ORIGINAL RESEARCH

Education Improves Decision-Making of Exercise Physiologists Regarding Low Back Pain

Mitchell T. Gibbs, PhD, AES[1,2], Natalie M.V. Morrison, PhD[3], Paul W. Marshall, PhD[2,4]

ABSTRACT

Background: To investigate the efficacy of targeted education on clinical decision-making in accredited exercise physiologists.

Methods: Fifty accredited exercise physiologists undertook a 4-hour targeted education session aimed to demonstrate why the biopsychosocial model is better suited to the management of chronic low back pain than the biomedical model. The pain attitudes and beliefs scale for physiotherapists and patient vignettes were collected before and after the targeted education to observe changes in beliefs and clinical decision-making.

Results: A significant reduction in biomedical beliefs ($P < 0.01$) with no concomitant change in biopsychosocial beliefs was observed following the targeted education. Clinical decision-making significantly altered on all 8 items associated with the patient vignettes following the targeted education.

Conclusion: Following targeted education, a reduction in biomedical beliefs with no concomitant change to biopsychosocial beliefs significantly altered clinical decision-making. The findings of this study support existing literature and demonstrate changes in attitudes and beliefs following education impact clinical decision-making in accredited exercise physiologists. Education interventions should focus on informing practitioners of the benefits of the biopsychosocial model as compared to the biomedical model for management of chronic low back pain rather than simply teaching biopsychosocial theory and application. *J Clin Exerc Physiol*. 2022;11(1):12–18.

Keywords: Practitioner education, clinical decision-making

INTRODUCTION

Chronic low back pain (CLBP) incurs a substantial societal and economic burden, being the number one condition for years lived with disability (1). Currently, exercise is recommended as first-line treatment (2), and across the literature this has shown small to moderate effects on pain and disability (3). However, the onus for dissemination of contemporary CLBP literature and clinical practice guidelines to practice is placed on the individual practitioner. Unfortunately, multiple studies demonstrate practitioner's biomedical biases often determine clinical decision-making, which may impact the application of best-practice approaches to CLBP (4,5) as demonstrated by the use of clinical patient vignettes (6,7). Biomedical beliefs, as measured by tools such as the pain attitudes and beliefs scale for physiotherapists (PABS-PT) (8,9) refer to a Cartesian view of pain, with an assumed isomorphic relationship between pain and damage (10). Conversely, current clinical practice guidelines and best available evidence reflect a framework more consistent with the biopsychosocial

[1]School of Health Science, University of New South Wales, Kensington, 2052 Australia
[2]School of Health Science, Western Sydney University, Campbelltown, NSW 2560 Australia
[3]School of Medicine, Western Sydney University, Campbelltown, NSW 2560 Australia
[4]Department of Exercise Science, University of Auckland, Auckland 1023 New Zealand

Address for correspondence: Mitchell T. Gibbs, Wallace Wurth Building, UNSW, Sydney, 2052 Australia; e-mail: Mitchell.gibbs@unsw.edu.au.

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model of managing the pain experience (2,11). The biopsychosocial model explains the interaction between biological, social, and psychological factors, which ultimately influence the pain experience of the individual (12). Multiple studies have reported the efficacy of providing biopsychosocial-based education interventions to manipulating practitioner's attitudes and beliefs (13–15).

Increasing the knowledge and clinical application of the biopsychosocial model for practitioners working with CLBP is often the focus of practitioner education (13–15). However, these studies often only use 1 scale of measurement, which dichotomizes biopsychosocial and biomedical beliefs (13,14). Indeed, measurement tools such as the back beliefs questionnaire (16) use one continuous scale where an increase in score reflects higher biopsychosocial beliefs. Studies using single scale questionnaires like the back beliefs questionnaire, such as those by O'Sullivan et al. (14) and Beales et al. (13), are unable to observe if any changes in practitioners' clinical decisions are because of a reduction of biomedical beliefs, increase of biopsychosocial beliefs, or both. Indeed, these studies also did not directly measure clinical decision-making, although O'Sullivan et al. (14) contacted practitioners whose beliefs changed more than the mean to ask if they qualitatively agreed they had improved. Conversely, the PABS-PT (17) contains both a biopsychosocial and biomedical subscales, allowing for a more cohesive measurement of these belief structures. Measurement of beliefs using the PABS-PT means it is plausible for a practitioner to hold both high biomedical and biopsychosocial beliefs. Overmeer et al. (15) used vignettes and the PABS-PT questionnaire to measure beliefs to measure clinical decision-making following practitioner education. This study reported both a decrease in biomedical and an increase in biopsychosocial beliefs, which manifested in changed clinical decision-making (15). However, the specific mechanism responsible for altering practitioners' clinical decision-making was not elucidated and may have been related to a reduction in biomedical beliefs, an increase in biopsychosocial beliefs, or a combination of both.

