



**ESCOLA BAHIANA DE MEDICINA E SAÚDE PÚBLICA
PROGRAMA DE PÓS-GRADUAÇÃO EM TECNOLOGIAS EM SAÚDE**

JOELY WILDER MERRIMAN

**ENHANCING INTERPROFESSIONAL TEAM BUILDING, COMMUNITY
ENGAGEMENT AND HUMANISTIC INTERACTIONS IN HEALTH EDUCATION:
THE PROGRAMA CANDEAL EXPERIENCE**

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Dissertação apresentada ao Programa de Pós-Graduação Stricto Sensu da Escola Bahiana de Medicina e Saúde Pública como requisito parcial à obtenção do título de Mestre em Tecnologias em Saúde.

Orientador: Amâncio José de Souza

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JOELY WILDER MERRIMAN

“IMPACT OF AN INTERDISCIPLINARY COMMUNITY HEALTH EDUCATION PROGRAM ON PROFESSIONAL CHOICES AND ACTIVITIES ON ITS FORMER STUDENT PARTICIPANTS”

Dissertação apresentada à Escola Bahiana de Medicina e Saúde Pública, como requisito parcial para a obtenção do Título de Mestre em Tecnologias em Saúde.

Salvador, 14 de maio de 2021.

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RESUMO

INTRODUÇÃO: Programa Candeal é um programa interdisciplinar de educação em saúde desenvolvido pela Escola Bahiana de Medicina e Saúde Pública (EBMSP) que promove a prática educativa em saúde nas comunidades de forma contínua concomitante com a formação dos alunos nas disciplinas tradicionais, e também desenvolve a habilidade dos alunos de trabalhar em equipes interdisciplinares e com organizações de saúde baseadas em comunidades. O programa atinge este objetivo através de experiências semi-estruturadas e práticas em equipe com grupos marginalizados fora dos papéis tradicionais do profissional de saúde e paciente. Este manuscrito relata uma análise retrospectiva do impacto do Programa Candeal, destacando pontos fortes, impactos imprevistos, e temas emergentes. Este manuscrito também aponta para a facilidade da implementação de uma avaliação on-line semi-automática, sem carga administrativa indevida, além de examinar quais facetas do Programa Candeal pode se beneficiar de avaliação contínua adicional.

OBJETIVOS: Os objetivos desta pesquisa são três [3]: (1) Descrever o envolvimento profissional subsequente dos ex-alunos do Programa Candeal nas atividades comunitárias; (2) Descrever a melhoria subsequente dos ex-alunos do Programa Candeal nas atividades de trabalho em equipe; (3) Demonstrar a viabilidade de uma plataforma de avaliação on-line em um ambiente de poucos recursos. **MATERIAIS:**

Nenhum financiamento, espaço institucional ou materiais da EBMSP foram utilizados na execução da avaliação. **MÉTODOS:** Um termo de consentimento livre e esclarecido (TCLE) seguido por um questionário foram carregados em uma plataforma on-line segura (REDCap) e um link foi enviado no formato de email em massa ao grupo oficial dos alunos de EBMSP solicitando a participação dos ex-alunos do Programa Candeal. Dados coletados incluíram informações demográficas, recordações do participante do Programa Candeal, estimativa da influência do Programa Candeal nas colaborações interprofissionais, interações com membros marginalizados da comunidade, envolvimento estruturado com a comunidade pré e pós-Programa Candeal, e escolhas profissionais subsequentes. **RESULTADOS:**

Dos ex-alunos dos anos 2015 até 2018, 83 preencheram ambos o TCLE e o questionário. Destes, 61 respondentes relataram envolvimento contínuo nas atividades de extensão na comunidade (73,5%) desde a participação deles no Programa Candeal, enquanto apenas 34 respondentes relataram envolvimento nas atividades de extensão na comunidade antes da participação no Programa Candeal (44,5%). O aumento na percentagem de respondentes relatando envolvimento em atividades de extensão na comunidade depois de participação no Programa foi estatisticamente significativo ($p < 0,0001$) com um intervalo de confiança de 62,65% a 83,33%. Dos respondentes totais, 44 adicionalmente forneceram respostas abertas, com temas emergentes codificados da seguinte forma: aumento no humanismo nas interações com membros marginalizados da comunidade e futuros pacientes, um crescimento dos interesses profissionais em disciplinas adicionais (por exemplo a saúde pública, a saúde materno-fetal, etc), um entendimento aumentado da área atual de especialização clínica do respondente, habilidade aumentada na execução do trabalho em grupo no ambiente interdisciplinar, um compromisso maior com a disciplina escolhida pelo respondente, falta de influência nas escolhas profissionais antecipadas, e críticas em relação à facilitação dos grupos de foco específicos. **CONCLUSÃO:** Dados iniciais sugerem que o Programa Candeal obtem sucesso em promover a participação de alunos da área de saúde em atividades de extensão na comunidade de forma contínua. A execução desta pesquisa sem carga

financeira ou consumo de recursos institucionais demonstra a viabilidade da implementação de uma plataforma de avaliação on-line permanente em um ambiente de poucos recursos como etapa realista e alcançável em garantir uma programação inovadora, baseada em evidências e iterativa, alcançando objetivos desejados, para alunos de área de saúde em qualquer lugar do mundo.

Palavras Chaves: Educação interprofissional; Educação em saúde; Atividades de extensão. Avaliação.

ABSTRACT

INTRODUCTION: Programa Candeal is a health education program pioneered at the Bahiana School of Medicine and Public Health (BSMSP) in Salvador, Brazil, that aims to promote the practice of continuing engagement in community health education alongside traditional career paths in direct health care and improve the capacity of health professional students to work successfully on interdisciplinary health care teams, and with community-based health organizations. This is executed through hands-on experience working in a team environment with disenfranchised populations outside of the traditional roles of provider and patient. This manuscript reports the findings of a retrospective analysis of the impact of Programa Candeal, highlighting program strengths, unforeseen impacts, and emergent themes. This manuscript also highlights the relative ease of implementing a semi-automated online evaluation protocol, without undue administrative burden, in addition to addressing facets of Programa Candeal that may benefit from additional ongoing assessment.

OBJECTIVES: The objectives of this study are threefold: (1) Describe the subsequent professional involvement of former Programa Candeal participants in community outreach activities; (2) Describe the subsequent improvement of former Programa Candeal participants in teamwork activities; (3) Demonstrate the feasibility of an online standing evaluation platform in a low-resource environment.

MATERIALS: No financial resources, institutional space (e.g. classroom space, lecture halls), or equipment (e.g. printer paper, writing utensils, computers) from BSMPH were used in the execution of this evaluation.

METHODS: An informed consent and survey were uploaded to a secure cloud-based platform (REDCap) and a secure survey link was sent in mass-email format to the BSMPH student listserv soliciting participation of Programa Candeal alumni. Survey data collected included participant demographics, participant recollections of Programa Candeal, participant estimation of influence of Programa Candeal on interprofessional collaboration, interactions with disenfranchised community members, participant reported pre- and post- Programa Candeal community outreach involvement, and subsequent professional choices.

RESULTS: Eighty-three [83] program alumni from between 2015 to 2018 completed both the informed consent and the survey. Sixty-one [61] reported ongoing involvement in community outreach activities (73.5%) since their engagement in Programa Candeal, while thirty-four [34] respondents reported having engaged in community outreach activities prior to engagement in Programa Candeal (44.2%). The increase in the percentage of respondents reporting community outreach and volunteer initiatives after participation in Programa Candeal was found to be statistically significant ($p < 0.0001$) with a 95% confidence interval of 62.75% to 83.33%. Forty-four [44] respondents answered an open-response prompt in the survey with emergent themes as follows: Increased humanism in interactions with low socioeconomic status community members and anticipated future patients, a broadening of professional interests to additional fields (e.g. public health, maternal-fetal health), an augmented understanding of one's current area of clinical specialization, increased facility at executing group work in an interdisciplinary setting, increased sense of obligation and personal accountability to one's chosen specialty, a lack of influence on subsequent professional choices, and specific criticisms related to focus group facilitation.

CONCLUSION: Programa Candeal is successful in encouraging health professional students to practice ongoing community engagement. The execution of this study without undue cost or consumption of university resources also

demonstrates the feasibility of implementing an online standing evaluation platform in a low-resource environment as an integral step on the road to ensuring innovative, evidence-based and iterative programming for health professional students around the world that achieve desired results.

Keywords: Interprofessional education; Health education; Community outreach; Evaluation.

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1 INTRODUCTION

Programa Candeal is a health education program pioneered at the Bahiana School of Medicine and Public Health (BSMPH) in Salvador, Brazil, that aims to promote the practice of continuing engagement in community health education alongside traditional career paths in direct health care. Programa Candeal also aims to improve the capacity of health professional students to work successfully on interdisciplinary health care teams and with community-based social, health and education organizations through hands-on experience working in a team environment with disenfranchised populations outside of the traditional roles of provider and patient. Undergraduate students between their second and fourth semesters of study in medicine, dentistry, physiotherapy, psychology, biomedical science, nursing, physical education and occupational therapy at BSMPH are grouped into mixed, interprofessional teams of 8-10 students with one faculty leader to design and implement weekly educational programming for members of two disenfranchised communities surrounding the BSMPH campuses. The interdisciplinary health student teams engage in nine hours of team-building exercises distributed over the three weeks prior to beginning their direct community engagement. Community members then longitudinally interact with the same interprofessional team each week, themselves grouped by themes that vary yearly, typically including but not limited to: integrative and complementary therapies, social inclusion for differently abled individuals, tobacco use disorder, living with Human T-Cell Lymphotropic Virus health in the classroom, early childhood, the aging population, adolescent health and youth identity development, maternal-fetal health, alcoholism or active addiction, living with diabetes and hypertension, and partnering with community agencies.

Twenty years of existing medical literature speaks to a global interest in interprofessional experiences and the role of community engagement in the formation of 21st century health professions alike, particularly though not confined to those training in low-resource settings. (1-8) In 2013 the World Health Organization spotlighted an “urgent need to scale up the number of human resources for health... and ensure a proper skill mix, and to adopt measure and incentives to make the geographical and organization distribution of health professionals more equitable,” while acknowledging that “in many countries, this need has to be met in a context of

difficult economic circumstances.” (9) Along these lines it is of particular note that Programa Candeal situates itself at the interface of some of the widest socioeconomic divides in Brazil, in the city of Salvador, the capital of Bahia, where functional illiteracy has been estimated at as high as 30.8% (10), facilitating coordinated and yet non-algorithmic interactions between health professional students at a private university and those most socially marginalized by virtue of where they were born in addition to a frequently socially-determined array of health conditions. More recently medical literature from the English-speaking and Lusophone world alike has emerged critiquing the patient experience of lack of empathy from health care providers, negatively impacting the therapeutic alliance between provider and patient, and the quality of medical care given. (11-15)

Programa Candeal is unique in that it purports to touch upon these three areas: 1) encouraging ongoing community engagement, 2) exposing students to a culture of collective work and team-building, and 3) promoting humanistic interactions. It has not only sustained itself for twelve years at the time of this manuscript, but evolved from an elective, complementary activity to a required, fundamental course for all health professional students at BSMPH. To date, no systematized evaluation of Programa Candeal has been carried out.

The following manuscript reports the findings of a retrospective analysis of the impact of Programa Candeal, executed through a series of mixed methods surveys administered to past health professional student participants via an online platform, highlighting program strengths, unforeseen impacts, areas for growth, and emergent themes. This manuscript also highlights the relative ease as well as some of the challenges in implementing a semi-automated online evaluation protocol in a setting where one did not previously exist, in addition to addressing facets of Programa Candeal that may benefit from additional, ongoing assessment.

2 PRIMARY OBJECTIVES

2.1 General (Primary)

1. Describe the subsequent professional involvement of former Programa Candeal participants in community outreach activities.
2. Describe the subsequent improvement of former Programa Candeal participants in teamwork activities.

2.2 Specific (Secondary)

Demonstrate the feasibility of an online standing evaluation platform in a low-resource environment.

3 LITERATURE REVIEW

3.1 Humanization and dehumanization of the vulnerable patient in health care in the Lusophone and English-speaking world

Specific to the Lusophone world, Brandão et al in their 2019 study of female nurse assessments of pain and consequent management practices based on perceived patient socioeconomic status found that patients with lower socioeconomic status (SES) were routinely interpreted as suffering from less intense pain, even in the setting of “distress cues” on pain assessment, which themselves were interpreted to be “less credible.” (12) In their 2019 study “Classism and dehumanization in chronic pain” assessing fifty Portuguese female nurses from both the public and private sectors in their work with pain in females from lower SES and middle SES, Diniz et al (13) revealed a pervasive provider sympathy toward middle SES women as evidenced in the attitude that they were making more unique and valuable contributions to society and the public realm, and therefore an interest and investment should be made in helping them regain functionality despite their pain. In contrast, lower SES status women were often described in nursing records as limited by their pain, lacking agency and interest in treatment, and resigned to poor functional outcomes with providers subsequently withdrawing attention and resources from them. Diniz et al go so far as to describe a sub-theme that emerged in their study of blaming the victim, in which women of lower SES were denied an assumption of baseline competence by their providers, criticized by providers for their own “mismanagement” of pain, with their pain being interpreted as a reflection of “individual failure.”

Regarding the English-speaking world, Magwood et al (14) in a 2019 systematic review of 35 studies from the UK, Canada and the US assessing barriers to health and social interventions for people with lived experience of homelessness or vulnerable housing astutely comment on their marginalization from health systems despite a clear need for services offered, evidenced by both struggles with mental health and addiction and inequitably low life expectancy rates, with the Office of the United Nations Human Rights Council estimating the worldwide prevalence of those in vulnerable housing situations at 1.8 billion (15). Magwood et al describe both

reluctance to accept interventions from healthcare providers from individuals with lived experience of homelessness and concurrent experiences of marginalization and dehumanization, simultaneous with valuing trust and a sense of personal safety in human interactions. A 2015 study by Raja et al (16) addressing patient perceptions of dehumanization in a university-affiliated dental educational setting through in-depth interviews with 20 uninsured or underinsured dental patients found relational aspects of the patient-provider interaction to be integral to a positively-perceived patient outcome, notably empathy and rapport-building, and pain and anxiety awareness.

