

# Physician and Educator Co-design of a Canadian School-Based Health Centre Referral Form: a Quality Improvement Study

Kristen Dietrich<sup>1</sup>, MD;  Sloane Freeman<sup>2</sup>, MD, MSc, FRCPC; Justine Cohen-Silver<sup>2</sup>, MD, MSc, FRCPC, MPH 

<sup>1</sup>Temerty School of Medicine, University of Toronto, Toronto, Canada

<sup>2</sup>Department of Paediatric Medicine, University of Toronto, Toronto, Canada

\*Corresponding author: Justine Cohen-Silver, MD, MSc, FRCPC, MPH; Department of Paediatrics, 3<sup>rd</sup> floor, Our Lady of Mercy Wing, Saint Joseph's Health Centre, 30 The Queensway, M6R 1B5, Toronto, Ontario, Canada. Tel: +1 416 5306625; Fax: +1 416 5306924; Email: Justine.cohen-silver@unityhealth.to

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## Abstract

**Background:** A school-based health centre (SBHC) in Toronto, Canada, supports students with academic, developmental, and behaviour-related challenges. The educators in this centre complete a referral form to provide information to the SBHC. The present study aimed to a) collaborate with the educators to co-design the existing SBHC referral form and b) provide the educators with a resource on a common pediatric disorder.

**Methods:** The current quality improvement study was performed using a Plan-Do-Study-Act (PDSA) cycle. Data was collected from November 2020 to January 2021. Twenty-three educators rated their understanding of the original SBHC referral form using a 6-point Likert scale. The symptom descriptors flagged by >10% of the educators as unclear were updated and re-evaluated through a second survey. The educators voted on a common medical issue for which a pamphlet was created and evaluated for its effectiveness. Statistical analysis was performed using GraphPad Prism. Paired data were assessed by Wilcoxon rank-order test, unpaired data with Fischer's exact, and proportions via Chi-squared test.

**Results:** The original referral form had 13/48 (27%) presenting symptoms identified for revision. After this revision, significantly fewer presenting symptoms met the criteria for revision (3/50, 6%;  $P < 0.01$ ). Most educators (10/23, 43%) requested an educational pamphlet on childhood anxiety. The majority of them (13/16, 81%) strongly agreed that they knew more about childhood anxiety after reviewing the resource and all of them (16/16, 100%) thought the resource would be helpful and could be shared with parents.

**Conclusion:** Collaboration with the educators to co-design a SBHC referral form clarified its descriptors, enhancing the communication between the two parties in the referral process. Physician-created educational resource enhanced the educators' knowledge about anxiety.

**Keywords:** School-based clinics, Program planning, School health services, Research, Form design, Quality improvement

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## 1. Introduction

School-based health centres (SBHC)s are an important model of healthcare delivery in Canada and the United States, particularly for children facing negative social determinants of health, such as low socio-economic status, recent immigration status, and those with parents without postsecondary education (1). The SBHC model allows educators to refer students with developmental, behavioural, and academic concerns to physicians directly within the school system with parental consent. This model alleviates the barriers to accessing healthcare for families with socioeconomic challenges as clinics are accessible within schools. This model also enhances communication between educators and the medical team, improving advocacy and sharing of information. Studies have shown that the SBHC

model results in fewer emergency room visits and earlier diagnosis of chronic illnesses, such as asthma, as well as neurodevelopmental conditions, including Attention Deficit Hyperactivity Disorder (ADHD) and Autism Spectrum Disorder (ASD), mental health disorders, and learning disabilities (2-5). Schools that have implemented SBHCs also demonstrated an improved academic performance (6).

Literature suggested that stakeholders should optimize collaboration and communication between educators and healthcare providers in order to improve patient care within SBHCs (4, 7). A quality improvement study by Stephan and colleagues demonstrated an increase in mental health referrals to SBHCs after psychologists and SBHC physicians collaborated to create individual

team objectives around mental health referrals within their own SBHCs. One potential way to improve physician-educator communication is to re-evaluate and co-design the SBHC referral form to ensure that the current presenting symptoms listed on the referral form are clear, relevant, and reflect educator' concerns about students. While referral forms are a vital tool for physicians to triage concerns, most referral forms are independently created by physicians; to date there have been no studies that include educators for assessing the clarity and content of SBHC referral forms (8).

