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Validating an adapted questionnaire to measure belongingness of medical students in
clinical settings

Short title: Measuring belongingness in medical students

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Medical students; belongingness; questionnaire; factor structure

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Public Interest Statement: Belongingness is how secure and accepted a learner feels in their environment. Educational research provides strong evidence that the level of belongingness a learner feels influences their development. In this paper we present a questionnaire that will help understand self-reported belongingness of medical students in their clinical placement environment.

About the authors: There is a lot of research in education that shows differential attainment amongst learners in medicine by protected characteristics, in particular by race. However, a lot of this research demonstrates differences but struggle to explain the underpinning reasons for this differential achievement. We are interested in investigating whether improving belongingness in learning environments can help to reduce this differential attainment.

ABSTRACT

Belongingness is a key factor that influences learner development and wellbeing but no previous research has been performed to evaluate perceived belongingness in medical students whilst on their placements.

Method: The Belongingness Scale-Clinical Placement Experience (BES-CPE) for nursing students was adapted for use with medical students. Following a face validity assessment, 490 undergraduate medical students in years three to five at a UK university were invited to participate and 302 completed the adapted questionnaire. The factor structure was explored using Exploratory Factor Analysis (EFA) with Principal Component Analysis (PCA) and internal consistency was assessed using Cronbach's alpha.

Results: A three-component structure was identified (Esteem, Connectedness, and Efficacy), which was aligned to the original theoretical model underpinning the scale, and the instrument had high internal consistency. Four items were discarded and the final adapted version had a total of 30.

Conclusions: The adapted BES-CPE instrument for medical students in our sample of UK undergraduate medical students had an appropriate factor structure and high internal consistency. This context-specific instrument can be used for future research as a valid instrument to measure the role of belongingness in medical education and to support developing belongingness in medical students during clinical placements.

Keywords: belongingness, measuring, medical student, learning

There has been increasing interest in the importance of belongingness in nurse education, especially whilst on clinical placements. (1) Levett –Jones et al defined “belongingness” as “a deeply personal and contextually mediated experience that evolves in response to the degree to which an individual feels (a) secure, accepted, included, valued and respected by a defined group, (b) connected with or integral to the group, and (c) that their professional and/or personal values are in harmony with those of the group.”(1) In addition, the “experience of belongingness may evolve passively in response to the actions of the group to which one aspires to belong and/or actively through the actions initiated by the individual.”(1) Previous research in nurse education has highlighted that a positive experience of belongingness whilst on clinical placements can lead students to become more empowered in their own education(2). Students become more pro-active and self-confident, taking advantage of the wide range of available learning opportunities on their placement (1, 3-5). Furthermore, a student who has had a positive experiences of belongingness is more likely to be confident in questioning any poor practice (6, 7).

A scoping review exploring the role of belongingness in health professions education, highlighted that belongingness influenced motivation for learning, identity development and wellbeing (8). Furthermore, integration of students into clinical placements had a clear association with self-reported belongingness (5, 9-13). However, these results were mostly

observed in nurse education contexts and there was a lack of research investigating medical students' belongingness and their integration into clinical placements.

In 2009, Levett-Jones et al. developed and tested the psychometric properties of the Belongingness Scale—Clinical Placement Experience (BES-CPE)(3), “an instrument designed to measure the extent to which nursing students experience belongingness related to their clinical placements” (p. 153), in three cohorts from two Australian universities and one university in the United Kingdom,] The BES_CPE instrument has 34-items, with each item scored on a five-point Likert- rating scale (1 = never true; 2 = rarely true; 3 = sometimes true; 4 = often true; 5 = always true). The items measure the three major components of belongingness: Esteem (feeling secure, included, valued and respected within placements); Connectedness (feeling part of or integral to the clinical team, being accepted, and fitting in); and Efficacy (feeling confident and capable both in engaging with clinicians and in negotiating learning opportunities within placements). The authors found that the scale was internally consistent and valid in measuring belongingness. No similar valid instrument has been identified for use with medical students but Levett-Jones et al. (3) noted that the BES-CPE could be replicated in the medical student setting.