These manuscripts highlight shortcomings in health care of patients from lower SES groups in both the Lusophone and English-speaking world secondary to inability to form satisfactory therapeutic alliances between health care providers and those from different social classes. There remains a paucity of literature regarding effective interventions to rectify this gap in care, however a recent study of predictors of emotional intelligence in 176 medical residents by Shahid et al (17) in 2020 found that those who took any kind of gap year before starting their medical training were significantly more likely to have higher emotional intelligence than their colleagues, independent of age, gender, type of medical degree, conferral of an advanced degree, or choice of specialty, particularly in the areas of interpersonal skill, empathy, decision-making, and impulse control. Shahid and his colleagues define emotional intelligence as the skill of understanding oneself, managing oneself, understanding others, and managing relationship. This prompts the question of whether engagement in activities that fall outside of the norms of traditionally structured education result confers increased aptitude to work in interdisciplinary settings and form trusting relationships with patients.

3.2 Dynamic, interprofessional and socially responsible training environments for health professional students

The Canadian team Jarvis-Selinger et al (18) in their 2008 paper "Social accountability in action: University-community collaboration in the development of an interprofessional Aboriginal health elective," in which they discuss an elective, longitudinal pilot curriculum track paralleling required courses for undergraduate health professional students, comment on the potential of educational curricula that

incorporate interprofessional approaches to improve access to health care, and, relatedly, recruitment of health professionals to the communities where they participated as students. With respect to challenges, interestingly the authors acknowledge less the anticipated setbacks of providing both health and interprofessional educational programming in resource-austere settings, but rather the clash of different professional lineages in how they define successful educational experiences for their students and how they measure the success of socially accountable interventions in interprofessional training programs. These differences in viewpoint embedded in specialty-specific vocabulary and bodies of knowledge were felt to influence how willing students were to work together and how effective their community projects were. This tension between disciplines was in turn interpreted to be a bigger barrier to the execution of such interprofessional educational community outreach experiences than disputes between the university administrators and the community partners themselves.

Several studies exist documenting collaborations between health professional students and community partners. As early as 2006, Andrus et al (1) describe eight years of gradual changes in a US medical and nursing school curriculum with the intent to better equip students to interface with population health inequities and key community players to close health outcomes gaps more effectively. The study highlights a collaboration in Rochester, New York between a medical school and the county government health department that “gives interdisciplinary teams of students opportunities to partner with community agencies engaged in research-oriented health improvement initiatives.” (1) The authors discuss a focus on teams of students becoming “independent learners”, with an eventual modification in the curriculum to incorporate a problem-based learning (PBL) philosophy, preparing students to work independently in the classroom environment while engaging actively with larger societal problems, including anticipating some of the challenges embedded in establishing and maintaining fruitful partnerships between health professionals and community organizations. Over the subsequent fifteen years, the course transitioned to, first, a required and, subsequently, an elective course available to only senior medical students, thus shedding its collaborative, interdisciplinary signature within the health professions. Likewise, as early as 2008 Jarvis-Selinger et al (18) and Andrus et al (1) describe initial programming efforts to place health professional

students in community organizational settings as a means to increase inter professional and interdisciplinary teamwork during training years and also to instill a sense of social accountability in health professional students.

Meurer et al (19) in their 2011 publication "The Urban and Community Health Pathway: Preparing Socially Responsive Physicians Through Community-Engaged Learning" describe a three-year longitudinal required course at an American medical college aiming to prepare future physicians to effectively care for patients in urban, underserved settings, to "promote community health", and to "shape the system to improve the public's health." Educational methods included four hours of monthly readings, didactics, case discussion and site visits, and an additional six hours monthly of individualized activities as co-developed by each student and a faculty advisor. Individual learning plans included service-learning activities, relevant enrichment coursework or community-engaged research, as well as service-learning required for all. A yearly synthesis paper documenting progress toward a culminating scholarly project, or addressing a specific socioeconomic barrier to health or health care access and a community-based resource to address it, or a reflective synthesis of the personal impact of pathway experiences on the learner. The authors note that students valued in-person interactions over readings and online resources, and likewise interactive community-based sessions over classroom didactics, while noting that the classroom didactics were also indispensable.

Walker et al (8) in their 2018 publication "Mapping the interprofessional education landscape for students on rural clinical placements: an integrative literature review," synthesized results from 27 peer-reviewed primary research studies taking place in Australia, Canada, the United States, New Zealand, the Philippines, South Africa and Tanzania between 2000 and 2016, acknowledging a "movement towards community-based person-centered care", an ongoing reliance on interprofessional collaboration in the rural setting, and efforts to recruit students to eventual work placements in this settings. It was found that the most common interprofessional educational format was an initial orientation followed by serial interactions with a clinician during placement with concurrent seminars, tutorial discussion groups, case presentations, and community projects.

Kaye et al's 2011 (6) research article "Lessons learnt from comprehensive evaluation of community-based education in Uganda: a proposal for an ideal model community-based education for health professional training institutions" investigates the many interpretations and settings for implementation of community-based education (CBE) through the evaluation of 22 CBE programs for health professional students in the Ugandan setting, arguing that well-designed and administered CBE programs can provide "contextual learning that addresses manpower scarcity [through acquisition of] requisite experiences, competence, confidence and values." Kaye et al outline their process of serial program evaluation, including documentary review of curricula, site visits to institutions and their CBE sites and in-depth interviews with key administrators and community leaders. It was found that 15 programs (68.2%) provided learning experiences in urban/peri-urban areas, 11 programs had their students (50%) learn and participate within multidisciplinary teams, and 9 (40.9%) had an evaluation plan embedded within the curriculum. While describing how CBE provides contextual learning for health professional trainees, it was noted to be implemented differently at different institutions despite similar curricula, and deficiencies existed within many programs with regard to "curriculum content, supervision of trainees, inappropriate assessment, trainee welfare, and underutilization of opportunities for contextual and collaborative learning."

This section highlights the heterogeneity of programming efforts geared toward unpacking and strengthening relationships between communities and health professionals. It simultaneously alludes to some of the challenges intrinsic to extrapolating about the impact of any given interprofessional educational initiative based on the existing body of research commenting on other initiatives. The quandary of measuring the impact of discrete interprofessional educational initiatives and making comparisons between them is addressed in the next section.

3.3 Impact of interprofessional education

Reeves et al (20) in their seminal 2016 international Best Evidence Medical Education (BEME) Collaborative systematic review of the effects of interprofessional education (IPE) evaluated 46 IPE studies using Kirkpatrick's classic education outcomes model, defining an IPE intervention as "members of more than one health

and/or social care profession learning actively together, for the explicit purpose of improving the health or well-being of patients/clients.” The BEME team found that a majority of IPE interventions evaluated elicited measurable changes in student participant attitudes to the practice IPE and student self-perception of knowledge and skill acquisition. Thirty-two [32] of the studies evaluated (65%) reported changes to student attitudes toward IPE post-participation, with 25 reporting positive outcomes and 7 reporting mixed outcomes. Twenty-six [26] of the studies evaluated (56%) reported predominantly positive changes to student self-perception of knowledge and skills, followed by mixed outcomes, and one study that concluded there was no change. Interviews and self-assessment surveys were the predominant tools used to assess this. The authors call for more studies to develop a firmer understanding of the teaching and learning processes involved in the delivery of effective IPE, acknowledging that while in aggregate IPE appears to do more good than harm, the specific elements of IPE programming that make one initiative more impactful than another are not readily understood. With regard to a Latin American context, notably 38 of the studies selected for Reeves et al's work (20) were from the Anglophone world (19 from the UK, 10 from the US, 7 from Canada, 2 from Australia), with the remainder of the studies met systematic review criteria exclusively from European nations (2 from Denmark, 2 from the Netherlands, 1 from Germany, 1 from Sweden, 1 from Finland). There appears to be a dearth of literature - primary studies and literature reviews alike - from either the Lusophone world or Latin America.

Preliminarily positive findings with respect to the impact of IPE, with the caveat of great variation in programming, region, and assessment tools, are echoed in the 2018 work of Fox et al, a scoping review of 33 studies designed to describe and assess interprofessional teamwork skills, with the objective of elucidating the components of both effective pedagogy and assessment tools. Fox et al (2018) identify ten [10] different quantitative assessments tools used to assess impact of IPE programming: the Teamwork Score (TWS), the Anaesthetist's Non-Technical Skills (ANTS); the Mayo High Performance Teamwork Scale; TeamSTEPPS Teamwork Perceptions Questionnaire; Collaborative Healthcare Interdisciplinary Planning, Paediatric simulation technology KidSIM; Readiness for Interprofessional Learning Scale (RIPLS), Attitudes Toward Interprofessional Health CareTeams (ATHTS),

Interdisciplinary Education Perspective Scale (IEPS) and Clinical Outcomes Score (COS), however without clearly identifying any as superior.

Imafuku et al in 2016 (21) reference the body of literature addressed in Reeves et al's (20) 2016 systematic review and saliently argues that while many comparative studies emphasize and generalize the effectiveness of IPE interventions through data that can be quantified (eg the tools summarized by Fox et al, above), there is a place for qualitative research methodologies in identifying the complexities of the process of teaching and learning in individual IPE curricula. Imafuku's team goes on to discuss the experiences and meaning-making of three groups of students [66 total] engaged longitudinally in project-based learning (PBLs) from medicine, dentistry, pharmacy sciences, nursing, PT/OT during the first three years of their training through 104 written reflections from a series of ePortfolios. The authors highlight that the use of tandem free-form ePortfolio entries specifically enabled researchers to comment on the specific processes by which students became self-motivated and self-directed in the program, estimation of teamwork came to be realized, and further developed their professional identities in concert with the professions of others. Specific to this study, the primary driver behind student self-directed learning and motivation was the opportunities the student learners were given for what the authors call "active engagement". Also specific to this study, estimation of teamwork appeared to be realized through early exposure to clinical environments, which highlighted the need for effective communication, and through the experience of PBL, in which the performance of the group was ultimately deemed more important than the performance of the individual.

Peeters et al (22) in their 2017 article describe "word clouds" as another qualitative measure of program impact. The authors describe a 14-week longitudinal classroom- and simulation-based interprofessional education experience offered to 554 students at an American public higher-education institution during the first semester of their medicine, nursing, occupational therapy, physical therapy, physician's assistant, respiratory therapy and speech and language pathology training. Students participated in a two hours of large classroom lectures immediately followed by weekly two-hour interprofessional small groups of 11-12 students total. Evaluation tools included a self-assessment questionnaire, a "word cloud" motif to assess

students' pre- and post-course perceptions of each of the participating professions, and end-of-course evaluations to characterize student satisfaction. These tools were organized under the theoretical framework of Kirkpatrick's model of outcomes for program evaluation. 82% of participants contributed to the word clouds both pre- and post-course participation. It was found that while some misperceptions, uncertainty and negativity were present at both time points, it appeared that course participation resulted in overall increased appreciation and understanding. Interestingly, the authors observe that pre-course perceptions appeared to be influenced by stereotypes and media/entertainment, while post-course perceptions appeared to be influenced by direct shared experiences in professional training and inter professional peer interactions. End-of-course evaluations were filled out by 27% of course participants. Of those that responded, the most favorable free-response comments were given to experiential activities with minimal lecturing. Course organizers, however, commented in their manuscript that experiential activities were the most time- and resource-intensive to successfully coordinate at the level of course administration.

Wong et al's (23) 2016 study "A longitudinal study of health professional students' attitudes towards interprofessional education at an American university" identifying modifiers of health professional student attitudes toward interprofessional education at an American university offers a wealth of information with regard to both existing validated instruments gauging student estimation of and readiness for IPE, and possible curricular components of health professional training that may maximize interprofessional experiences. Wong's team used the 20-item Readiness for Inter-professional Learning Scale (RIPLS; Parsell & Bligh, 1999) and 18-item Interdisciplinary Education Perception Scale (IEPS; Luecht, Madsen, Taugher, & Petterson, 1990), administered at two instances in time longitudinally to 110 anonymous volunteer students during the first and third years of their undergraduate medical, physician's associate, and nursing training. Notably, participation in extracurricular activities was found to be associated with higher scores in the Teamwork & Collaboration domain of the RIPLS, whereas participation in interprofessional courses taking place solely in the classroom without an outreach component, and personal relationships with colleagues from other professions did not appear to have an association with increased Teamwork & Collaboration scores

between the first and third years of training. It is noteworthy that engagement in interprofessional extracurricular activities at this university was not mandated; while possible that those who elect to engage in interprofessional extracurricular activities themselves are a subset of students who will be more likely to value IPE, Wong et al (23) suggest that there may be benefit in making IPE required, in particular service-learning models where students collaborate toward shared community goals.

Wang et al (24) in 2019 reviewed 16 studies in a meta-analysis looking at IPE training, addressing both commonly used quantitative assessment tools and potential IPE training impact on student participants. It was found that in aggregate there was a significant improvement in students' understanding of collaboration and attitudes toward interprofessional teamwork, with the exception of no significant change in understanding of roles and responsibilities. Two studies were noted to have found equivocal to no impact on students, with one study having negative outcome. Of note, female respondents gave significantly more positive feedback than male students regardless of profession. Studies included in the review measured quantitative outcomes with regard to participant attitudes and perceptions related to IPE. The majority of studies included participants from three professions or less. The majority of studies used the RIPLS as their quantitative tool, but ATTITUDES, IEPS, and the Interdisciplinary Weekly Team Inventory were also used. Studies were predominantly from the English-speaking world, with eleven students from the US, Canada and the United Kingdom, and five students from Italy, Switzerland, Indonesia, and Singapore. The heterogeneity of programs assessed in these studies, particularly with regard to program structure and duration, cannot be over-emphasized: study length varied from a single three-hour training to a two-year curriculum.

DiVall et al (25) comment in their 2014 publication "Interprofessional socialization as a way to introduce collaborative competencies to first-year health science students" acknowledge interprofessional education as both a prerequisite in the development of competent health care providers and also challenging to administer. Their team describes a classroom-based half-day conference for 277 first-year health sciences, nursing, pharmacy, physical therapy, and speech language pathology and audiology students at an American university in which a discussion of a clinical case and

surrounding activities were intended to bolster abilities to work with individuals of other professions respectfully, as well as leverage knowledge of the role of other professionals in appropriately assessing and addressing health care needs, in keeping with Interprofessional Education Collaborative (IPEC) competencies. The RIPLS was completed by 89% of respondents before the conference and 73% of respondents after the conference. Of note, only 32% of conference attendees completed post conference evaluations. In open-ended response questions, students acknowledged the benefit of interprofessional interaction, however some remarked that without sufficient experiential training coming into the experience the day perhaps did not result in maximum benefit. Respondents were found to view interprofessional education favorably in the pre-conference RIPLS.