Another strategy for collaboration is for SBHC practitioners to enhance educators' confidence in recognizing medical and developmental issues present in the classroom by providing educational resources on such topics. Given the fact that children spend over 30 hours a week at school, teachers are in an optimal position for recognizing certain issues, such as attention difficulties, language delays, and behaviour-associated concerns (9). Educators, however, reported receiving minimal formal training on identifying and managing pediatric neurodevelopmental and mental health disorders (10-12). Barned and colleagues demonstrated that most teachers, within 1 year of graduating from Teacher's College, incorrectly attributed ASD as a disorder of childhood, which children outgrow through adulthood (13). The participants also had difficulty identifying social, language-related, and sensory impairments as being cardinal features of ASD. While educators reported that their knowledge of pediatric disorders improves with job experience, studies indicated that most educators are interested in receiving further training on ADHD, ASD, and mental health (13-15).

Overall, the present study aimed to enhance the communication between educators and clinicians at a SBHC in Toronto, Canada, through a) collaborating with educators to co-design the existing SBHC referral form and b) creating an educational resource for educators on a common pediatric disorder.

## 2. Methods

### 2.1. Participants

In total, 23 educators participated in this study, including classroom teachers, special education teachers, and administrators, such as principals

and vice principals. All the participants are currently working or have previously worked in an elementary school in Canada (from kindergarten to Grade 8). They included both educators working within the SBHC as well as those outside the SBHC to increase the study's power. The educators within the SBHC were contacted to participate in the study by the vice-principal. Those outside the SBHC were contacted by the study leads as convenience sample, who provided consent to participate.

To meet the ethical standards, all the participants voluntarily participated in the study and their personal data were anonymized. The Research Ethics Board at Unity Health Toronto reviewed the nature of this quality improvement study and determined that it was exempt from Research Ethics approval based on the study design and research questions.

### 2.2. Study Design

As a quality improvement (QI) study, the Plan-Do-Study-Act (PDSA) cycle was implemented. In the "Plan" phase, the objectives were set to a) collaborate with educators to co-design the existing SBHC referral form and b) create an educational resource for educators on a common pediatric disorder.

In the first cycle of "Do" phase, the participants were contacted by e-mail outlining the intent of the study. It included the original SBHC referral form (Figure 1A), which the SBHC medical lead adapted from the hospital pediatric consult clinic referral form, as well as an initial questionnaire for the participants to complete. The first questionnaire comprised three sections. First, there is a demographics section, which collected information regarding the participants' detailed position as an educator (teacher, special-education, or administrative role (principal/vice principal)), the grade taught (from kindergarten to Grade 8), number of years working within the school sector, and the school board association (Table 1).

In the second section, the participants evaluated the original SBHC referral form. Herein, they rated approximately how many presenting symptoms they understood for each section of the referral form (social/communication skills, proprioceptive skills, behavioural and emotional presentation, and academic skills) utilizing a six-point Likert scale



**Figure 1:** The figure shows A) original and B) co-designed referral form for SBHC in Toronto, Canada. \*Indicates symptom descriptions that met criteria for revisions. Underlined text in 1B indicates revisions made with educator feedback.