Currently, the majority of practitioner education literature relating to CLBP has focused on physiotherapists and general practitioners (13,15,18). Thus, the context of practitioner education concerning a biopsychosocial approach to exercise prescription for CLBP has an exclusive physiotherapy focus. In Australia, accredited exercise physiologists (AEPs) are an exercise-based allied health profession, providing interventions for CLBP (6). AEPs are exercise-based practitioners recognized under Medicare, WorkCover, Department of Veteran Affairs, and some private health insurance policies to provide interventions to patients with chronic musculoskeletal pain (6). AEPs have a scope of practice excluding diagnostic measures and manual therapies, which positions this profession well to adopt a biopsychosocial approach to exercise management of CLBP with evidence showing increased efficacy of contemporary interventions when coupled with exercise (19). A recent study surveyed the attitudes and beliefs of AEPs and physiotherapists and found AEPs to have higher biomedical beliefs (6). Interestingly, this study did report biomedical beliefs influenced clinical decision-making regardless of profession, illustrating the importance of biomedical beliefs on practice and the CLBP patient's treatment (6). Indeed, a question arising from this paper is if targeted education can shift this relationship of biomedical beliefs impacting clinical exercise management of CLBP in or among AEPs. However, there is currently no research investigating the efficacy of biopsychosocial education on the clinical practice of AEPs.

Based on the available literature, this study was designed to investigate the efficacy of a targeted educational approach at manipulating AEP practitioner beliefs and observe associated changes in clinical decision-making. The targeted approach in this is based on the findings of previous work examining the implication of beliefs on practice (6). The targeted education was designed to show practitioners why a biopsychosocial approach was better suited to CLBP management as opposed to biomedical, rather than simply aiming to increase biopsychosocial knowledge and skills. This approach was selected as it is unknown if an increase of biopsychosocial beliefs is any more important than a decrease in biomedical beliefs, when measured independently. The authors hypothesized AEPs clinical-decision making would improve following the intervention and a decrease in biomedical beliefs would be equally as important as an increase in biopsychosocial beliefs to the effect on clinical decision-making.

MATERIALS AND METHODS

Trial Design and Ethics

This study was a cohort educational intervention for AEPs in Australia and was approved by the Western Sydney University Human Research Ethics Committee (H13645).

Recruitment

Power calculations were performed based on previous literature estimating a sample of n = 40 was needed to observe a pre-education to posteducation change using 80% power and significance set to $P = 0.05$ (15,20). Fifty AEPs were recruited through social media and email contact. Prior to COVID-19, AEPs were recruited in proximity to Western Sydney University, Campbelltown Campus, to attend a face-to-face session. To meet changing COVID-19 guidelines, face-to-face sessions were transferred to online format, allowing for ongoing recruitment to be expanded Australia wide. Because of the multiple methods being used for recruitment, it is not possible to comment on the response rates.

The targeted education was designed to present practitioners with the knowledge and application of the biopsychosocial model and to facilitate discussion around downfalls of the biomedical model for CLBP. The education also provided practitioners with a pragmatic model to implement the biopsychosocial approach to CLBP into clinical practice. The model was scoped to the 5 sessions provided to patients under the Medicare chronic disease management plan in

Australia. The targeted education to practitioners in this study consisted of 6 modules: basics of pain neuroscience, the biomedical model of exercise for CLBP, the biopsychosocial model and why this is well suited to CLBP exercise management, structuring biopsychosocial exercise interventions, structuring pain education, and case study examples. Pain neuroscience education elements of the intervention were based on the *Explain Pain* text by Butler and Moseley (21). The targeted education made no reference to any survey items used in the data collection process.

Survey

The survey included demographic questions (e.g., age, gender, field of practice, level of education, years working in the field, and confidence to manage patients with CLBP as measured on a 6-point Likert-type scale ranging from 1—totally disagree to 6—totally agree), the PABS-PT, and 2 patient vignettes. The survey was collected immediately pre-education and posteducation.