This section has given an overview of the diversity of existing interprofessional educational programming and the diversity of tools being used to evaluate its efficacy. It has also touched on the lack of existing critical analysis of IPE in the Latin American and Lusophone context.

4 MATERIALS AND METHODS

4.1 Study design

The present study is a mixed qualitative-quantitative cross-sectional study. A survey was constructed using the values and theoretical frameworks summarized by Walser's (27) elucidation of the theory of evaluability assessment, first articulated by Wholey (28) were used. The survey collected participant demographics, inquired into program participant recollections of Programa Candeal, subjective estimation of the efficacy a variety of program facets including working on interprofessional teams and relating to disenfranchised community members, and recorded pre- and post-Programa Candeal community outreach involvement, and participant career trajectory. Notably, quantitative measures were used to capture sociodemographic data and a mix of quantitative and qualitative measures were used to measure the impact of Programa Candeal.

An informed consent and a survey composed of twenty categorical questions, twenty-six continuous questions, and one open response question was generated to be administered to program alumni. All surveys were administered in Brazilian Portuguese, as this is the language of instruction of Programa Candeal. English translations are included in Appendix – Surveys.

4.2 Discussion of study subjects and Programa Candeal

Study subjects were undergraduate health professional students at the Bahiana School of Medicine and Public Health from the faculties of medicine, dentistry, physiotherapy, psychology, biomedical science, nursing, physical education and occupational therapy who have participated in Programa Candeal.

Programa Candeal is an interdisciplinary community health education program set in Salvador, Bahia amidst some of the largest socioeconomic divides in Brazil. It is administered by the Bahiana School of Medicine and Public Health in collaboration with community partners. Every semester it provides participating students with a cumulative forty hours of direct social engagement with a small, typically standing

group of community members over a four-month period. Students take turns weekly designing and then leading educational and recreational programming for each community encounter with fellow students in supporting roles.

4.3 Inclusion and exclusion criteria

Study subjects were defined as any past participant in Programa Candeal who had participated in the program as a graduation requirement. This definition included health professional students from the faculties of medicine, dentistry, physiotherapy, psychology, biomedical science, nursing, physical education and occupational therapy. Class years that either had not participated in Programa Candeal, were presently participating in Programa Candeal, or were less than two semesters post their Programa Candeal participation were excluded from this study.

4.4 Sample size estimation

The estimated sample size of the study was calculated based on the 2016 review of evaluation of 46 studies of interdisciplinary health education interventions by Reeves et al (20) that stated 65% of interdisciplinary health education program participants reported changes in student attitudes toward interdisciplinary work after their program experience. Taking into account our target population of 1500 students on the ESBMP listserv and an estimated 30% augmentation in community engagement after program involvement and considering an alpha error of 5% and a detectable difference of 10%, the estimated sample size and desired capture for this study is 80 respondents.

4.5 Method of subject identification and recruitment

Study subjects were recruited through a secure link sent in mass-email format to the BSMPH student listserv. The email briefly introduced potential subjects to the study. Those who then clicked on the link included in the email were connected with an informed consent form and survey which had been uploaded to secure cloud-based platform REDCap. Alumni response was voluntary and confidential, and alumni could execute the informed consent and survey at any time of their choosing. Of note, no

financial resources, space (e.g. classroom space), or equipment (e.g. computers) from BSMPH was used in the execution of this evaluation.

This study was approved by the Bahiana School of Medicine and Public Health Committee for Ethics in Research on 25 June 2019 (CAAE number 11287919.0.0000.5544) and received an exempt determination from the University of Rochester Medical Center Research Subjects Review Board on 29 April 2019. There are no financial disclosures that accompany this project.

4.6 Ethical considerations

With regard to ethical considerations for the Programa Candeal student participant study subjects, it was noted that survey participants may experience discomfort with the act of sharing personal experiences relating to Programa Candeal and honest assessments with program administrators and instructors with whom they may have ongoing professional, collaborative relationships in the future, and for this reason all data was de-identified prior to analysis, and all survey results were shared with Programa Candeal administrators in aggregate only, to preserve anonymity of the program alumni who donated their time to this endeavor.

4.7 Data analysis

All survey data was entered, stored and secured into the REDCap online platform licensed to the University of Rochester Medical Center (URMC). Average and standard deviation (SD) was used to describe continuous variables, while percentage and confidence interval (CI) was used to describe discrete variables. The Chi-squared test was used to analyze associations between categorical variables. The one proportion test was used to analyze binary variables.

Responses to the free response question *In which ways do you think Programa Candeal has influenced your professional choices?* were coded by a group of mutually independent reviewers. Reviewers identified descriptive themes in relationship to the experience of participating in Programa Candeal and its impact on

professional choices that emerged across responses. Responses were then coded appropriately.

5 RESULTS

5.1 Study participation

A description of the study and link to a consent form and survey were emailed to a total of 1500 program alumni. One hundred and twenty-two [122] program alumni visited the survey website between the dates of 14 Oct 2019 and 26 March 2020. Nineteen [19] program alumni started but did not complete the informed consent. Twenty [20] completed only the informed consent and then left the survey completely unfilled. Eighty-three [83] program alumni completed both the informed consent and the survey. The respondents who completed the survey had participated in Programa Candeal between the spring semester of 2015 and the spring semester of 2018. These recruitment data demonstrate a lower percentage of study participation (5.5%) when compared with recruitment data from other studies. Peeters et al (22) in their 2017 study of a semester-long IPE program involving 554 participants report at 27% participation rate in program evaluation; DiVall et al (25) in their 2014 study looking at effectiveness of a half day classroom-based IPE conference involving 277 participants report a 32% response rate.

5.2 Demographic data

Of the 83 respondents who completed surveys, 19 identified as male (22.9%), 64 identified as female (77.1%), and 0 identified as other. Thirty-nine [39] identified as racially mixed (47.6%), 37 identified as white (45.1%), 5 identified as black (6.1%), and 1 identified as indigenous (1.2%). (Table I)

Twenty-four [24] respondents stated they were the first member of their immediate families to enter into a health profession (28.9%), while 59 stated that they were not (71.1%). 7 respondents reported being the first member of their immediate family to attend college (8.4%).

Seventy-six [76] respondents were still studying for their primary degree (91.6%), 6 had completed their degree (7.2%) and 1 respondent described their current educational level as other (1.2%).

Seventy-three [73] respondents self-identified as middle class (88%), 8 self-identified as upper class (9.6%), 1 self-identified as lower class (1.2%) and 1 preferred not to respond (1.2%).

Table 1 - Participating Alumni Demographic Data

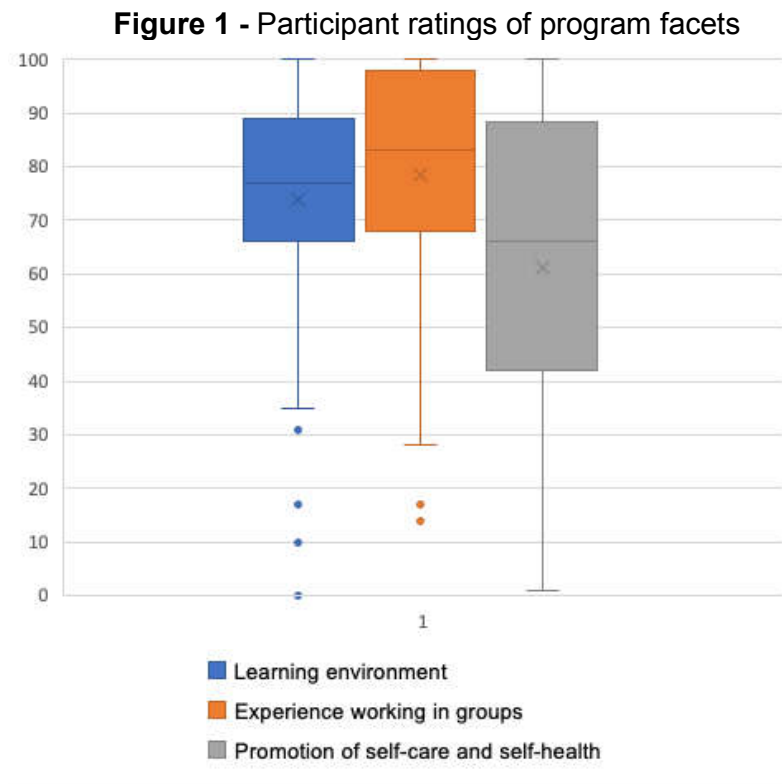
N = 83			
<i>Gender</i>	Male 19 (22.9%) Female 64 (77.1%) Other 0 (0.0%)	<i>Area of Study</i>	Medicine 49 (59.8%) Nursing 9 (11.0%) Biomedical research 7 (8.5%) Dentistry 7 (8.5%) Psychology 7 (8.5%) Physical therapy 3 (3.7%) Physical education 0 (0.0%) Did not disclose 1 (1.2%)
<i>Ethnicity</i>	Racially mixed 39 (47.6%) White 37 (45.1%) Black 5 (6.1%) Indigenous 1 (1.2%)		
<i>Self-perceived social class</i>	Upper class 8 (9.6%) Middle class 73 (88%) Lower class 1 (1.2%) Prefer not to respond 1 (1.2%)	<i>Community outreach or volunteer work prior to Programa Candeal?</i>	Yes 35 (42.2%) No 43 (51.8%) Don't remember 5 (6.0%)
<i>First in family to attend college?</i>	Yes 7 (8.4%) No 76 (91.6%)		
<i>First in Family to enter into health profession?</i>	Yes 24 (28.9%) No 59 (71.1%)		

A majority of survey respondents identified as female or were part of the Faculty of Medicine. Nearly half of respondents identified as racially mixed. A majority of respondents identified as middle class. Almost one third of respondents identified as the first in their family to enter into a health profession. Less than half of respondents reported participating in community outreach or volunteer work prior to participation in Programa Candeal.

Of the 83 respondents, 49 were pursuing a degree in medicine at the time they participated in Programs Candeal (59.8%), 9 were pursuing a degree in nursing (11.0%), 7 were pursuing a degree in biomedical research (8.5%), 7 were pursuing a degree in dentistry (8.5%), 7 were pursuing a degree in psychology (8.5%), 3 were pursuing a degree in physical therapy (3.7%), and 1 respondent did not disclose. Physical education was not a degree path represented among respondents despite being a sub-group that required to participate in Programa Candeal. Four [4] respondents changed their area of study after participating in Programa Candeal (4.9%).

Thirty-five [35] respondents had participated in volunteer or community outreach activities prior to their participation in Programa Candeal (42.2%), while 43 had not (51.8%). 5 respondents could not remember (6.0%).

On a 100-point continuous scale, with 100 being the most efficacious and 0 being ineffectual, respondents rated the learning environment, experience working in a group, and the promotion of their self-care and self-health as follows: learning environment, mean 73.82 +/- 25.69 (SD); experience working in a group, mean 78.42 +/- 21.72 (SD); promotion of self-care and self-health, 61.15 +/- 28.99. (Figure 1)



	Percentiles			Mean	SD	SE
	0.25	Median 0.50	0.75			
Learning environment	66	77	88.5	73.82	23.26	2.82
Experience working in groups	78.42	21.72	69.5	83	97.5	2.37
Promotion of self-care and self-health	46	66	88	61.15	28.99	3.2

SD = standard deviation; SE = standard error

While a majority of respondents rated the Programa Candeal learning environment, experience working in groups, and promotion of self-care and self-health highly, the widest and most uniform variation in responses were observed in the area of promotion of self-care and self-health.

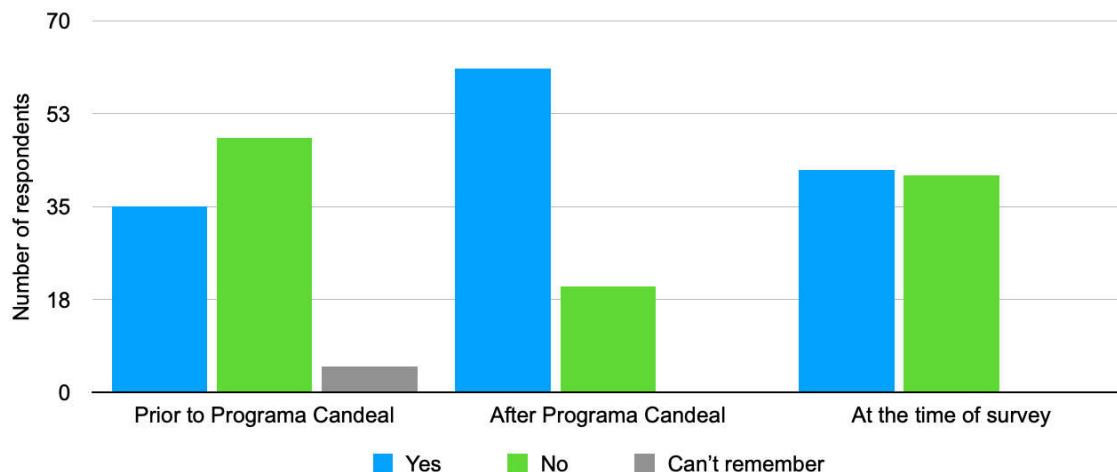
5.3 Program effectiveness

5.3.1 Community outreach and volunteer initiatives

Of the 83 survey respondents, 61 reported ongoing involvement in community outreach activities (73.5%) since their engagement in Programa Candeal while 20 reported no ongoing involvement (24.1%). Two [2] respondents could not remember (2.4%). At the time of participation in the survey, 42 respondents were actively involved in community outreach efforts (50.6%) and 41 respondents were not (49.4%). (Figure 2)

Thirty-four [34] respondents reported having engaged in community outreach activities prior to engagement in Programa Candeal (44.2%). The increase in the percentage of respondents reporting community outreach and volunteer initiatives after participation in Programa Candeal was found to be statistically significant (Figure 1, $p < 0.0001$) with a 95% confidence interval of 62.75% to 83.33%. The percentage of respondents reporting active engagement in community outreach at the time of their survey participation was not found to be significantly higher than the percentage of respondents who reported engaging in community outreach activities prior to engagement in Programa Candeal (Figure 2, $p = 0.2581$).