**Table 1:** Demographic Summary of study participants

		Survey 1 n (%)	Survey 2 n (%)	P value
n		23	16	
Type of educator (%)	Teacher	17 (73.9)	12 (75.0)	0.98
	Principal/Vice Principal	2 (8.7)	2 (12.5)	0.73
	Special education teacher	4 (17.4)	2 (12.5)	0.62
Grade Taught (%)	JK/SK	5 (29.4)	4 (25)	0.84
	Grade 1-3	4 (17.4)	3 (18.6)	0.63
	Grade 4-6	3 (13.0)	2 (12.5)	0.86
	Grade 7-8	5 (29.4)	3 (18.6)	0.66
Number of years in Education (%)	0-10	11 (36.7)	7 (43.8)	0.55
	11-20	2 (8.7)	1 (6.3)	0.78
	21-30	5 (21.7)	3 (18.8)	0.88
	30 +	5 (21.7)	5 (31.3)	0.63
School Board Association (%)	Public	14 (65.2)	9 (43.8)	0.62
	Catholic	2 (8.7)	2 (12.5)	0.71
	Private	3 (13)	1 (6.3)	0.42
	Montessori	4 (17.4)	4 (25.0)	0.44

(0=0% symptoms understood, 1=1-25%, 2=26-50%, 3=51-75%, 4=76-99%, and 5=100%). The educators then identified specific presenting symptoms that they felt were unclear. This section also included an open-ended question to allow the educators to provide suggestions in order to improve the clarity of wording on the referral form.

In the final section of the questionnaire, the educators selected a topic of interest for common paediatric disorders. Their choices included Autism Spectrum Disorder (ASD), Attention Deficit Hyperactivity Disorder (ADHD), Global Developmental Delay (GDD), anxiety, depression, child maltreatment, or others (with free text), as

well as selection of the educational resource format. The choices included a one-page pamphlet, short video, slideshow, poster, or an interactive game. All the questionnaire responses were collected and anonymized using Google Forms.

In the “Study/Act” phase of the initial QI cycle, the first questionnaire responses were reviewed by the primary author, a fourth-year medical student. The revisions were made with secondary input from a supervising school-clinic paediatrician. The symptoms that >10% of the educators identified as challenging to understand were revised using educators’ comments in the feedback sections. Their suggestions for symptom descriptions to be added or deleted were also considered in the revised referral form.

Additionally, based on the educators’ preferences, a one-page educational pamphlet was created on childhood anxiety.

After the revisions were made, a second cycle was initiated with the objective of assessing if the revisions made improved the clarity of the form. In the second “Do” phase, the co-designed referral form (Figure 1B), newly created educational resource (Figure 2), and the second questionnaire were emailed to the participants. The second questionnaire contained four sections. The first section again collected demographic information. In the second section, the educators assessed the updated form using the same six-point Likert scale rating and were again asked to identify the unclear symptom descriptions. Open-ended questions were provided at the end of each referral form section for further comments and suggestions in order to improve the form clarity. In the third section, the participants rated their overall comprehension of the co-designed form compared to the original form with a five-point Likert scale (1=much worse, 2=slightly worse, 3=the same, 4=slightly better, 5=a lot better). In the final section, they rated the functionality of the educational resource in