PABS-PT

The revised version of the PABS-PT (17) is a 19-item scale designed to reflect the 2 main treatment orientations for physiotherapists identified within the literature: biomedical and biopsychosocial. The PABS-PT has 10 questions relating to the biomedical model, with the remaining 9 relating to the biopsychosocial model. The PABS-PT is measured on a 6-point Likert-type scale ranging from 1—totally disagree to 6—totally agree, with each scale being individually totaled. The start of the survey informs participants the researchers are only interested in their opinion about the management of CLBP specifically and the opinion of others is not relevant. Participants were informed the survey is regarding non-specific CLBP excluding diagnoses such as radicular syndrome, cauda equina syndrome, fractures, infections, inflammation, a tumor, or metastasis (17). The Cronbach alpha for the biomedical scale is 0.80, and the biopsychosocial scale is 0.68 (17). The revised version of the PABS-PT was used as the internal consistency of the biopsychosocial scale had been raised from 0.54 in its original form to 0.68 (17,22). Additionally, this scale was selected because of its applicability to the scope of exercise-based practitioners and generalizability to the larger body of literature.

Vignettes

Two of 3 vignettes (vignette 2 and 3) designed by Rainville et al. (7) were used in this survey (Appendix). These vignettes, as described in the original paper, included patient symptomology, physical findings, diagnostic test results, and treatment history. Additionally, vignettes lacked evidence that would indicate surgical intervention. The third vignette was not included in the current study as a postoperative patient is described and the larger body of existing literature for the management of CLBP with exercise has excluded patients with a history of spinal surgery. Following reading of each vignette participants were asked to provide their opinion about pathology, severity of symptoms, and appropriate work and activity levels on a Likert-type scale (Appendix). All responses to vignette items were scored from 1 to 5, with 1 representing less severe pathology/symptoms and higher activity/work recommendations, and 5 representing more severe pathology/symptoms and lower activity/work recommendations (Appendix).

Statistical Analysis

PABS-PT scores were totaled for both subscales (17). An analysis of variance was performed on pre-education and posteducation data for both subscales of the PABS-PT and all vignette items. Estimates of effect size were calculated by use of Cohen's *d* (0.2 = small effect, 0.5 = moderate effect, 0.8 = large effect). Consistent with previous literature (4,6), a stepwise linear regression was then performed on the *change* score (i.e., pre-education minus posteducation) for each vignette item, with PABS-PT scores and demographics included in the model. Additionally, a group variable was created to distinguish any differences between the face-to-face and online participants and included into the regression model as a covariate. The use of parametric tests and representation of means in Likert scale data is shown to be acceptable in studies with small samples (23), and is consistent with previous literature (4,6,7,24). Significance was set to $P = <0.05$.

RESULTS

Recruitment extended over a 3 month period. Demographic data of all 50 participants is shown in Table 1.

A significant reduction of biomedical beliefs with a large effect size was observed following the targeted education ($P = 0.004$, $\eta^2 = 1$, Table 2). No significant difference was observed on biopsychosocial scores following the targeted education. No differences were observed between those participating in either face-to-face (n = 15) or the online (n = 35) targeted education.

A significant difference with moderate to large effect size was observed following completion of the targeted education for all vignette items (Table 2). A reduction in score in clinical vignettes reflects decision-making consistent with

TABLE 1. Demographic information of responders.

	Mean	SD
Age	29.4	5.9
Sex (% Female)	35%	
Education[a]	1.9	0.7
Confidence (Pre)	5.0	0.7
Confidence (Post)	5.0	0.7
Years Practicing	4.4	4.4
Continued Education (% completed)	37.5%	

[a]Level of education: 1 = bachelor's degree; 2 = master by coursework; 3 = master by research; 4 = PhD. Further voluntary education relating to exercise management of chronic low back pain

TABLE 2. Pretargeted and posttargeted education PABS-PT and vignette responses.

	Mean	SD	*P* value	Cohen *d*
PABS-BPS				
Pre	38.8	4.1		
Post	39.8	4.8	0.30	0.23[a]
PABS-BM				
Pre	25.9	5.7		
Post	22.2	5.5	<0.01*	0.67[b]
Severity				
Pre	2.8	0.6		
Post	2.2	0.7	<0.01*	0.97[c]
Pathology				
Pre	1.5	0.8		
Post	1.2	0.5	0.03*	0.49[a]
Activity				
Pre	2.0	1.0		
Post	1.5	0.8	0.01*	0.60[b]
Work				
Pre	2.4	0.9		
Post	1.8	0.8	0.01*	0.60[b]
Severity				
Pre	3.5	0.5		
Post	3.0	0.6	<0.01*	0.91[c]
Pathology				
Pre	2.8	0.9		
Post	2.3	1.0	0.01*	0.54[b]
Activity				
Pre	2.7	1.1		
Post	2.4	1.1	0.01*	0.54[b]
Work				
Pre	3.3	0.9		
Post	2.5	0.9	<0.01*	1.00[c]

BPS = Biopsychosocial; BM = Biomedical; PABS = pain attitudes and beliefs scale
[a]small effect size
[b]moderate effect size
[c]large effect size
*$P < 0.05$

current guidelines and best practice research literature such as increasing levels of activity and reducing rest or time off work (6,25,26). Stepwise linear regression showed the reduction in biomedical beliefs significantly explained the variance in the change in work and activity responses for both vignettes (vignette 1 = work 11%, activity 18%; vignette 2 = work 13%, activity 15%; Table 3). This relationship shows reduced biomedical beliefs and explains clinician recommendations for increased engagement with both activity and work. No differences were observed between face-to-face and online participants in the targeted education.