Figure 2 - Health professional student involvement in community outreach and volunteer initiatives before and after participation in Programa Candeal



	Yes	No	Can't remember
Community outreach involvement prior to Programa Candeal	35	48	5
Community outreach involvement after Programa Candeal	61	20	0
Active community outreach involvement at time of survey	42	41	0

A statistically significant increase was found in the number of respondents reporting subsequent engagement in community outreach and volunteer initiatives after participation in Programa Candeal.

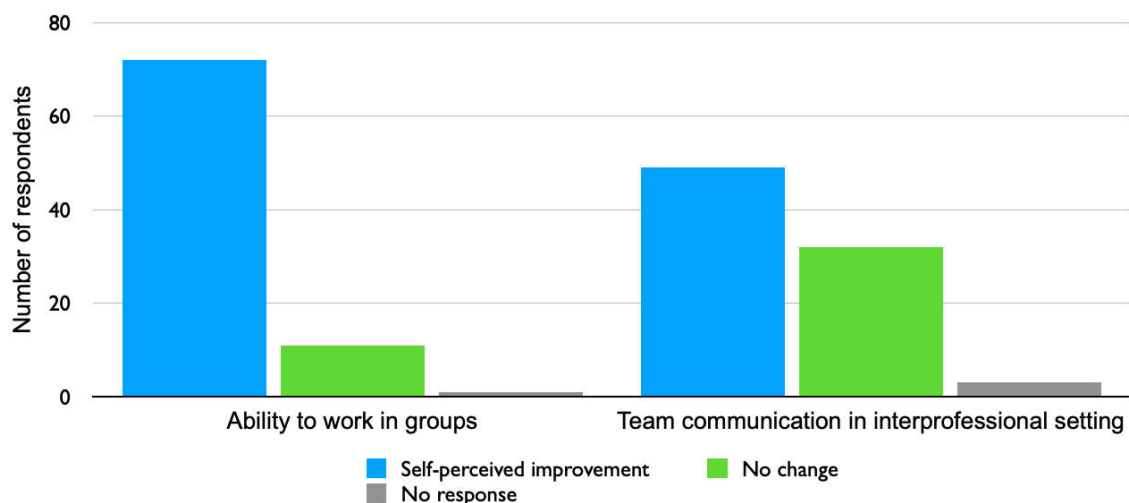
Thirty-eight [38] respondents felt that their participation in Programa Candeal augmented their interest in continued community outreach activity involvement (45.8%). Four [4] respondents felt that their participation in Programa Candeal diminished their interest in continued community outreach (4.8%). Forty-one [41] respondents felt that their participation in Programa Candeal did not inform their choice (49.4%).

Fifty-nine [59] respondents felt that their experience in Programa Candeal had not been reproduced in other areas of their professional training to date (71.1%), while 24 respondents did not feel that the experience was unique (28.9%).

5.3.2 Teamwork in the interprofessional setting

Seventy-two [72] respondents felt that participating in Programa Candeal improved their ability to work in groups (87.8%). Ten [10] respondents did not feel that Programa impacted their ability work in groups (12.2%), and one respondent did not respond (1.2%). (Figure 3)

Forty-nine [49] respondents felt that in particular their ability to communicate and work effectively with health professionals from different specialties had improved as a result of their participating in Programa Candeal (60.5%). Thirty-two [32] respondents did not feel that their abilities had changed (39.5%). (Figure 3)

Figure 3 - Self-assessment of teamwork in interprofessional setting

	Self-perceived improvement	No change	No response
Ability to work in groups	72	11	1
Team communication in interprofessional setting	49	32	3

A majority of respondents appreciated an improvement in their capacity for working in groups, and additionally an improvement in their communication skills in an interprofessional setting.

Fifty-five [55] respondents endorsed approaching their profession differently as a result of participating in Programa Candeal (66.3%), while 28 respondents felt that the program did not have this impact (33.7%).

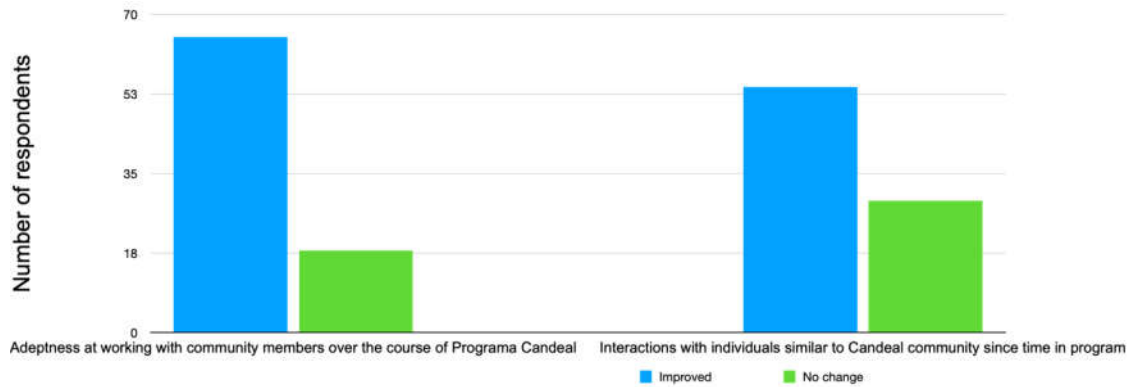
5.3.3 Interactions with community members of different socioeconomic status

Sixty-five [65] respondents reported that their adeptness at working with community members in their Programa Candeal focus group improved over the duration of the course (78.3%). Four [4] respondents answered “No” (4.8%), and 14 respondents felt that participation in Programa Candeal made no difference in this area for them (16.9%). (Figure 4)

Fifty-four [54] respondents shared that when they encounter patients with health conditions similar to those predominating in the groups they were assigned to during Programa Candeal, they treat them differently on account of having participated in

the program (65.1%). 6 respondents reported “No” (7.2%) and 23 respondents stated that their participation in Programa Candeal did not influence their subsequent approach to patients with similar conditions to those they worked with as Programa Candeal participants (27.7%). (Figure 4)

Figure 4 - Interactions with community members of different socioeconomic



	Improved	No change
Adeptness at working with community members over the course of Programa Candeal	65	18
Interactions with individuals similar to Candeal community since time in program	54	29

A majority of respondents felt that over the course of their Programa Candeal experience their interactions with community members became more easeful and appropriate. Interestingly, a majority of respondents also felt that their Programa Candeal experience resulted in them approaching their interactions with community members differently when subsequently encountering them in a clinical setting.

5.3.4 Answers to open response question and emergent themes

Forty-four [44] respondents provided free responses to the open-ended question “In what ways do you believe this program has influenced your professional choices?” Upon blinded review from the researchers, 27 responses were interpreted to convey positive impact (61.4%), while 17 were interpreted as conveying either neutral or negative impact (38.6%).

As the majority of respondents to the survey on the whole were female (77.1%), an additional sub-analysis was performed to see if gender influenced positivity or

negativity of impact of Programa Candeal. Gender identity was not found to significantly alter estimation of program. (Table 2)

As the majority of survey respondents were in the faculty of medicine (59.8%), an additional sub-analysis was performed to see if specialty influenced positivity or negativity of impact of Programa Candeal. Medicine versus non-medicine specialty was not found to significantly alter estimation of the program. (Table 2)

Table 2 - Open response answers by Gender; Medicine vs Non-medicine speciality

	+	-	Totals	
Female	21	11	32	
Male	6	6	12	
				p = 0.343132
Medicine	13	13	26	
Non-Medicine	14	4	18	
				p = 0.06828
Total +/-	27	17		

+ = Overall positive response to how Programa Candeal influenced participant's professional choices

- = Overall negative response to how Programa Candeal influenced participant's professional choices

There was no statistically significant difference noticed in positive or negative estimation of Programa Candeal based on respondent gender or enrollment in the faculty of Medicine versus one of the non-Medicine faculties.

Thirty-eight [38] respondents reported that they had been placed in their first choice of focus groups while participating in Programa Candeal (45.8%), while 27 were not placed in their first choice (32.5%), and 18 could not remember (21.7%). Of the 44 respondents who provided answers to the open-response question, these proportions were largely preserved at 43.2% having been placed in their first choice of focus group, and a cumulative 56.8% having either not been placed in their first choice or unable to recall. Having been placed in one's first choice of focus group was found to significantly alter estimation of the program. (Table 3, p = 0.000843)

Table 3 - Open response answers by whether assigned to focus group of preference

	+	-	Totals	
First choice	17	2	19	
Not first choice	10	15	25	
			p = 0.000843	
Total +/-	27	17		

+ = Overall positive response to how Programa Candeal influenced participant's professional choices

- = Overall negative response to how Programa Candeal influenced participant's professional choices

Those respondents who were assigned to their first choice of focus group within Programa Candeal were statistically significantly more likely to hold their program experience in positive esteem, suggesting that initial participant excitement and interest has a significant influence on outcome.

Individual responses were separated into discrete sentences. Sentences were then reviewed in aggregate, where the following themes emerged (Figure 5):

1. A more humanistic approach to interactions with low socioeconomic status community members and anticipated future patients

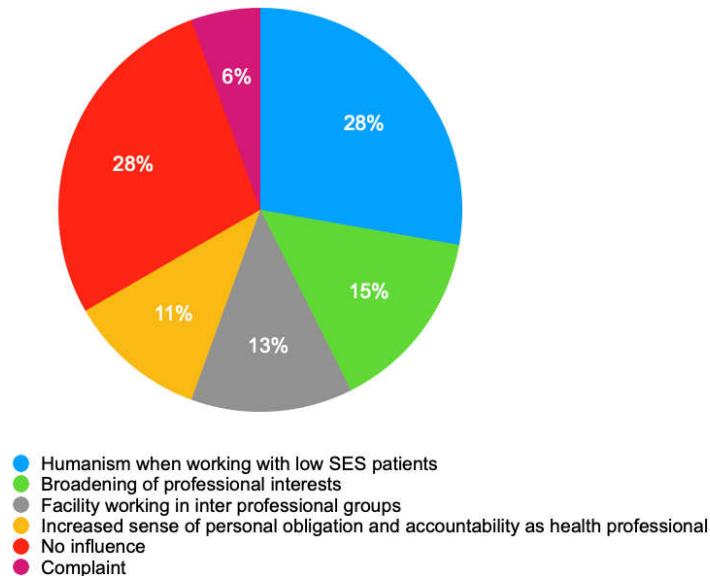
Fifteen [15] of the 44 respondents (34.1%) described transformations in their individual relationships with community group members as "less technical and more human" and "more holistic", some citing a transformation toward more patient-centered care as evidenced by a new interest in the impact of active listening. One respondent working with a group of elders observed, "I could see that these workshops were a moment when [these community members] could be heard and welcomed, which may not have been happening even in their very own homes."

2. A broadening of professional interests to additional fields (eg public health, maternal-fetal health), or an augmented understanding of one's current area of specialization

Eight [8] of the 44 respondents (18.2%) described either a broadening to include public health, or expressed that their time in Programa Candeal contributed to fruitful exploration of subspecialties within their potential scope of future practice. One respondent reported founding an extracurricular, interdisciplinary female student group devoted to elucidating the importance of public health initiatives in patient outcomes. Respondents who had participated in elderly, childhood, and early

childhood focus groups reported an increased comfort with working with Individuals across the life span that had not been there previously.

Figure 5 - Emergent themes from participant experience



Themes from open response questions

	Humanism when working with low SES patients	Broadening of professional interests	Facility working in inter professional groups	Increased sense of personal obligation and accountability as health professional	No influence	Complaint
Responses	15	8	7	6	15	3

Open responses to the question, "In what ways do you believe [Programa Candeal] has influenced your professional choices?" touched upon themes of increased ownership and accountability in professional responsibility toward patients, increased humanism, and improved facility in interprofessional groups. A minority of respondents (27.7%) felt that Programa Candeal left no impact on the subsequent professional journeys.

3. An increased facility at executing group work in an interdisciplinary setting

Seven [7] of the 44 respondents (15.9%) expressed an increase in their self-perceived facility at executing group work in an interdisciplinary setting, with one respondent stating that this kind of sustained, recurring interaction with colleagues from other specialties was as valuable as sustained, recurring interactions with community members. Another respondent appreciated being able to now foresee some of the communication challenges that could be intrinsic to a multi professional teamwork.

4. An increased sense of obligation and personal accountability to one's chosen specialty

Six [6] of the 44 respondents (13.6%) expressed certainty in their chosen profession with increased resolve as a result of participating in Programa Candeal, with some respondents speaking specifically of their increased dedication to working with set strata of patients, and others speaking more generally of the experience with Programa Candeal "reinforcing [the] choice to care for others."

5. A lack of influence on subsequent professional choices

Fifteen [15] of the 44 respondents (34.1%) reported that Programa Candeal had no influence on their professional choices. Two [2] respondents reported already being interested in broader social engagement and volunteer work. One respondent expressed that their experience in Programa Candeal was suboptimal, but did not specify why, while another stated that their participation was perfunctory. The remaining respondents did not elaborate.

6. Specific criticisms related to focus group facilitation

Three [3] respondents (6.8%) relayed cumulatively negative experiences participating in Programa Candeal, specific to the tone set by their respective group facilitators and the professional cultures of the environments in which they executed their weekly workshops. Inadequate attention from the facilitator, whether perceived to be due to facilitator preference toward contributions from students from a particular specialty or perceived to be a general disinvestment from the groups activities, was consistent across the three responses. The respondents were studying under three different health professional pathways: medicine, nursing, and physiotherapy.

6 DISCUSSION

When designing the present study, the researchers worked closely with Programa Candeal administrators in a conscious, self-aware effort to arrive at mutually shared goals and values to guide the production of a mixed methods survey, an approach consistent with a constructivist evaluation paradigm. The constructivist as described by Mertens et al in 2018 posits that the choice to involve the evaluator in the workings of the program to be evaluated - in this case discussions with administrators - strengthens the deliverable, and in particular increases the likelihood that administrators will apply findings of the evaluation toward programmatic improvement, having gained feedback that they feel to be directly relevant (26, pp 129-130). Walser in her 2015 piece “Evaluability assessment in higher education: Supporting continuous improvement, accountability, and a culture of assessment” neatly outlines and applies one model for the execution of the constructivist paradigm known as *evaluability assessment* (27). Evaluability assessment was first described by Wholey in his 1979 volume “Evaluation: Promise and Performance” in the setting of evaluating government-led initiatives (28), however Walser’s work succeeded in illustrating the application of the steps of evaluability assessment in the setting of higher educational initiatives (27), and as such was found to be more pragmatically relevant in guiding the execution of the present study. Walser argues that program stakeholders must be first identified and that their level of involvement in both the program and the evaluation process should be articulated in advance of evaluation execution. Second, an “initial program theory” should be articulated should it not already exist. In the case of Programa Candeal, the pre-existing 2012 volume “Educação em Saúde na Comunidade: Elementos pedagógicos de uma prática interdisciplinar. Programa Candeal” edited and curated by Maria Antonieta Nascimento Araújo (29) documented the theoretical pedagogical framework guiding initial implementation and development of Programa Candeal, with conversations between the researchers and present administrators further elucidating on emerging program tenets.