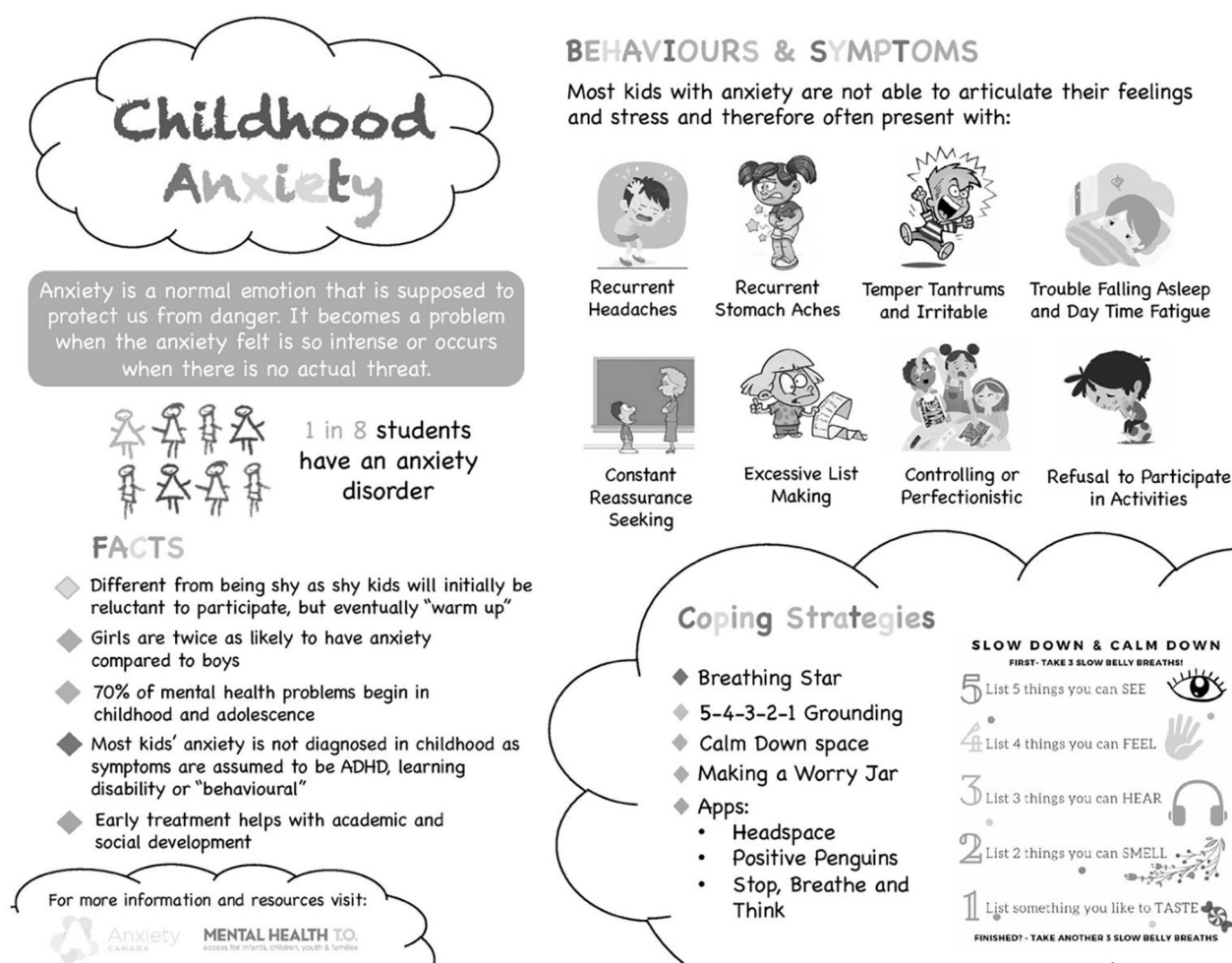


Figure 2: The figure shows grey-scaled copy of created one-page educational pamphlet on childhood anxiety.

terms of content quality and relevance to their class setting utilizing a five-point Likert scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree). The educators also rated their comfort level with the chosen topic before and after reading the pamphlet using a five-point Likert scale (1=extremely uncomfortable, 2=slightly uncomfortable, 3=neutral, 4=slightly comfortable, and 5=extremely comfortable).

In the “Study” phase of this second cycle, the data were analysed as detailed below. Following evaluation of the data, a second “Act” phase was conducted. In this phase, two senior pediatricians at the school clinic assessed the revisions and made final revisions to ensure the key presenting symptoms remained or were present on the form and to ensure it remained a clinically relevant tool. This included keeping “Weak Spelling” on the form.

### 2.3. Power Analysis

Power analysis was performed presuming an increase in the primary outcome of the overall referral form clarity by 5% on Likert score and standard deviation of 0.1. Power was set to 0.8 and a P value of 0.05 was the level of significance. The total sample size required was 8.

### 2.4. Data Analysis

The obtained data were analysed using GraphPad Prism (version 9.0; GraftPad Software, Inc, La Jolla, CA) for statistical measures. The number of teaching years and Likert data were analysed using unpaired t-test with Welch’s correction for unequal variances if F-test reached the level of significance. Paired data, including individual Likert-scores assessing the original versus the revised referral form, were assessed with Wilcoxon rank-order test. Fischer’s exact test or Chi-Squared were used for comparing the remainder of the demographics data (the type of educator, grade taught, and school board association) and the proportion of teachers identifying the descriptors was found to be unclear in the original referral form versus the co-designed version. Simple linear regression analysis was utilized for assessing the correlation between the number of years they worked and the number of reported concerns in  $R^2$  as well as the associated P-values. Statistical significance was set at P value < 0.05.