TABLE 3. Stepwise regression analysis for vignette items.

Vignette	Item	Model	Variable(s) Included in Model	Adjusted r^2 (%)	*P* Value
1	Activity	1	BM	18	0.04*
1	Work	1	BM	11	0.02*
2	Activity	1	BM	15	<0.01*
2	Work	1	BM	13	0.01*

BM = Biomedical
*$P < 0.05$

DISCUSSION

This is the first study to examine the efficacy of targeted education for AEPs aimed at manipulating beliefs related to clinical decision-making. The main findings were that biomedical beliefs significantly reduced while biopsychosocial beliefs were no different following the education. Further, the reduction in biomedical beliefs resulted in significant changes to all clinical decision-making across both vignettes. Moreover, based on regression analysis, the variance in work and activity items following the vignette was significantly explained by the reduction in biomedical beliefs. This finding is novel as these are the 2 primary areas of the vignette items relating to the practice of AEPs. Further, the findings of this study suggest biomedical beliefs pose a potent influence on clinical decision-making even with concomitant biopsychosocial beliefs.

The reduction in biomedical beliefs following the targeted education resulted in AEPs giving increased physical activity and work recommendations to both vignettes. Indeed, AEPs also showed a significant change in their understanding of the pathology and severity represented in both clinical vignettes. However, the reduction in biomedical beliefs only emerged as a significant variable in the regression analysis for the work and activity related items. This finding is pragmatic for both the role and practice of the AEP in the treatment of people with CLBP. As AEPs are exercise-based practitioners, these changes reflect the ability of the practitioner to increase the patient's engagement with exercise and work. Indeed, it is plausible this may lead to improved patient outcomes as exercise has been shown to improve clinical outcomes (3) and psychosocial factors associated with pain-related disability and adherence (27). Further, as AEPs are regularly involved in return-to-work settings under insurance structures such as WorkCover, this finding suggests AEPs with reduced biomedical beliefs will be less conservative reengaging patients with work, which is in-line with previous literature (28).

Interestingly, in this study the reduction in biomedical beliefs responsible for clinical decision-making improvements

were not accompanied by a concomitant increase in biopsychosocial beliefs. A parallel reduction in biomedical beliefs following practitioner education has previously been reported by Overmeer et al. (15). However, Overmeer et al. (15) also reported a significant concurrent increase in biopsychosocial beliefs. One potential explanation for these discrepant outcomes is the higher biopsychosocial beliefs at baseline in the current study. The baseline beliefs of the current study are unable to be compared to Overmeer et al. (15) because of a revision to the PABS-PT questionnaire changing the overall scoring of each subscale (17). However, a recent study of AEPs and physiotherapists using the revised PABS-PT does allow for comparison with the current study. The study by Gibbs et al. (6) reported similar baseline biopsychosocial scores to the current study. Indeed, these baseline scores could represent these samples of AEPs had previous knowledge of the biopsychosocial model. Thus, it is plausible a concomitant increase in biopsychosocial beliefs following targeted education may have been observed if baseline biopsychosocial scores were lower. Further research is needed to understand the extent of change and/or the overall score of biomedical/biopsychosocial beliefs to be clinically relevant, which is consistent with previous findings of Overmeer et al. (24). Much of the present literature has focused on an absolute biopsychosocial score, without a biomedical counterpart, so further understanding of clinical relevance is unknown.