The present study arguably best addresses the third installment of evaluability assessment, in which data is gathered to assess whether a program is successfully executing its aims given the program theory that it has consciously (if already

articulated) or tacitly (if previously unarticulated) adopted. To this objective of identified perhaps not previously articulated tenants of Programa Candeal that could be influencing outcomes nevertheless, it was agreed upon by program administrators and the researchers alike that a mixed methods approach to data collection would maximize the likelihood of measuring mutually agreed upon desired outcomes, as well as unearthing themes in student participant experience that may not be readily observable to program staff.

The evaluation likewise aimed to be both descriptive and critically reflexive in its analysis, such that it can direct future changes to the Program where applicable. The following measurable elements were identified as mutually important to both the researchers and program administrators and staff: (1) measurement of change in community outreach and volunteer initiatives, (2) measurement of changing attitudes and perceived facility in working as a member of a team in the inter professional setting, (3) measurement of changing attitudes toward community members of different socioeconomic status through periodic, longitudinal interactions, and (4) ability to uncover tacit themes in student experience may not have been specifically articulated curricular goals.

A statistically significant association was observed between the increase in reported participation in community engagement projects before and after participation in Programa Candeal (Figure 2), although statistical significance was not observed when survey respondents instead commented on whether they were actively engaged in community outreach at the time of survey administration (Figure 2). This data suggests that there is a significant increase in volunteer community engagement, but potentially the projects are shorter in duration - with a concrete beginning, middle and endpoint - rather than ongoing, longitudinal collaborations. Future data captures will shed light on whether volunteer community engagement continues as students graduate and move into professional life, but this initial data capture suggests a culture of volunteer community engagement broader than one's chosen specialty is being instated at the undergraduate level. While it is possible that other elements of the curricula of the health faculties at BSMPH also foster this culture, it is worth commenting that 71.1% of respondents reported that their experience in Programa Candeal - a longitudinal experience in structured community

outreach - had not been reproduced in other areas of their professional training to date, in keeping with the formative nature of this experience.

In contrast with programming initiatives founded in a similar time frame described by Jarvis-Sellinger et al (18) and Andrus et al (1), where health professional students likewise enter into community settings, Programa Candeal differs in three major ways: first, since its inception Programa Candeal has remained committed to the creation and upholding of interprofessional student teams as the primary unit entering communities rather than placing students in communities as individuals or in groups comprised only of those sharing the same specialty; second, student participation in Programa Candeal remains mandatory and enrolls all health professional students in the pre-clinical years of their training, rather than taking the form of an elective activity only for those who choose to engage; and third, Programa Candeal's structure prioritizes direct student engagement with individual community members over principal engagement with community-based organizations, administrators, and community-based health workers. While Jarvis-Selinger et al in their 2008 study on community engagement IPE initiatives through health professional training programs comment on the possibility of such initiatives facilitating healthcare worker recruitment in participating communities, the authors of the present study have not found manuscripts in the existing literature assessing either augmented level of interest or subsequent increase in extra-professional community engagement of health professional students as a result of interfaced with disenfranchised communities through their participation in IPE programs. The structure of Programa Candeal again differs significantly from the aforementioned initiatives and additionally the more recent programming outlined by Meurer et al (19) in its commitment to building interprofessional health student teams, its emphasis on direct interactions between students and community members, and its condensed time frame of months (one semester) with weekly recurring engagement rather than taking place over years with more spread out, monthly encounters. Finally, Programa Candeal differs from the programmatic model described by Walker et al (8) in so far as many Programa Candeal focus groups find their continuity in serial interactions with the same group of community members rather than serial interactions with a clinical provider.

Interestingly, Wong et al (23) in their 2016 research study assessing modifiers of health professional student attitudes toward IPE reported that student extracurricular activity involvement was associated with higher performance in the Teamwork & Collaboration domain of the Readiness for Interprofessional Learning Scale, whereas participation in interprofessional courses taking place solely in the classroom without an outreach component, and personal relationships with colleagues from other professions did not appear to have an association with increased Teamwork & Collaboration scores between the first and third years of training. Wong et al comment on an interesting limitation to their study: students who were enrolled in extracurricular community engagement were those who had elected this path voluntarily, thus making it impossible to distinguish whether there was a selection bias in the students who were drawn to this kind of work as those with more receptivity toward teamwork and collaborative learning at baseline. With regard to Programa Candeal, where community outreach is required, and an uptick in community outreach and volunteer initiatives is reported in the present study by participants after program engagement (Figure 2), it is well possible that Programa Candeal both improves student aptitude toward inter professional collaboration through required semi-structured community outreach sessions while students are program participants, but also through priming students to continue to seek out extracurricular community engagement experiences that will continue to both expand and refine the collaborative professional skillset that Programa Candeal laid a foundation for. With regard to Imafuku et al's (21) description of PBL learning and their concept of "active engagement", one might infer that Programa Candeal, while not a PBL-centered program, gives ample opportunity for "active engagement" as students are expected to design and lead weekly workshops for groups of community members. One might also infer that the success of such workshops hinges on collective sense of cohesiveness and gain. Peeters et al (22) in their 2017 report on health professional student attitudes and comprehension of the roles of health professionals in other disciplines before and after participation in an IPE program by asking students to generate qualitative word clouds. It was found that while some misperceptions, uncertainty and negativity were present at both time points, it appeared that course participation resulted in overall increased appreciation and understanding, which may be viewed as a positive outcome for enhanced teamwork. However, each of the aforementioned papers simultaneously allude to both the

uniqueness of the format of Programa Candéal as well as some of the challenges intrinsic to extrapolating about the impact of a given interprofessional educational initiative based on the existing body of research commenting on other initiatives. Programa Candéal is structured differently enough from other community-based interprofessional education initiatives to even call into question the efficacy of using similar evaluative tools. With regard to the evaluation of the extent to which self-care and self-health are reinforced through participation in Programa Candéal (61.15 +/- 28.99 (SD) on a 100-pt scale). (Figure 1) Interestingly, data on promotion of self-care and self-health has not been reported on in the existing literature. Walker et al (8) in their 2018 integrative literature review of 27 peer reviewed primary research studies on IPE from around the world comment that the most frequent outcomes assessed were changes in attitudes toward IPE and changes toward attitudes and esteem toward other health professionals. Reeves et al (20) in their 2016 review of 46 studies of IPE interventions likewise describe the main metric analyzed being satisfaction or lack thereof with specific IPE experiences.

As for no statistically significant associations found between enrollment in medicine versus non-medicine faculties and positive or negative estimation of the program, this data could be interpreted as positive, suggestive that Programa Candéal as a culture and in practice, values its participants in aggregate equally, providing a consistent experience. However, more data needs to be captured from the "non-medicine faculties" in order to look specifically at experiences of nursing, physiotherapy, occupational therapy, psychology and dentistry students in isolation rather than in aggregate. This is a shortcoming of recruitment. Additional data can be gleaned from the three specific criticisms that were graciously and articulately proffered to the survey open response question. Although reported in minority, they suggest that the tone set by the group facilitator and the surrounding work environment toward students and sometimes toward community members alike, holds a profound impact on whether the experience of Programa Candéal was felt to be positive or negative. In particular, a perceived disinvestment from the group facilitator for any reason caused students to feel that their personal investment in the experience was not valued. Consistent with this variation in experience, when all 83 respondents were asked to evaluate different facets of Programa Candéal based on continuous 100-point scale, mean estimations of learning environment, experience working in a

group, and self-care and self-health were grossly positive, but with large standard deviations bespeaking a broad range of personal experiences. A future direction for subsequent surveys would be to analyze data captured from each focus group independently to better address this question of the influence of the group facilitator and work environment on subjective program experience.

Conversely, a statistically significant association observed between positive estimation of experience in Programa Candeal and having initially been placed in one's first choice of focus group (Table 3) bespeaks the importance of initial student interest and enthusiasm in shaping the Programa Candeal experience.

At a minimum, emergent themes from open response questions (Figure 5) bespoke a literacy and ease with the concept of multi professional teamwork that merits further exploration and vetting in subsequent estimation of the program, and likewise a nascent awareness of the tenets of patient-centered care, as evidenced through comments recognizing that the lived lives of community members differed widely from those of providers, and self-reports of making more space for humanized interactions in light of this new understanding. Respondents also comfortably articulated an enhanced appreciation for public health as a field simultaneous with expressing a deepened commitment to their chosen health specialties. Of note, these responses were to a question that did not prompt them to speak directly to any of these areas, and was optional.

A majority of respondents reported that their facility working with community members improved over the duration of their participation in Programa Candeal (Figure 3), and that their treatment of subsequent patients who fit medical or sociodemographic profile similar to those of the community members they interacted during Programa Candeal changed as a result (Figure 4). To the author's knowledge, this data has not been reported in other evaluations of community-outreached IPE initiatives and their impact on student adeptness interacting appropriately with individuals from communities and backgrounds distinct from their own, perhaps as a proxy of community member satisfaction with the program, and perhaps heralding future patient satisfaction. What has been researched and reported on in both the English-speaking and lusophone has been sizable bias by providers based on

perceived social class of patients, impacting both patient trust of healthcare providers - influencing whether patients choose to present for health care and what information they share - and healthcare provider care plans for patients.

As discussed in detail in the literature review section of this manuscript, 2019 studies by Brazilian researchers Brandão et al (12) and Portuguese researchers Diniz et al (13) suggest the presence of bias by health care providers toward socioeconomically vulnerable patients with regard provider minimization of the experience of physical pain in this group, and provider perceptions of the culpability of these patients in the progression of their own disease processes, both of which disparately influence medical treatment plans. Likewise, a systematic review of 35 studies from the UK, Canada and the US by UK researchers Magwood et al 2019 (14) describes reluctance of lower socioeconomic status individuals and particularly those with housing instability to either seek medical care or accept interventions due to a perception of stigma and dehumanization in medicalized environments. Programa Candeal is modeled in such a way as to emphasize humanity in interactions between those with lower socioeconomic status, vulnerable housing, or otherwise marginalized and the health professional students that will ultimately be trained to provide essential health-related services to these populations should they elect to do so. Specifically, community focus groups and student teams have recurring weekly encounters of multiple hours in duration, notably not beholden to the time constraints and infrequency of other health-related encounters. Likewise, the structure of encounters around educational programming - in which students take on the role of teacher rather than clinician, even in the sphere of health-related material - opens space for a broader range of interactions than that between patient and provider.

It is of note that this entire study from instrument design, recruitment, participant consent, data collection, data storage, and analysis was carried out free of cost using a secure, open-source online platform called Research Electronic Data Capture (REDCap). A university license was required to use this software, but no university computers, hard materials, workspace or paid personnel were needed to carry out the study. Study participants could fill out the survey using public workstations or their personal smart phones at any time they found convenient and not necessarily while on the university campus. The relative ease with which such survey instruments

could be built and data captured on a secure platform without placing burden on university staff or study participants speaks to the feasibility of building a standing online evaluation tool, with existing open source infrastructure, to facilitate ongoing assessment of the efficacy of Programa Candeal, and particularly student response to programmatic changes guided by existing data, to be reviewed on an annual basis. This can be executed without undue financial burden or need for additional space or personnel in a setting that is already running at capacity with regard to fulfilling its educational mission.

7 CONCLUSION

Programa Candeal is successful in encouraging health professional students to practice community engagement. Emergent themes from open response questions bespoke a literacy and ease with the concept of multi professional teamwork that merits further exploration and vetting in subsequent estimation of the program. Programa Candeal also promotes humanistic interactions with community members in need.

Future directions include instating a more objective analysis of interprofessional teamwork development before and after program participation, increasing evaluation recruitment to enable study of the impact of individual focus groups on subjective experience of the program and the achievement of these aims, and design and implementation of an evaluation protocol to gauge community member experience, satisfaction, and critique of the Programa Candeal experience.

The execution of this study without undue cost or consumption of university resources also demonstrates the feasibility of implementing an online standing evaluation platform in a low-resource environment as an integral step on the road to ensuring innovative, evidence-based and iterative programming for health professional students around the world that achieve desired results.

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APPENDIX**Appendix A - Surveys**

PROGRAMA CANDEAL PROGRAM ALUMNI SURVEY

Do you remember which semester/year you were enrolled in Programa Candéal?

(Generally it is the third or fourth semester)

(Yes, year ____, semester ____) (I don't remember)

Name:

Name during Programa Candéal, if different:

Phone:

Email:

Would you like to receive updates about Programa Candéal? (Yes) (No)

1. Which of the below best describes your gender identity? (Male) (Female) (Other) (I prefer not to respond)

2. Do you identify with a specific race? (Black) (Indigenous) (Mixed) (White) (Other) (I prefer not to respond)

3. Are you the first person in your family to enter a health profession? (Yes) (No)

4. Are you the first person in your family OR part of the first generation in your family to attend college? (Yes) (No)

5. What is your present education level?

I am currently an undergraduate.

I have completed my undergraduate degree.

I am currently a resident.

I have completed a residency.

I am currently a master's student.

I have completed a Master's program.

I am currently a doctoral student.

I have completed my doctorate.