## 3. Results

### 3.1. Demographics

Overall, 23 educators participated in this study (Table 1), the majority of whom were teachers (17/23, 74%). They had most frequently worked in kindergarten (5/17 29%), with about the same number of educators teaching the remaining grades. Most educators had worked in this field for over 20 years (10/23, 43%), and in the Public School Board (14/23, 65%). Among the original participants, the majority (16/23, 70%) completed both questionnaires. There were no significant demographic differences between the study participants that completed both questionnaires and those who only completed the first questionnaire ( $P > 0.05$ ; Table 1).

### 3.2. Referral Form Revisions

A total of 13 (13/48, 27%) presenting symptoms on the original referral form met the criteria for revision. The Academic Skills section had the most descriptors that met the criteria for revision (6/13, 55%). “Academically performs one grade level below peers” and “Academically performs two grade levels below peers” were suggested to be added to the Academic Skills section as this specific phrasing was identified terms educators used when creating an individualized education plan for students. It was also suggested in the comments that the Academic Skills section be divided into subsections, including “Language, Math, and Overall” as the participants described these subsections better aligned with the Ontario school curriculum and report cards. Therefore, the symptom descriptions were arranged in a recognizable format for the educators (Figure 1B). Additionally, examples were added in brackets, for example: (Weak inference skills (drawing conclusions)), and presenting symptoms identified as medical jargon were rephrased as per feedback, including “Maybe rephrase”, “I’m unsure what this means” and “Trying adding an example”. Weak Spelling was flagged by 5/23 (22%) participants as a descriptor that was difficult to quantify in terms of what would be considered ‘weak’. One educator suggested that Weak Spelling should be removed since it is not explicitly measured in the Ontario curriculum.

After the revisions, there was a significant

reduction in the number of descriptors that met the criteria for reassessment both overall (Figure 3A; 13/48, 27% vs. 3/50, 6%;  $P<0.01$ ) and in the Academic Skills section (6/11, 55% vs. 1/13, 8%;  $P=0.03$ ). For note, only one symptom description, which was revised after the first quality assessment cycle, met the criteria for further revision on the second quality assessment cycle. This symptom was “Weak Phonological Skills (speech difficult to understand)”.

The wording on academic performance was adjusted to “Academically performs two levels below the grade level” and “Academically performs one level below the grade level” (Figure 1B) based on a comment stating “Could consider quantifying academics by grade level. Two grade levels trigger me to think about IEP”.

### 3.3. Assessment of Referral Form Clarity

After the revisions were made, the educators’ Likert scores increased within all the five categories in terms of form clarity, excluding the Social Communication Skills section; however, none of these increases was significant ( $P>0.05$ ). Further, the overall mean Likert score of referral form clarity increased from  $4.5\pm 0.1$  to  $4.7\pm 0.1$  compared with the original vs. the co-designed referral forms. Nonetheless, this comparison did not reach statistical significance ( $P=0.19$ ). Statistically fewer participants flagged presenting symptoms as needing further revision comparing the original referral form to the co-designed version (Figure 3B; 19/23, 83% vs. 8/16, 50%;  $P=0.04$ ). After the revisions, the majority of the participants (15/16, 93%) rated the referral form as either a lot (10/16, 60%) or slightly easier (5/16, 33%) to understand.