Aims

The aim of the present study was to develop and validate an adapted version of the BES-CPE for medical students in a sample of UK medical students.

Permission was obtained from Levett-Jones to adapt the questionnaire for use with medical students.

Method

An adapted version of the BES-CPE was developed and validated (face validity, factor structure and internal consistency) in line with recommendations by Cook and Lineberry(14) and Downing(15). The study received ethical approval by the medical school's research ethics committee (reference number: 011514).

(a) Assessment of Face Validity

A panel of seven judges with experience of the medical curricula (Six medical students and one junior doctor) responded to an email invitation. Participation was voluntary with no incentives. The judges independently assessed the BES-CPE for face validity, with consideration of the relevance of all items for the medical student clinical placement context; and also to highlight ambiguity or misunderstanding of the items. The comments of the judges were collated and discussed within the research group. Twelve items were reworded because of sentence structure and semantic meaning- See Table 1 for the revisions undertaken.

Table 1 about here

In addition, the item 'It is important to me that someone at my placement acknowledges my birthday in some way' was removed since this was not considered to be relevant to the medical student setting. Each judge was then asked to independently confirm the

appropriateness of the adapted version. There was consensus about the adapted questionnaire and no further recommendations were made.

(B) Exploration of factor structure and assessment of internal consistency

The adapted questionnaire was distributed online to participants enrolled in their fourth and fifth year of undergraduate medical programme at a UK Medical School. This study population was considered to be the most relevant since they had clinical placements in hospitals in the surrounding districts.

Between January and May 2017, 490 students were contacted and informed about the study through the medical school virtual learning environment and during planned learning opportunities. Participation was voluntary and neither incentives nor penalties would be provided. Of those invited, 302 students completed the adapted questionnaire; 129 (42.72%) from year four of studies and 173 (57.28%) from year five, with an overall response rate of 61.63%. The students were aged 22-35 years ($M = 24.12$, $SD = 1.81$), and identified themselves as Females ($N = 165$, 54.64%) and Males ($N = 137$, 45.36%).

Exploratory Factor Analysis was performed using Principal Component Analysis (PCA) and Promax rotation. Assumptions of sampling adequacy and sphericity were tested by means of the Kaiser-Meyer-Olkin test and Bartlett's test, respectively. The internal consistency was assessed using Cronbach's alpha, as utilised by Levett-Jones et al.(3) in their original study. All analyses were carried out by using the software IBM SPSS Statistics 24.

Results

Suitability of the data for Principal Component Analysis in terms of sampling adequacy and sphericity was confirmed by the Kaiser-Meyer-Olkin test (0.87) and the Bartlett test of sphericity ($\text{Chi-square}_{(595)} = 3090.13, p < .001$),

Principal Component Analysis was performed, initially extracting all components with an eigenvalue > 1 . The solution was rotated by using the Promax method, assuming components to be correlated. Ten components were extracted, overall explaining the 59.34% of the total variance. However, the pattern matrix showed several items that were either poorly loading ($< .30$) or cross-loading onto one or more components ($\geq .30$), making the solution very difficult to interpret. Moreover, among the ten components extracted, the first three stood out, each showing eigenvalue > 2 , overall explaining the 35.75% of total variance. For this reason, PCA was repeated by constraining the number of components to be retained to three. This second solution was much easier to interpret, with most items loading highly onto their relevant component. Aiming at identifying the simple structure of the inventory, and following recommendations from the literature(16), any items showing poor loadings or cross-loadings were progressively removed.

Finally, a version of the inventory with three components explaining 36.56% of variance was retained. Four items were removed because they were found to either poorly load or cross-load onto one or more components. This 30-item version had an overall satisfactory internal consistency (Cronbach's alpha = .86), however the structure of each of these three components had differences when compared to the original formulation by Levett-Jones et al. (2009). Table 2 presents the rotated pattern matrix of the finally retained version of the inventory, along with the removed items. For the modified questionnaire, please see Appendix 1.