Other _____

6. With which socioeconomic class do you identify? (Lower class) (Middle class) (Upper class) (I prefer not to respond)

7. During your undergraduate training, with which socioeconomic class did you identify? (Lower class) (Middle class) (Upper class) (I prefer not to respond)

8. In which area is your most recent degree?

9. In which discipline do you currently work? (I'm still studying) (Medicine) (Physical Therapy) (Psychology) (Nursing) (Biomedicine) (Physical Education) (Dentistry) (Other: _____)

10. You were studying in which discipline when you participated in Programa Candeal? (Medicine) (Physical Therapy) (Psychology) (Nursing) (Biomedicine) (Physical Education) (Dentistry) (Other: _____)

11. Did you continue in this discipline after completing Programa Candeal? (Yes) (No, I left school) (No, I switched to _____)

12. Did you, or are you currently, specializing within your chosen discipline? (Yes: _____) (No)

13. If yes, do you feel Programa Candeal influenced your choice of which specialty to pursue? (Yes, without a doubt) (Yes, it influenced my choice partially) (No) (I don't remember) (I prefer not to respond)

14.? Did you participate in volunteer/outreach activities before Programa Candeal? (Yes) (No) (I don't remember)

15. Did you participate in volunteer/outreach activities during your undergraduate training after Programa Candeal? (Yes) (No) (I don't remember)

16. Are you currently involved in volunteer/outreach work? (Yes) (No)

17. Do you feel your choice of whether to participate in other volunteer/outreach activities is influenced by your participation in Programa Candeal?

(Yes, Programa Candeal increased my interest in participating in extension activities)

(Yes, Programa Candeal decreased my interest in participating in extension activities)

(No, Programa Candeal has not impacted my choice of whether to become more involved with volunteer/outreach activities)

18. In which focus group were you placed for Programa Candeal?

Was this group your first choice? (Yes) (No, my first choice was _____) (I don't remember)

Who was your instructor? _____ (I remember the person, but not the name (I don't remember)

19. What do you remember of your participation in Programa Candeal?

I remember the patients: All, some, none

I remember the other students in my group: All, some, none

I remember my instructor: Yes, no

I remember my group's activities with the community: All, some, none

I still think about my experience with Programa Candeal: Often, sometimes, rarely, never

20. Na escala de 1 até 10, qual é a sua avaliação geral do Programa?

Learning 1 2 3 4 5 6 7 8 9 10

Exposure to community 1 2 3 4 5 6 7 8 9 10

I approach the population I worked with differently because of my experience in Programa Candéal. 1 2 3 4 5 6 7 8 9 10

Teaching 1 2 3 4 5 6 7 8 9 10

Group work 1 2 3 4 5 6 7 8 9 10

Self-care and focus on personal well-being in a health profession 1 2 3 4 5 6 7 8 9 10

21. How would you evaluate your experience with Programa Candéal?

It was an experience that I have not had in any other part of my training. (Yes) (No)

I approach my profession differently because of my participation in Programa Candéal. (Yes) (No)

My experience in Programa Candéal helped me learn how to work in interprofessional groups. (Yes) (No)

I work and communicate differently with members of the health team outside of my discipline because of my experience in Programa Candéal. (Yes) (No)

22. Over the course of Programa Candéal, my approach to the patients in my focus group improved. (Yes) (No) (No change)

23. Do you interact and approach individuals with health conditions similar to your community participants in Programa Candéal differently because of your experience in the Program? (Yes) (No) (No change)

24. In which ways do you think Programa Candéal has influenced your professional choices?

Thanks so much for your participation!

Appendix B - Questionário de Ex-Alunos do Programa Candeal

Você se lembra em qual ano você participou do Program Candeal?

(Geralmente é o segundo semestre da graduação)

(Sim, ano 20__, semestre __) (Não me lembro)

Nome:

Nome durante Programa Candeal, se fosse diferente:

Número de telefone:

Email:

Você quer ter notícias sobre Programa Candeal? (Sim) (Não)

1. Você se identifica como qual gênero?

(Masculino) (Feminino) (Outro) (Prefiro não responder)

2. Você se identifica como qual raça?

(Negra) (Indígena) (Parda) (Branca) (Outra) (Prefiro não responder)

3. Você é era a primeira pessoa na sua família a seguir uma profissão de saúde? (Sim) (Não)

4. Você foi a primeira pessoa na sua família OU parte da primeira geração da sua família a participar de um programa de graduação?(Sim) (Não)

5. Atualmente possui que nível de de educação?

(no momento estudante de graduação)

(Já formado)

(no momento estou fazendo uma residência)

(Já fiz uma residência)

(no momento estudante de pós-graduação, nível mestrado)

(mestrado completo)

(no momento estudante de pós-graduação, nível doutorado)

(doutorado completo)

(Outra resposta _____)

6. Você se considera membro de qual classe sócio-econômica?

(Classe baixa) (Classe média) (Classe alta) (Prefiro não responder)

7. Durante os anos de graduação, você se considerou membro de qual classe sócioeconômica?

(Classe baixa) (Classe média) (Classe alta) (Prefiro não responder)

8. Qual é a área de seu diploma mais recente? _____

9. Em qual área trabalha agora?

(Ainda

estudo) (Medicina) (Fisioterapia) (Psicologia) (Enfermagem) (Biomedicina) (Educação Física) (Odontologia) (Outro: _____)

10. Você cursava que curso durante sua participação no Program Candeal?

(Medicina) (Fisioterapia) (Psicologia) (Enfermagem) (Biomedicina) (Educação Física) (Odontologia) (Outro: _____)

11. Continuou nesta área depois da sua participação no Programa Candeal?

(Sim) (Não, deixei escola) (Não, trocou por outra área: _____)

12. Você fez ou está fazendo um curso de especialização dentro da sua area de formação? (Sim: _____) (Não)

13. Se sim, o Programa Candeal influenciou a sua escolha de área de especialização?

(Sim, sem dúvida) (Sim, contribuiu parcialmente) (Não) (Não me lembro) (Prefiro não responder)

14. Você participou de atividades voluntárias ou atividades de extensão antes do Programa Candeal?

(Sim) (Não) (Não me lembro)

15. Você participou de atividades voluntárias ou atividades de extensão durante os anos de graduação depois da sua participação no Programa Candeal?

(Sim) (Não) (Não me lembro)

16. Você participa em atividades voluntárias ou atividades de extensão atualmente?

(Sim) (Não)

17. A sua participação no Programa Candeal influenciou a sua escolha de participar em outras atividades voluntárias ou atividades de extensão ou não?

(Sim, o Programa Candeal aumentou o meu interesse em participar em outras atividades de extensão)

(Sim, a minha experiência com Programa Candeal diminuiu o meu interesse em participar em outras atividades de extensão)

(Não, a minha participação no Programa Candeal não teve nenhum impacto na minha escolha de participar em outras atividades de extensão ou não)

18. Você foi colocado em qual grupo de foco de comunidade no Programa Candeal?

Esse grupo foi a sua escolha preferida? (Sim) (Não, a minha escolha preferida foi _____) (Não me lembro)

Quem foi o professor/líder do seu grupo? _____ (Me lembro a pessoa, mas não o nome) (Não me lembro)

19. O Quanto você se lembra da sua participação no Programa Candeal?

Me lembro dos pacientes: (Todos) (alguns) (Nenhum)

Me lembro dos outros estudantes no meu grupo: (Todos) (alguns) (Nenhum)

Me lembro do professor do meu grupo: (Sim) (Não)

Me lembro das atividades do meu grupo com a comunidade: (Todas) (algumas) (Nenhuma)

Ainda penso sobre a minha experiência no Programa Candeal: (Muitas vezes) (As vezes) (Raramente) (Nunca)

20. Na escala de 1 até 10, qual é a sua avaliação geral do Programa (sendo 1 o mínimo e 10 o máximo)?

Aprendizagem 1 2 3 4 5 6 7 8 9 10

Exposição às comunidades 1 2 3 4 5 6 7 8 9 10

A minha abordagem perante a população com quem trabalhava mudou por causa da minha experiência no Programa Candeal. 1 2 3 4 5 6 7 8 9 10

Trabalho em grupo 1 2 3 4 5 6 7 8 9 10

Aprendizagem de auto cuidado e da minha saúde 1 2 3 4 5 6 7 8 9 10

21. Como você avaliaria sua experiência com Programa Candeal?

Foi uma experiência que não tive em outra parte da minha formação. (Sim) (Não)

Abordo a minha profissão de forma diferente por causa de Programa Candeal. (Sim) (Não)

A minha experiência aumentou a minha habilidade de trabalhar em grupos interprofissionais. (Sim) (Não)

Eu trabalho e me comunico diferentemente com membros da equipe de saúde fora da minha disciplina por causa da minha experiência com indivíduos em formação em outras disciplinas durante a minha participação no Programa Candeal. (Sim) (Não)

22. Durante a minha participação no Programa Candeal a minha abordagem para com os pacientes dentro do meu grupo melhorou. (Sim) (Não) (Não há diferença)

23. Você interage e aborda de maneira diferente indivíduos com condições de saúde similares às dos participantes da comunidade do seu grupo no Programa Candeal por causa da sua participação? (Sim) (Não) (Não há diferença)

24. De que forma você acha que este programa influenciou as suas escolhas profissionais?

Obrigada pela sua participação!

Appendix C - Submitted article

Enhancing Interprofessional Team Building, Community Engagement and Humanistic Interactions in Health Education: the Programa Candeal Experience

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Enhancing Interprofessional Team Building, Community Engagement and Humanistic Interactions in Health Education: the Programa Candeal Experience

ABSTRACT: Twenty years of existing medical literature speaks to a global interest in interprofessional experiences and the role of community engagement in the formation of 21st century health professionals, with recent literature highlighting shortcomings in the ability to form satisfactory therapeutic alliances with patients of lower socioeconomic status. There remains, however, a paucity of literature regarding effective interventions to rectify these gaps in care. This manuscript reports the findings of a retrospective analysis of the impact of Programa Candeal, a previously un-evaluated health education program at the Bahiana School of Medicine and Public Health in Salvador, Brazil seeking to improve the capacity of health professional students to work successfully on interdisciplinary health care teams through hands-on experience working with disenfranchised populations notably outside of the traditional roles of provider and patient. Results of a mixed quantitative-qualitative survey reveal that Programa Candeal is successful in encouraging health professional students to practice community engagement, cultivates a literacy with the concept of multi professional teamwork, and promotes humanistic interactions with community members at some of the widest socioeconomic divides in Brazil. This manuscript also highlights the relative ease of implementing a semi-automated online evaluation protocol without undue administrative burden in a low-resource environment.

Keywords: Interprofessional education, health education, community outreach, evaluation, socioeconomic status, healthcare disparity

Introduction

Twenty years of existing medical literature speaks to a global interest in interprofessional experiences and the role of community engagement in the formation of 21st century health professions alike, particularly though not confined to those training in low-resource settings. (Andrus & Bennet, 2006; Darlow et al., 2015; de Villiers et al., 2017; Evans et al., 2011; Fox et al., 2018; Kaye et al., 2011; McIntosh et al., 2008; Walker et al., 2018) In 2013 the World Health Organization spotlighted an “urgent need to scale up the number of human resources for health... and ensure a proper skill mix, and to adopt measures and incentives to make the geographical and organization distribution of health professionals more equitable,” while

acknowledging that “in many countries, this need has to be met in a context of difficult economic circumstances.” (*World Health Organization*, 2013) More recently, medical literature from the English-speaking and Lusophone world alike has emerged critiquing the patient experience of lack of empathy from health care providers, negatively impacting the therapeutic alliance between provider and patient, and the quality of medical care given. (Bohren et al., 2014; Brandão et al., 2019; Diniz et al., 2019; Magwood et al., 2019; *Office of the United Nations High Commissioner for Human Rights*, 2020)

Programa Candeal, an interdisciplinary community health education program twelve years in existence at the time of this manuscript set in Salvador, the capital of Bahia, where functional illiteracy has been estimated at as high as 30.8% (*Instituto Brasileiro de Geografia e Estatística, Ministério do Planejamento, Orçamento e Gestão*, 2010) has sought to promote a culture of interprofessionalism and address socioeconomic disparity between health care providers and their patients facilitating coordinated and yet non-algorithmic interactions between health professional students at a private university and those most socially marginalized first by virtue of where they were born, in addition to a frequently socially-determined array of health conditions.

The following manuscript reports the findings of a retrospective analysis of the impact of Programa Candeal, executed through a series of mixed methods surveys administered to past health professional student participants via an online platform, highlighting program strengths, unforeseen impacts, areas for growth, and emergent themes. This manuscript also highlights the relative ease as well as some of the challenges in implementing a semi-automated online evaluation protocol in a setting where one did not previously exist, in addition to addressing facets of Programa Candeal that may benefit from additional, ongoing assessment.

Background

Programa Candeal is an interdisciplinary community health education program set in Salvador, Bahia amidst some of the largest socioeconomic divides in Brazil. It is administered by the Bahiana School of Medicine and Public Health in collaboration with community partners. Every semester it provides participating students with a cumulative forty hours of direct social engagement with a small, typically standing group of community members over a four-month period. Students take turns weekly designing and then leading educational and recreational programming for each community encounter with fellow students in supporting roles. Undergraduate students between their second and fourth semesters of study in medicine, dentistry, physiotherapy, psychology, biomedical science, nursing, physical education and occupational therapy at BSMPH are grouped into mixed, interprofessional teams of eight to ten students with one faculty leader to design and implement weekly educational programming for members of two disenfranchised communities surrounding the BSMPH campuses. Community members longitudinally interact with the same interprofessional team each week, themselves grouped by themes that vary yearly, typically including but not limited to: integrative and complementary therapies, social inclusion for differently abled individuals, tobacco use disorder, living with Human T-Cell Lymphotropic Virus health in the classroom, early childhood, the aging population, adolescent health and youth identity development, maternal-fetal health, alcoholism or active addiction, living with diabetes and hypertension, and partnering with community agencies.

Programa Candeal is unique in that it purports to touch upon: 1) encouraging ongoing community engagement, 2) exposing students to a culture of collective work and team-building, and 3) promoting humanistic interactions between future providers and their patient base. It has not only sustained itself for twelve years at the time of this manuscript, but evolved from an elective, complementary activity to a required, fundamental course for all

health professional students at BSMPH. To date, no systematized evaluation of Programa Candeal has been carried out.

In order to measure the efficacy of such a program in meeting its purported aims and additionally address a gap in the literature with regard to the interventions that successfully promote productive interprofessional interactions, ongoing community engagement and strengthened therapeutic alliances, a survey was administered to health professional student program alumni to evaluate perceptions of the impact of Programa Candeal on the subsequent career choices and professional activities of its student participants through the lens of volunteer community outreach initiatives, characterize the subsequent professional involvement of former Programa Candeal participants in community outreach activities, and assess for improvement of former Programa Candeal participants in their performance in teamwork activities. Additionally, as a proof-of-concept, the execution of this survey served to demonstrate the feasibility of establishing an online standing evaluation platform in a low-resource environment, as an additional tool in collecting locally relevant data, guiding iterative and deliberate programmatic change, and reinforcing a culture of evidence-based practice.