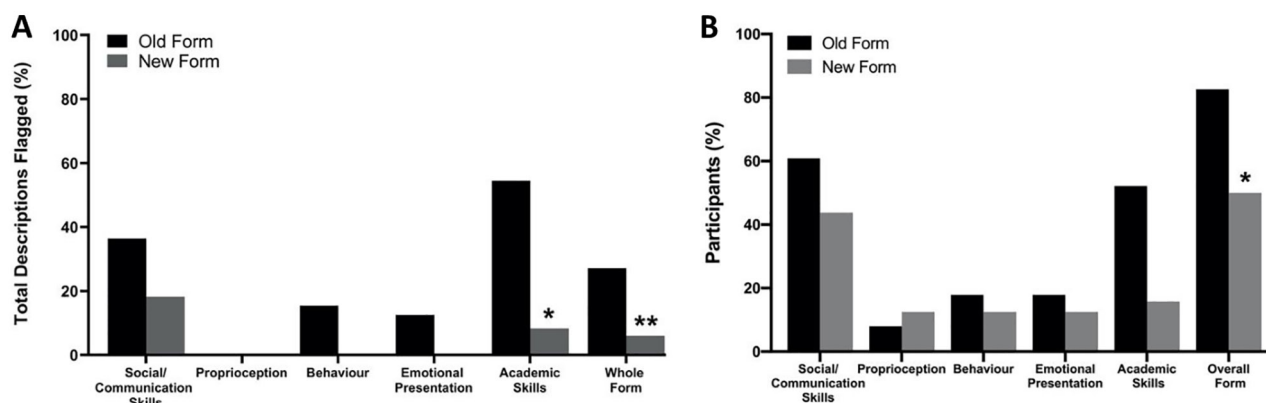
### 3.4. Regression Analysis of Years of Teaching and Form Comprehension

The number of years of teaching was not correlated with the average of comprehension Likert score of the original referral form ( $R^2=0.03$ ,  $P=0.44$ ) or the number of presenting symptoms they identified as difficult to understand on the original referral form ( $R^2<0.01$ ,  $P=0.73$ ).

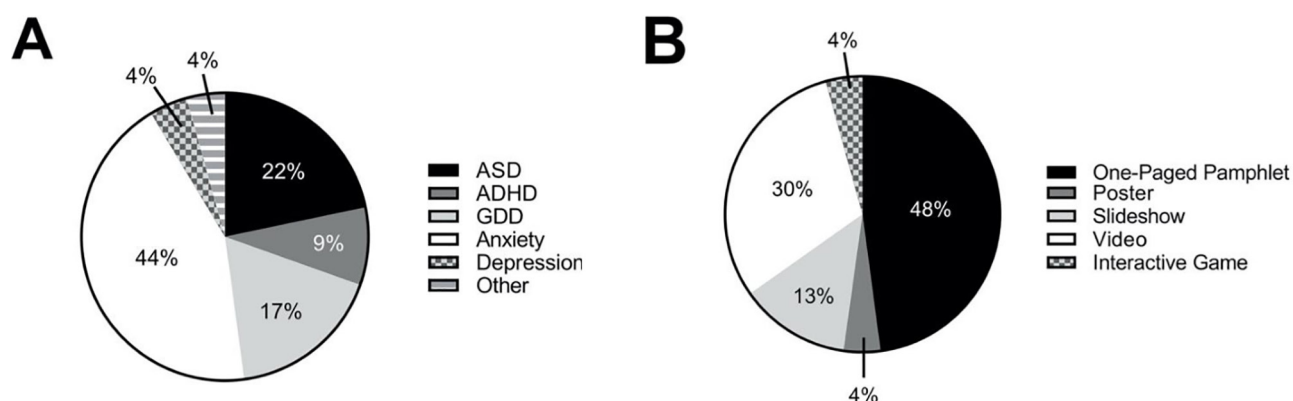
### 3.5. Educational Resource

Ten out of 23 educators (43%) voted for an educational resource on childhood anxiety (Figure 4A) in a one-page pamphlet format (11/23, 47%; Figure 4B). Beyond the topics proposed, one participant requested an educational resource focused on gender dysphoria (1/23, 4%). Based on these results, a one-page pamphlet was created focusing on childhood anxiety (Figure 2).