[Table 2: About Here]

Discussion

After minor item adjustments aimed at enhancing the BES-CPE for applicability for medical students on clinical placements, the factor structure of the adapted BES-CPE indicated that belongingness was a multifaceted construct with three components (Esteem, Connectedness, and Efficacy). This finding corresponds to its original theoretical formulation that was previously validated within the nurse education setting.(3) There was good internal consistency, with a Cronbach's alpha value (.85).

Factor One – Esteem

The common theme across the items corresponding to factor 1 are connected to self-worth, perceptions of competence and support from others. These items explore students' perception of the value they feel they bring to the clinical team. Questions asked participants how they viewed themselves or viewed their role as a medical student in the clinical team.

Esteem, or self-esteem, develops as a result of experiencing a sense of belonging, and has been described by Maslow as an essential component in his hierarchy of needs(2, 17).

Esteem is also defined by the psychological literature as a sense of worth and competency, with an affective element and an evaluative component(17). When a person feels competent they are likely to be more successful at the endeavours in which they feel competent. This feeling of success helps to build a more positive sense of self and this means that the person will be less affected by feelings of inferiority or incompetence. People who have high self-esteem are better able to deal with anxiety and report a heightened sense of belonging.

Factor Two – Connectedness

Items corresponding to factor 2 asked about students relationships with colleagues, as well as their interactions and communication.

The concept of 'Connectedness' is one that encompasses social presence, attachment and interpersonal relationship(18, 19). When an individual experiences a sense of connectedness this can have a positive impact by making the individual feel a sense of being in touch with others as being part of a group and consequently an experience of belongingness(19). Also, feelings of connectedness can have a direct impact on belongingness which in turn can influence cognitive behaviours(18).

It is also clear that connectedness has an impact on mental health as those who feel connected to others are able to better manage feelings of anxiety(20). Social connectedness is shown to have a clear link with self-esteem as well as with anxiety and depression(21).

Factor Three – Efficacy

Items corresponding to factor 3 addressed students' active efforts at engaging with colleagues and opportunities within the clinical learning environment. Zimmerman highlighted that efficacy was a predictor of the academic motivation of a student and their overall learning, as well as their academic performance. Students displaying efficacy in their behaviours tend to be more goal-driven, self-evaluative and strategic in their learning(22). Efficacy is also an essential component of self-actualisation(17).

The validated questionnaire (BES-CPE) is provided in Appendix 1.

Limitations

The online survey was active for a period of 12 weeks and students completed the survey at different time periods in placement; for example, one student may have been on the first week of placement when participating in the study and another student could have participated a few weeks later when they had been on placement for a longer period of time. Lengths of placements undertaken by students in this study varied from one week to six weeks and the literature suggests that length of time on placement is a factor in developing belongingness (1). The participants of this study were also based in one UK medical school and clinical learning environments may differ amongst medical schools. Despite these limitations, the adapted BES-CPE has a similar factor structure that is congruent with the theory-derived factor structure in the original BES-CPE that has been used across several contexts. However, we recommend further studies to confirm our findings in the medical student context.

Conclusions

We have developed and validated the first adapted instrument for measuring belongingness in medical students in clinical placements. Our findings have several important educational implications. First, researchers and medical educators will now have a measure of belongingness that can be used for understanding medical students' wellbeing in clinical placements, specifically in terms of self-esteem, resilience, feelings of connectedness, confidence and degree of self-efficacy, as well as feeling safe, comfortable, satisfied and happy in the clinical environment(3) Second, medical educators will have a tool to test belongingness as a predictor of medical students' capacity for learning in clinical placements, and to design and implement targeted interventions aimed at enhancing students' motivation for learning in such settings. Third, because socialisation plays an important role in student learning and professional identity formation, and belongingness was found to be a key factor that drives this socialisation process(23), the measure of belongingness through the adapted BES-CPE can shed a light on the process of students' competency development and the transformation of the individual from student to professional in the clinical placement.

The measure relates to students' experience during a specific clinical placement and is not appropriate as a longitudinal measure of a student's experiences during the same clinical placement.

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Authors have no declaration of interests to report.