Methods

The present study is a mixed qualitative-quantitative cross-sectional study. An informed consent and a survey composed of twenty categorical questions, twenty-six continuous questions, and one open response question was uploaded to the secure, cloud-based platform Research Electronic Data Capture (REDCap) licensed to the University of Rochester Medical Center for study subjects to complete at their convenience. All survey data was entered, stored and secured into the REDCap online platform. Study subjects were undergraduate health professional students at the Bahiana School of Medicine and Public Health who had

participated in Programa Candeal as a graduation requirement. Class years that either had not participated in Programa Candeal, were presently participating in Programa Candeal, or were less than two semesters post their Programa Candeal participation were excluded from this study. Alumni response was voluntary and confidential, and alumni could execute the informed consent and survey at any time of their choosing. Of note, no financial resources, space (e.g. classroom space), or equipment (e.g. computers) from BSMPH were used in the execution of this evaluation.

The survey collected participant demographics, inquired into program participant recollections of Programa Candeal, subjective estimation of the efficacy a variety of program facets including working on interprofessional teams and relating to disenfranchised community members, and recorded pre- and post- Programa Candeal community outreach involvement, and participant career trajectory. Notably, quantitative measures were used to capture sociodemographic data and a mix of quantitative and qualitative measures were used to measure the impact of Programa Candeal. All surveys were administered in Brazilian Portuguese.

Average and standard deviation (SD) was used to describe continuous variables, while percentage and confidence interval (CI) was used to describe discrete variables. The Chi-squared test was used to analyze associations between categorical variables. The one proportion test was used to analyze binary variables. Responses to the free response question *In which ways do you think Programa Candeal has influenced your professional choices?* were coded by a group of mutually independent reviewers. Reviewers identified descriptive themes in relationship to the experience of participating in Programa Candeal and its impact on professional choices that emerged across responses. Responses were then coded appropriately.

This study was approved by the Bahiana School of Medicine and Public Health Committee for Ethics in Research on 25 June 2019 (CAAE number 11287919.0.0000.5544) and received an exempt determination from the University of Rochester Medical Center Research Subjects Review Board on 29 April 2019. There are no financial disclosures that accompany this project.

Results

Study Participation and Demographics

A description of the study and link to a consent form and survey were emailed to a total of 1500 program alumni. One hundred and twenty-two [122] program alumni visited the survey website between the dates of 14 Oct 2019 and 26 March 2020. Nineteen [19] program alumni started but did not complete the informed consent. Twenty [20] completed only the informed consent and then left the survey completely unfilled. Eighty-three [83] program alumni completed both the informed consent and the survey. The respondents who completed the survey had participated in Programa Candeal between the spring semester of 2015 and the spring semester of 2018.

A majority of survey respondents identified as female (77.1%) or were part of the Faculty of Medicine (59.8%). Nearly half of respondents identified as racially mixed (47.6%). A majority of respondents identified as middle class. Almost one third of respondents identified as the first in their family to enter into a health profession (28.9%). Less than half of respondents reported participating in community outreach or volunteer work prior to participation in Programa Candeal (42.2%). A full synopsis of demographic data of study subjects is summarized in Table 1.

Given the preponderance of female-identifying respondents and faculty of medicine matriculants, an additional sub-analysis was performed to see if gender or health profession

faculty influenced positivity or negativity of impact of Programa Candeal. Neither was found to significantly alter estimation of program. (Table 2)

Program Effectiveness

Self-care and Self-health

On a 100-point continuous scale, with 100 being the most efficacious and 0 being ineffectual, respondents rated the learning environment, experience working in a group, and the promotion of their self-care and self-health as follows: learning environment, mean 73.82 +/- 25.69 (SD); experience working in a group, mean 78.42 +/- 21.72 (SD); promotion of self-care and self-health, 61.15 +/- 28.99. (Figure I)

Interestingly, however, those who were placed in one's first choice of focus group within Programa Candeal were statistically significantly more likely to hold their program experience in positive esteem (Table 3, $p = 0.000843$), suggesting that initial participant excitement and interest has a significant influence on outcome.

Community Outreach and Volunteer Initiatives

Of the 83 survey respondents, 61 reported ongoing involvement in community outreach activities (73.5%) since their engagement in Programa Candeal while 20 reported no ongoing involvement (24.1%). Two [2] respondents could not remember (2.4%). At the time of participation in the survey, 42 respondents were actively involved in community outreach efforts (50.6%) and 41 respondents were not (49.4%). (Figure I)

Thirty-four [34] respondents reported having engaged in community outreach activities prior to engagement in Programa Candeal (44.2%). The increase in the percentage of respondents reporting community outreach and volunteer initiatives after participation in Programa Candeal was found to be statistically significant (Figure I, $p < 0.0001$) with a 95% confidence interval of 62.75% to 83.33%. The percentage of respondents reporting active engagement in community outreach at the time of their survey participation was not found to

be significantly higher than the percentage of respondents who reported engaging in community outreach activities prior to engagement in Programa Candeal (Figure 2, $p=0.2581$).

Thirty-eight [38] respondents felt that their participation in Programa Candeal augmented their interest in continued community outreach activity involvement (45.8%). Four [4] respondents felt that their participation in Programa Candeal diminished their interest in continued community outreach (4.8%). Forty-one [41] respondents felt that their participation in Programa Candeal did not inform their choice (49.4%).

Fifty-nine [59] respondents felt that their experience in Programa Candeal had not been reproduced in other areas of their professional training to date (71.1%), while 24 respondents did not feel that the experience was unique (28.9%).

Teamwork in the Interprofessional Setting

Seventy-two [72] respondents felt that participating in Programa Candeal improved their ability to work in groups (87.8%). Ten [10] respondents did not feel that Programa impacted their ability work in groups (12.2%), and one respondent did not respond (1.2%). (Figure 3)

Forty-nine [49] respondents felt that in particular their ability to communicate and work effectively with health professionals from different specialties had improved as a result of their participating in Programa Candeal (60.5%). Thirty-two [32] respondents did not feel that their abilities had changed (39.5%). (Figure 3)

Fifty-five [55] respondents endorsed approaching their profession differently as a result of participating in Programa Candeal (66.3%), while 28 respondents felt that the program did not have this impact (33.7%).

Interactions with Community Members of different Socioeconomic Status

Sixty-five [65] respondents reported that their adeptness at working with community members in their Programa Candeal focus group improved over the duration of the course

(78.3%). Four [4] respondents answered “No” (4.8%), and 14 respondents felt that participation in Programa Candeal made no difference in this area for them (16.9%). (Figure 4)

Fifty-four [54] respondents shared that when they encounter patients with health conditions similar to those predominating in the groups they were assigned to during Programa Candeal, they treat them differently on account of having participated in the program (65.1%). 6 respondents reported “No” (7.2%) and 23 respondents stated that their participation in Programa Candeal did not influence their subsequent approach to patients with similar conditions to those they worked with as Programa Candeal participants (27.7%). (Figure 4)

Emergent Themes

Forty-four [44] respondents provided free responses to the open-ended question “In what ways do you believe this program has influenced your professional choices?” Upon blinded review from the researchers, 27 responses were interpreted to convey positive impact (61.4%), while 17 were interpreted as conveying either neutral or negative impact (38.6%).

Individual responses were separated into discrete sentences. Sentences were then reviewed in aggregate, where the following themes emerged (Figure 5):

- (1) A more humanistic approach to interactions with low socioeconomic status community members and anticipated future patients

Fifteen [15] of the 44 respondents (34.1%) described transformations in their individual relationships with community group members as “less technical and more human” and “more holistic”, some citing a transformation toward more patient-centered care as evidenced by a new interest in the impact of active listening. One respondent working with a group of elders observed, “I could see that these workshops were a moment when [these community

members] could be heard and welcomed, which may not have been happening even in their very own homes.”

(2) A broadening of professional interests to additional fields (eg public health, maternal-fetal health), or an augmented understanding of one's current area of specialization

Eight [8] of the 44 respondents (18.2%) described either a broadening to include public health, or expressed that their time in Programa Candeal contributed to fruitful exploration of subspecialties within their potential scope of future practice. One respondent reported founding an extracurricular, interdisciplinary female student group devoted to elucidating the importance of public health initiatives in patient outcomes. Respondents who had participated in elderly, childhood, and early childhood focus groups reported an increased comfort with working with individuals across the life span that had not been there previously.

(3) An increased facility at executing group work in an interdisciplinary setting

Seven [7] of the 44 respondents (15.9%) expressed an increase in their self-perceived facility at executing group work in an interdisciplinary setting, with one respondent stating that this kind of sustained, recurring interaction with colleagues from other specialties was as valuable as sustained, recurring interactions with community members. Another respondent appreciated being able to now foresee some of the communication challenges that could be intrinsic to a multi professional teamwork.

(4) An increased sense of obligation and personal accountability to one's chosen specialty

Six [6] of the 44 respondents (13.6%) expressed certainty in their chosen profession with increased resolve as a result of participating in Programa Candeal, with some respondents speaking specifically of their increased dedication to working with set strata of patients, and others speaking more generally of the experience with Programa Candeal “reinforcing [the] choice to care for others.”

(5) A Lack of Influence on Subsequent Professional Choices

Fifteen [15] of the 44 respondents (34.1%) reported that Programa Candeal had no influence on their professional choices. Two [2] respondents reported already being interested in broader social engagement and volunteer work. One respondent expressed that their experience in Programa Candeal was suboptimal, but did not specify why, while another stated that their participation was perfunctory. The remaining respondents did not elaborate.

(6) Specific Criticisms related to Focus Group Facilitation

Three [3] respondents (6.8%) relayed cumulatively negative experiences participating in Programa Candeal, specific to the tone set by their respective group facilitators and the professional cultures of the environments in which they executed their weekly workshops. Inadequate attention from the facilitator, whether perceived to be due to facilitator preference toward contributions from students from a particular specialty or perceived to be a general disinvestment from the group's activities, was consistent across the three responses. The respondents were studying under three different health professional pathways: medicine, nursing, and physiotherapy.

Discussion

A statistically significant association was observed between the increase in reported participation in community engagement projects before and after participation in Programa Candeal (Figure 2), although statistical significance was not observed when survey respondents instead commented on whether they were actively engaged in community outreach at the time of survey administration (Figure I). This data suggests that there is a significant increase in volunteer community engagement, but potentially the projects are shorter in duration - with a concrete beginning, middle and endpoint - rather than ongoing, longitudinal collaborations. It alternately suggests that the impact of Programa Candeal on subsequent community engagement is positive but transient.

As for no statistically significant associations found between enrollment in medicine versus non-medicine faculties and positive or negative estimation of the program, this data could be interpreted as positive, suggestive that Programa Candéal as a culture and in practice values its multidisciplinary participants in aggregate equally, providing a consistent experience. However, more data needs to be captured from the "non-medicine faculties" in order to look specifically at experiences of nursing, physiotherapy, occupational therapy, psychology and dentistry students in isolation rather than in aggregate. This is a shortcoming of recruitment.

Additional data can be gleaned from the three specific criticisms that were graciously and articulately proffered to the survey open response question, *In which ways do you think Programa Candéal has influenced your professional choices?*. Although reported in minority, they suggest that the tone set by the group facilitator and the surrounding work environment toward students and sometimes toward community members alike, holds a profound impact on whether the experience of Programa Candéal was felt to be positive or negative. In particular, a perceived disinvestment from the group facilitator for any reason caused students to feel that their personal investment in the experience was not valued. Consistent with this variation in experience, when all 83 respondents were asked to evaluate different facets of Programa Candéal based on continuous 100-point scale, mean estimations of learning environment, experience working in a group, and self-care and self-health were grossly positive, but with large standard deviations bespeaking a broad range of personal experiences. Interestingly, data on promotion of self-care and self-health has not been reported on in the existing literature. A future direction for subsequent surveys would be to analyze data captured from each focus group independently to better address this question of the influence of the group facilitator and work environment on subjective program experience.

Conversely, a statistically significant association observed between positive estimation of experience in Programa Candeal and having initially been placed in one's first choice of focus group (Table 3) bespeaks the importance of initial student interest and enthusiasm in shaping the Programa Candeal experience.

At a minimum, emergent themes from open response questions (Figure 5) bespoke a literacy and ease with the concept of multi professional teamwork that merits further exploration and vetting in subsequent estimation of the program, and likewise a nascent awareness of the tenets of patient-centered care, as evidenced through comments recognizing that the lived lives of community members differed widely from those of providers, and self-reports of making more space for humanized interactions in light of this new understanding. Respondents also comfortably articulated an enhanced appreciation for public health as a field simultaneous with expressing a deepened commitment to their chosen health specialties. Of note, these responses were to a question that did not prompt them to speak directly to any of these areas, and was optional.

A majority of respondents reported that their facility working with community members improved over the duration of their participation in Programa Candeal (Figure 3), and that their treatment of subsequent patients who fit medical or sociodemographic profile similar to those of the community members they interacted during Programa Candeal changed as a result (Figure 4). To the authors' knowledge, this data has not been reported in other evaluations of community-outreach interprofessional education initiatives and their impact on student adeptness interacting appropriately with individuals from communities and backgrounds distinct from their own, perhaps as a proxy of community member satisfaction with the program, and perhaps heralding future patient satisfaction. What has been researched and reported on in both the English-speaking and Lusophone world has been sizable bias by providers based on perceived social class of patients, impacting both patient trust of

healthcare providers - influencing whether patients choose to present for health care and what information they share - and healthcare provider care plans for patients. (Bohren et al., 2014; Brandão et al., 2019; Diniz et al., 2019; Magwood et al., 2019) Of note, design and implementation of an evaluation protocol gauging community member experience, satisfaction, and critique of the Programa Candeal experience fell outside of the scope of the present study.

