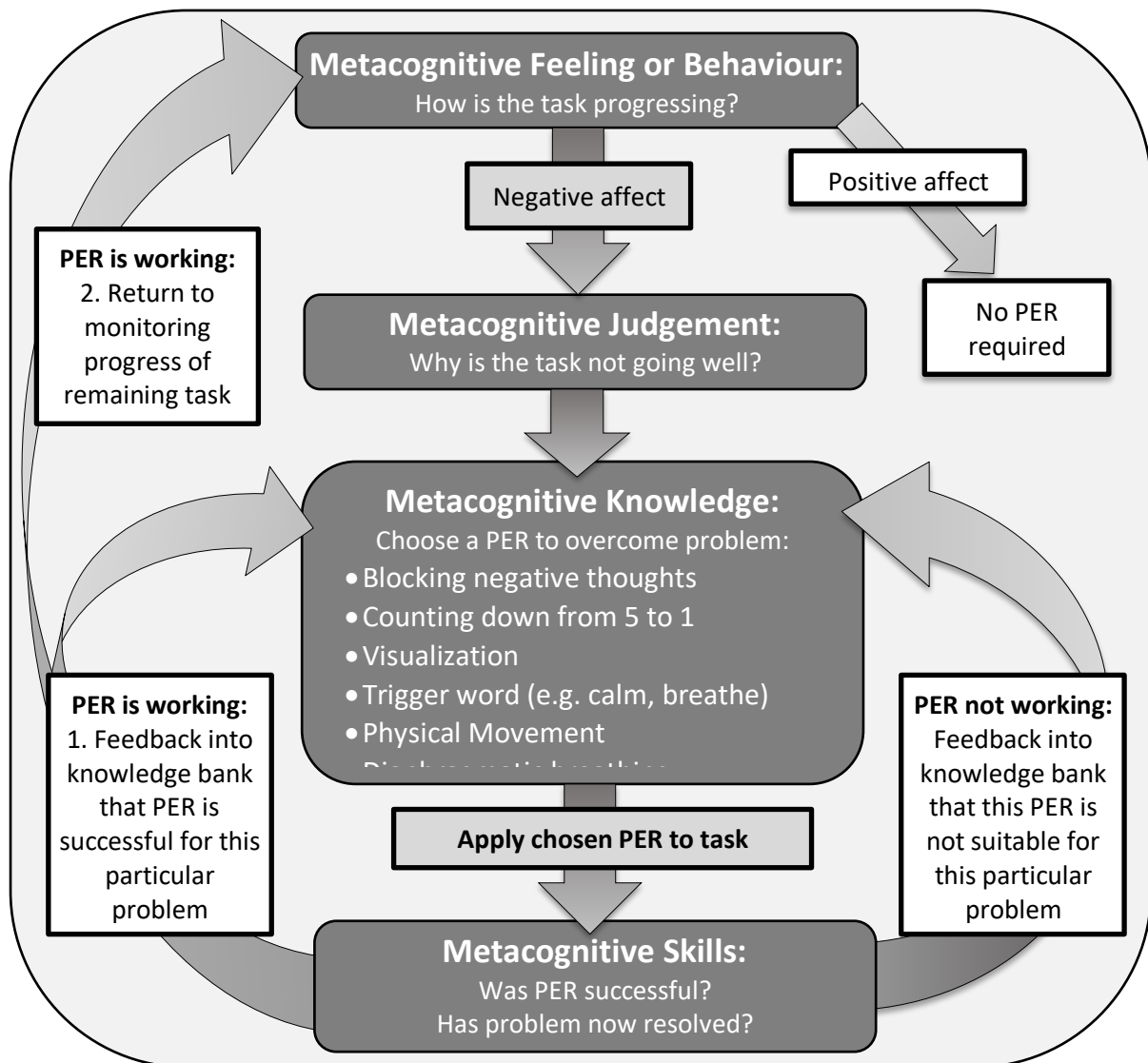


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Table 1: PERFORM Study - Statistical Results Of Self-Efficacy Scores Reflecting Control Over Negative Emotions And Behaviours (On Scale Of 0-100) Reported By Recently-Qualified Doctors Following Their Use Of Performance Enhancing Routines In Simulation

Change in self-efficacy pre-post PER	Median	Interquartile range	Z statistic	P value
Entire cohort	25.00	15.00 – 35.00	-2.94	0.003 ^a
By place of work		Interquartile range		
Central Teaching Hospital	30.00	27.50 – 52.50		
District General Hospital	16.25	14.38 – 31.25		
By training grade				
Doctor within 1 year of graduation from medical school	23.75	15.63 – 56.25		
Doctor within 2 years of graduation from medical school	25.00	25.00 – 35.00		
Multiple Regression Analysis Covariate	Coefficient (B)	Confidence Interval (95%)		P value
Constant	84.69	-21.30- 190.69		0.08
Baseline Self-efficacy score	-1.00	-3.17-1.16		0.24
Place of work	-14.55	-50.99 - 21.89		0.29
Trainee level	-9.54	-53.17 - 34.09		0.54
Job ^b Emergency Department	53.04	-23.64 - 129.72		0.12
General Medicine	34.31	-29.46 - 98.07		0.19
General Surgery	92.40	-17.63 -202.43		0.08
Gender	20.46	-25.58- 66.50		0.25