The CLBP literature has a strong bias toward increasing biopsychosocial beliefs without any exploration of other mechanism of change in clinical decision-making, such as the reduction of biomedical beliefs. The data in this study suggest that the influence of biopsychosocial beliefs of AEPs on clinical decision-making may be masked by the strength of biomedical beliefs. Previously, scales such as the back beliefs questionnaire (16) have measured beliefs on a spectrum with lower scores representing more negative beliefs, and higher scores the opposite. This measurement does not allow observation of biomedical or biopsychosocial beliefs independently, thus does not provide insight as to the mechanism of change in educational interventions. However, this study shows these 2 belief categories are not mutually exclusive and a series of 'negative' beliefs (e.g. higher biomedical scores associated with poorer clinical decision-making have the potential to disrupt biopsychosocial beliefs). Indeed, it is plausible previous research such as the work of Beales et al. (13) and O'Sullivan et al. (14) may have found similar reductions in biomedical beliefs following biopsychosocial education if it had not been for the measurement tool not collecting biomedical beliefs. Further, this study also questions the notion of dichotomizing biomedical and biopsychosocial beliefs, as this does not appear to be a correct interpretation. The seminal paper introducing the biopsychosocial model was framed in its title as a challenge to biomedicine (12), seemingly creating a dichotomy from its inception. However, this study's finding of a reduction in biomedical beliefs leading to change in clinical practice with no change in biopsychosocial beliefs, demonstrates the non-dichotomized nature. Moreover, it may suggest the relationship between biomedical and biopsychosocial beliefs is not isomorphic, however this would need to be explored in practitioners with lower baseline biopsychosocial beliefs. It appears essential to further investigate the findings of this research to better understand how to improve clinical decision-making of practitioners, and ultimately, provide a higher quality of treatment to individuals with CLBP.

CONCLUSION

Education aimed at increasing practitioners' biopsychosocial approaches to practice and reducing biomedical influence when managing patients with CLBP is efficacious for AEPs. Interestingly, a reduction in biomedical beliefs alone explained all changes in clinical decision-making, with no accompanying change in biopsychosocial score. Thus, it appears biopsychosocial beliefs can be limited by concomitant biomedical beliefs, which may impact the quality of care given to CLBP patients based on alterations in clinical decision-making. Further research is needed to understand if changes in practitioner's biomedical beliefs reflect changes in patient outcomes over time.

PRACTICAL APPLICATIONS

Education for exercise-based practitioners should focus on informing practitioners of the benefits of the biopsychosocial model as compared to the biomedical for management of CLBP rather than simply teaching biopsychosocial theory. The current bias of CLBP literature toward biopsychosocial beliefs needs to be further investigated following the findings of this paper suggesting concomitant biomedical beliefs can negate biopsychosocial influence on clinical decision-making.

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APPENDIX

PATIENT VIGNETTES

A 42-year-old woman presents with a 4-year history of mild low back pain, with multiple exacerbations per year. She has been out of work for the last month with a typical exacerbation. She describes her pain as a constant ache with an occasional sharp, stabbing pain in the mid-lumbar region. Her symptoms are improving. There are no neurological deficits on physical exam. Imaging studies are unremarkable. See Table A1 for female patient survey.

TABLE A1. Female patient survey.

This patient's symptoms are:				
1 – Very mild	2 – Mild	3 – Moderate	4 – Severe	5 – Extremely severe
It is most likely that this patient's symptoms result from spinal pathology that is:				
1 – Not from spinal pathology	2 – Mild	3 – Moderate	4 – Severe	5 – Extremely severe
I would recommend to this patient that she:				
1 – Not limit any activities	2 – Avoid only painful activities	3 – Limit activities to moderate exertion	4 – Limit activities to light exertion	5 – Limit all physical activity
I would recommend to this patient that she:				
1 – Work full-time, full duty	2 – Work moderate duty, full-time	3 – Work light duty, full-time	4 – Work light duty, part-time	5 – Remain out of work

A 37-year-old male factory foreman has complained of right low back pain radiating into the right calf since being rear-ended in a motor vehicle accident 9-months ago. He describes his back and leg pain symptoms as being moderate to severe, without improvement over the last 6-months. Neurological exam is normal. A recent MRI of the lumbosacral spine showed a central disc bulge at L4-5. The patient returned to work several months after the accident, but, discontinued working within 2-weeks after complaining that standing and walking at work aggravated his back and leg symptoms. See Table A2 for male patient survey.

TABLE A2. Male patient survey.

This patient's symptoms are:				
1 – Very mild	2 – Mild	3 – Moderate	4 – Severe	5 – Extremely severe
It is most likely that this patient's symptoms result from spinal pathology that is:				
1 – Not from spinal pathology	2 – Mild	3 – Moderate	4 – Severe	5 – Extremely severe
I would recommend to this patient that he:				
1 – Not limit any activities	2 – Avoid only painful activities	3 – Limit activities to moderate exertion	4 – Limit activities to light exertion	5 – Limit all physical activity
I would recommend to this patient that he:				
1 – Work full-time, full duty	2 – Work moderate duty, full-time	3 – Work light duty, full-time	4 – Work light duty, part-time	5 – Remain out of work