It is of note that this entire study from instrument design, recruitment, participant consent, data collection, data storage, and analysis was carried out free of cost using a secure, open-source online platform REDCap. A university license was required to use this software, but no university computers, hard materials, workspace or paid personnel were needed to carry out the study. Study participants could fill out the survey using public workstations or their personal smart phones at any time they found convenient and not necessarily while on the university campus. The relative ease with which such survey instruments could be built and data captured on a secure platform without placing burden on university staff or study participants speaks to the feasibility of building a standing online evaluation tool, with existing open source infrastructure, to facilitate ongoing assessment of the efficacy of Programa Candeal, and particularly student response to programmatic changes guided by existing data, to be reviewed on an annual basis. This can be executed without undue financial burden or need for additional space or personnel in a setting that is already running at capacity with regard to fulfilling its educational mission.

Conclusion

Our data suggests that Programa Candeal is successful in encouraging health professional students to practice community engagement. Emergent themes from open response questions bespoke a literacy and ease with the concept of multi professional teamwork that merits

further exploration and vetting in subsequent estimation of the program. Programa Candeal also promotes humanistic interactions with community members in need.

The execution of this study without undue cost or consumption of university resources also demonstrates the feasibility of implementing an online standing evaluation platform in a low-resource environment as an integral step on the road to ensuring innovative, evidence-based and iterative programming for health professional students around the world that achieve desired results.

Declaration of Interests

Marcos Almeida Matos, Atson Carlos de Souza Fernandes, Lavinia Boaventura Silva Martins, Sidney Carlos de Jesus Santana and Amancio Jose de Souza hold faculty positions at the Bahiana School of Medicine and Public Health. In particular, Lavinia Boaventura Silva Martins is the coordinator for Programa Candeal, and Sidney Carlos de Jesus Santana oversees one of the Programa Candeal community focus groups.

No author in this paper received extra compensation or financial benefit for this research.

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Table 1. Participating Alumni and Demographic Data.

N = 83			
<i>Gender</i>	Male 19 (22.9%) Female 64 (77.1%) Other 0 (0.0%)	<i>Area of Study</i>	Medicine 49 (59.8%) Nursing 9 (11.0%) Biomedical research 7 (8.5%) Dentistry 7 (8.5%) Psychology 7 (8.5%) Physical therapy 3 (3.7%) Physical education 0 (0.0%) Did not disclose 1 (1.2%)
<i>Ethnicity</i>	Racially mixed 39 (47.6%) White 37 (45.1%) Black 5 (6.1%) Indigenous 1 (1.2%)		
<i>Self-perceived social class</i>	Upper class 8 (9.6%) Middle class 73 (88%) Lower class 1 (1.2%) Prefer not to respond 1 (1.2%)	<i>Community outreach or volunteer work prior to Programa Candeal?</i>	Yes 35 (42.2%) No 43 (51.8%) Don't remember 5 (6.0%)
<i>First in family to attend college?</i>	Yes 7 (8.4%) No 76 (91.6%)		
<i>First in Family to enter into health profession?</i>	Yes 24 (28.9%) No 59 (71.1%)		

Table 2. Open Response Answers by Gender; Medicine vs Non-medicine Specialty.

	+	-	Totals	
Female	21	11	32	
Male	6	6	12	
				p = 0.343132
Medicine	13	13	26	
Non-Medicine	14	4	18	
				p = 0.06828
Total +/-	27	17		

+ = Overall positive response to how Programa Candeal influenced participant's professional choices

- = Overall negative response to how Programa Candeal influenced participant's professional choices

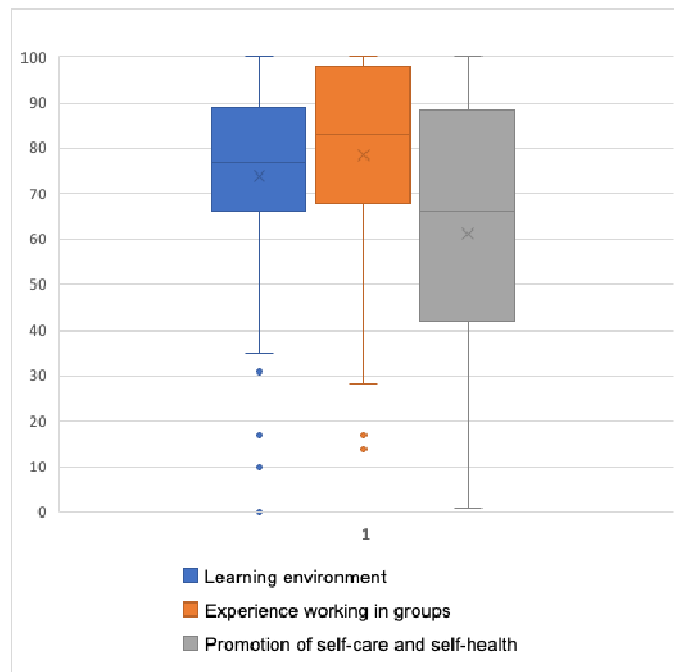
Table 3. Open Response Answers by whether assigned to Focus Group of Preference

	+	-	Totals	
First choice	17	2	19	
Not first choice	10	15	25	
			p = 0.000843	
Total +/-	27	17		

+ = Overall positive response to how Programa Candeal influenced participant's professional choices

- = Overall negative response to how Programa Candeal influenced participant's professional choices

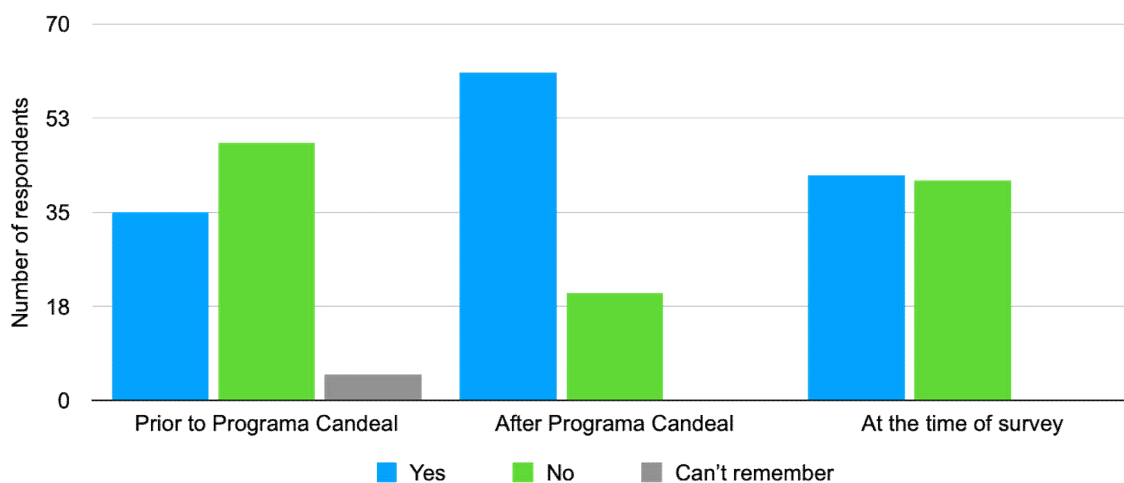
Figure 1. Participant Ratings of Program Facets.



	Percentiles			Mean	SD	SE
	0.25	Median 0.50	0.75			
Learning environment	66	77	88.5	73.82	23.26	2.82
Experience working in groups	78.42	21.72	69.5	83	97.5	2.37
Promotion of self-care and self-health	46	66	88	61.15	28.99	3.2

SD = standard deviation; SE = standard error

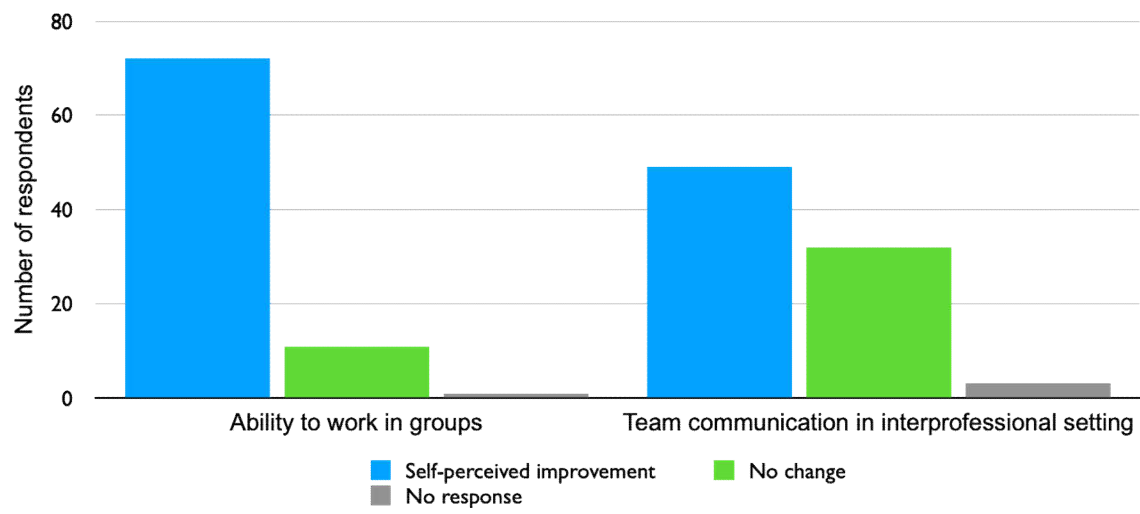
Figure 2. Health Professional Student Involvement in Community Outreach and Volunteer Initiatives before and after Participation in Programa Candeal.



	Yes	No	Can't remember
Community outreach involvement prior to Programa Candeal	35	48	5
Community outreach involvement after Programa Candeal	61	20	0
Active community outreach involvement at time of survey	42	41	0

A statistically significant increase was found in the number of respondents reporting subsequent engagement in community outreach and volunteer initiatives after participation in Programa Candeal, however not at the time of survey administration.

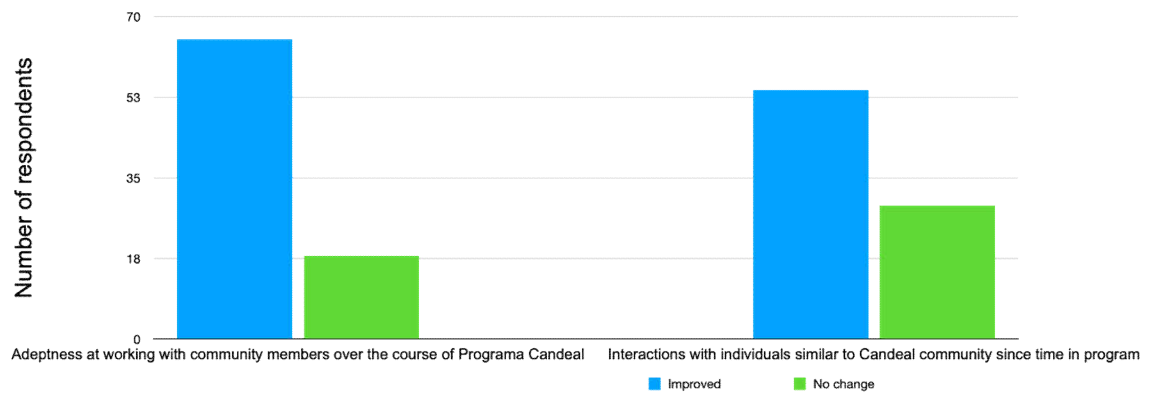
Figure 3. Self-Assessment of Teamwork in Interprofessional Setting.



	Self-perceived improvement	No change	No response
Ability to work in groups	72	11	1
Team communication in interprofessional setting	49	32	3

A majority of respondents appreciated an improvement in their capacity for working in groups, and additionally an improvement in their communication skills in an interprofessional setting.

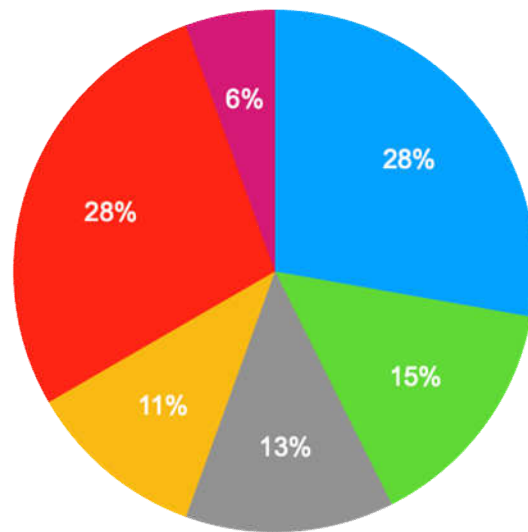
Figure 4. Interactions with Community Members of Different Socioeconomic Status.



	Improved	No change
Adeptness at working with community members over the course of Programa Candeal	65	18
Interactions with individuals similar to Candeal community since time in program	54	29

A majority of respondents felt that over the course of their Programa Candeal experience their interactions with community members became more easeful and appropriate. Interestingly, a majority of respondents also felt that their Programa Candeal experience resulted in them approaching their interactions with community members differently when subsequently encountering them in a clinical setting.

Figure 5. Emergent Themes from Participant Experience.



- Humanism when working with low SES patients
- Broadening of professional interests
- Facility working in inter professional groups
- Increased sense of personal obligation and accountability as health professional
- No influence
- Complaint

Themes from open response questions

	Humanism when working with low SES patients	Broadening of professional interests	Facility working in inter professional groups	Increased sense of personal obligation and accountability as health professional	No influence	Complaint
Responses	15	8	7	6	15	3

Open responses to the question, “In what ways do you believe [Programa Candeal] has influenced your professional choices?” touched upon themes of increased ownership and accountability in professional responsibility toward patients, increased humanism, and improved facility in interprofessional groups. A minority of respondents (27.7%) felt that Programa Candeal left no impact on the subsequent professional journeys.

ATTACHMENT**Attachment A - Proof of Article Submission**

From: IJIC-peerreview@journals.tandf.co.uk <IJIC-peerreview@journals.tandf.co.uk>
Sent: Tuesday, August 10, 2021 9:00 PM
To: Merriman, Joely
Subject: [EXT] Submission received for Journal of Interprofessional Care (Submission ID: 216605054)



Dear Joely Merriman,

Thank you for your submission.

Submission ID	216605054
Manuscript Title	Enhancing Interprofessional Team Building, Community Engagement and Humanistic Interactions in Health Education: the Programa Candeal Experience
Journal	Journal of Interprofessional Care

You can check the progress of your submission, and make any requested revisions, on the [Author Portal](#).

Thank you for submitting your work to our journal.
If you have any queries, please get in touch with IJIC-
peerreview@journals.tandf.co.uk.

Kind Regards,
Journal of Interprofessional Care Editorial Office