^a Statistically significant ($p < 0.05$)

^b Compared to critical care rotation

Abbreviations: PER – Performance Enhancing Routine

Table 2: PERFORM study – Topic, Themes And Subthemes With Illustrative Quotations following Thematic Analysis of Semi-Structured Interviews and Think Aloud Commentaries with Recently-Qualified Doctors following their use of Performance Enhancing Routines in Simulation ^a

Topic	Theme	Subtheme	Illustrative Quote
Mechanisms	Personal	Discussing Emotions	"...it was good just talking about it cos firstly just as an issue I think it is fairly common among junior doctors? ...and it's not something that's necessarily openly acknowledged by, any like other seniors I suppose, or like in the teaching programmes" (C01)
		Finding Solutions	"I've always kinda been aware that I've been nervous but I've never actively, made a path to try and solve that" (C06)
		Professional Identity	"...that's probably one of the most important things you can be as a clinician is being self-aware?...because you're not ever gonna do everything perfect all the time" (C02)
	Multidisciplinary	Trust	"...maybe I came across a bit more professional...because I was calmer" (C06)
		Influence	"...if you LOOK panicked, then they (nurses) feel panicked...so if you can manage not to look panicked, even if you are...then that panic doesn't spread" (C04)
	Clinical Performance	Autonomy	"...I just kind of panic and be like "Ah I need someone here now"...It (PERFORM model) probably gets me a little bit further (with patient management)" (C01)
		Accessing Knowledge	"...(it) allows me to draw on the knowledge that I know I've got" (S03).
		Efficiency	"...that's what prompted me to think "Right, so I've done this, so I need to call someone"...Which may've, probably would've still come, but might've been a little bit later" (S01)
	Application of the Model	Individualization	Initiating the model
Novel PERs			"I go through that thought process of "oh I'm cleaning my glasses so let's think about what's goin' on and stop." (S01)
Applying to non-acute/ non-clinical situations			"...when you have to go and speak to a patient's family, and they're gonna ask difficult questions and...I've like done the breathing BEFORE... so that when I go to them I've got a clear idea in my head of what the plan is and what's happening and I feel calm. And I can handle the situation." (C04)
Limitations		Conspicuous	"I suppose sometimes feel-would feel a bit self-conscious about, so things like sort of doing deep breathing and things I think are obvious to myself...y'know even though that might not be true" (S04)
Recommendations		Timing of intervention	"(PERFORM should be coached)...maybe like final year...and maybe even just F1 maybe...in the first few weeks..." (C06)

^a Code in brackets following each quotation denotes individual study participant

Abbreviations: PERFORM – Performance Enhancing Routines for Optimisation of Readiness using Metacognition

APPENDIX 1

PERFORM: Semi-structured interview schedule

Topics to be covered by interviewer:

- A. Usability of the PERFORM model in clinical practice as a whole
- B. Usefulness of the PERFORM model in clinical practice as a whole, and what in particular was the MOST useful element of the study.
- C. Validate how the PERs were used in the context of metacognitive processes by the participant. (The researcher will have gained an interpretation of this from the post-scenario reflective data, but this feedback session will allow participants to validate this model or alter it accordingly.)
- D. Suggestions for improvements.

Introduction

Researcher introduces themselves and checks candidate's name.

Researcher checks that candidate has read the Participant Information Sheet and signed the consent forms, and ask if there are any questions before we begin the interview.

Finally, the researcher will explain and reassure the candidate that their interview will be anonymised as soon as it is transcribed, and they will be assigned a Participant number for analysis purposes. Also, there are no 'wrong' answers to the following questions, and the following simulation will not be marked for clinical performance.

Main Body of Interview

Some example questions:

TOPIC A: Usability of the PERFORM model in clinical practice as a whole

1. Tell me about your experiences of this study
2. How have you found using the PERFORM model and PERs in the clinical environment?

TOPIC B: Usefulness of the PERFORM model in clinical practice as a whole, and what in particular was the MOST useful element of the study.

1. How useful has the study been in helping you when managing the acutely unwell adult?
2. Have you used what you have learned in the study in any other way? (clinically or non-clinically)
3. What was the most important element of the study for you?
4. Can you rank the following in order of importance for you:

1. Use of the routine itself
2. Increased awareness of own feelings
3. The identification of the specific element(s) of acute care that induces the negative emotions/behaviours (from Stage 1)
4. The use of reflection post-scenario as a cognitive forcing strategy
5. Other (please specify)

TOPIC C: Validate the researcher's understanding of participants construct of the way they use PERs within their metacognitive framework

From the reflections and conversations that we have had over the past few months, I have constructed how I think you use the model....(researcher explains their findings, and then asks for validation from the participant)

TOPIC D: Suggestions for Improvements

What would you change about the study to make it better?

Conclude the interview by asking if participant wishes to add anything to the responses they gave, and thank them for their time.