Practice Points

Belongingness is important for learning and wellbeing in clinical placements

An adapted instrument for medical students was developed and validated.

The adapted instrument has a stable factor structure and high internal consistency

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Table 1. Belongingness Scale-Clinical Placement Experience – Revised items and comparison with the original		
Item No.	Revised item descriptors (present study)	Original item descriptors (Levett-Jones et al., 2009)
1	I feel like I fit in with others during my placements	I feel like I fit in with other people during my placements
3	Colleagues see me as a competent person	Colleagues perceive me to be a competent person
10	I feel discriminated against on placements	I feel discriminated against on placements (you can provide more details of this at the end)
15	There are people that I work with on placements who share my values	On balance, there are people that I work with on placements who share my values
16	Colleagues ask for my ideas or opinions about different matters	Colleagues ask for my ideas or opinions about different matters (either professional or personal)
17	I feel understood by my colleagues	I feel understood by my colleagues (either in professional or personal sense)
19	I am supportive of my colleagues	I am supportive of my colleagues (either in professional or personal matters)
20	I ask for my colleagues' advice	I ask for my colleagues' advice (either in professional or personal matters)
22	I am uncomfortable attending social functions on placements because I	I am uncomfortable attending social functions involving colleagues on

	feel like I don't belong	placements because I feel like I don't belong
24	Feeling "a part of things" is one of the things I like about going to placements	I feel involved with the clinical team whilst on placement
27	It seems that people I work with on placements like me	I think that the people I work with on placements like me
30	One or more of my colleagues confides in me	One or more of my colleagues confides in me (includes professional or personal matters)
34	I feel free to share my disappointments with at least one of my colleagues	I feel free to share my disappointments with at least one of my colleagues (includes professional or personal matters)

Table 2. Belongingness Scale-Clinical Placement Experience – Revised and adapted for Medical Students. Rotated Pattern Matrix

Item No.	Item Descriptors	Component 1	Component 2	Component 3
30	One or more of my colleagues confides in me	.800		
8	I am invited to social events outside of my placements by colleagues	.788		
13	I invite colleagues to eat lunch/dinner with me	.784		
22 ^a	I am uncomfortable attending social functions on placements because I feel like I don't belong	.618		
34	I feel free to share my disappointments with at least one of my colleagues	.609		
29	Colleagues notice when I am absent from placements or social gatherings because they ask about me	.578		
28	I let colleagues know I care about them by asking how things are going for them and their family	.559		
25	There are people on placements with whom I have a strong bond	.489		
26 ^a	I keep my personal life to myself when	.448		

	I'm on placements	
12	On balance, there are people that I work with on placements who share my values	.317
7	I get support from colleagues when I need it	.693
4	Colleagues offer to help me when they sense I need it	.678
24	I feel involved with the clinical team whilst on placement	.631
15	There are people that I work with on placements who share my values	.589
9	I like the people I work with on placements	.566
10 ^a	I feel discriminated against on placements	.560
27	I think that the people I work with on placements like me	.553
17	I feel understood by my colleagues	.539
23	When I walk up to a group on a placement I feel welcomed	.525
21	People I work with on placements accept me when I'm just being myself	.484
1	I feel like I fit in with others during my placements	.395
3	Colleagues perceive me to be a	.351

	competent person			
19	I am supportive of my colleagues			.583
11	I offer to help my colleagues, even if they don't ask for it			.533
18	I make an effort when on placements to be involved with my colleagues in some way			.532
20	I ask for my colleagues' advice			.514
5	I make an effort to help new students or staff feel welcome			.491
2	It is important to feel accepted by my colleagues			.483
31	I let my colleagues know that I appreciate them			.419
6	I view my placements as a place to experience a sense of belonging			.413
14 ^{a,b}	On placements I feel like an outsider	.393	.436	-.281
16 ^b	Colleagues ask for my ideas or opinions about different matters (either professional or personal)	.373	.354	.012
32 ^b	I ask my colleagues for help when I need it	-.279	.381	.495
33 ^b	I like where I work on placements	-.065	.599	.139

^a Reverse scored item

^b Removed from the final version