The educators felt more comfortable with identifying childhood anxiety in the classroom after reading the pamphlet with an average increase in the rate of Likert scale of  $0.5\pm 1.19$  and a trend towards the level of significance ( $P=0.06$ ). Overall, 13/16 (81%) of the educators strongly agreed that they knew more about childhood anxiety after the resource, 1/16 (6%) agreed, 2/16 (13%) were neutral, and none of the participants disagreed with the statement (0/16, 0%). Among the participants, 6/16 (38%) strongly agreed that the pamphlet information was relevant to what they saw in the classroom, 9/16 (56%) agreed, and one participant strongly disagreed (1/16, 6%). All of the educators felt, to a certain extent, that the pamphlet would be useful to share with parents when they voiced concerns about a student’s anxiety with parents (16/16, 100%).



**Figure 3:** The figure shows (A) proportion of symptom descriptions flagged as unclear in the original and revised referral form and (B) the proportion of participants who selected a symptom description as unclear before and after revisions were made. \*Indicates  $P$  value  $<0.05$ , and \*\*Indicates  $P$  value  $<0.01$ .



**Figure 4:** The figure shows (A) summary of educators' selection of educational topics including autism spectrum disorder (ASD), attention-deficit hyperactivity disorder (ADHD), global development delay (GDD), depression and other; and (B) selection of preferred format for the educational resource.

#### 4. Discussion

This is the first study to assess and co-design a school clinic referral form through the collaboration of physicians and educators. Herein, we demonstrated while school-based clinic intake forms solely designed by physicians can be easily used by educators, medical jargon and lack of examples could confuse educators who complete them. Regarding identifying specific sections that educators identify as confusing, the form can be optimized for the users. Additionally, physicians-created resources, such as the pediatric anxiety pamphlet made here, increased the educators' knowledge and comfortability with this pediatric disorder suggesting another strategy for physician-educator collaboration, optimizing the care children receive at SBHCs.

While the educators scored the original referral form as moderately easy to use and understand, some descriptors required clarification or rephrasing. By reducing the medical jargon, providing examples in brackets, and adding section subtitles, more educators understood the descriptors and significantly fewer descriptors met the criteria for revision. In collaborating with the educators, we were able to organize the descriptors and use the terminology specific to education when describing Academic Skills. It was unsurprising that educators helped suggest the most changes to the Academic Skills section of the referral form as they have extensive knowledge regarding what content should be included in this section. Conversely, they may have contributed less to the medical sections of the referral form as they would have less knowledge of these issues. Overall, a co-designed SBHC referral form may translate into

improved identification of symptoms of concern.

Even though some participants noted that Weak Spelling skills were difficult to quantify and one of them suggested omitting spelling as it is not explicitly a current curriculum expectation, the medical leads had previously found Weak Spelling to be a helpful indicator of academic difficulty. After the medical leads consulted with two special education experts, a decision was made to include the descriptor "Weak Spelling". Specifically, these experts felt that difficulty in spelling can indicate possible issues with phonological awareness and processing, as well as difficulty with visual-spatial awareness and memory, all of which are red flags for possible learning disabilities (16).

In our study, the number of years that an educator had worked in this field did not correlate with their overall understanding of the descriptors listed on the referral form. This was surprising as many studies have suggested that educators are better at recognizing problems warranting a pediatric assessment as they gain teaching experience (14, 17). This result may suggest that the recent improvement in education on neurocognitive pediatric disorders in college teachers may enable new graduates to more readily recognize the descriptor terminology used on the original referral form compared to educators with traditional training (18).

The majority of the educators requested an educational resource about childhood anxiety. This is similar to the research by Shelemy and colleagues who demonstrated that most educators wanted additional resources and training on students' mental health (19). Childhood mental

health issues are currently not taught explicitly in teachers' colleges despite evidence suggesting that poor mental health negatively impacts academic success (17, 20). After reading the newly created anxiety pamphlet, most educators felt more confident identifying childhood anxiety and the majority noted that the pamphlet would be a useful resource to show parents when advocating for students to seek professional assessment for anxiety. This is critical as early referral to a healthcare professional for childhood anxiety has been shown to contribute to earlier diagnosis, intervention, and long-term mental health benefit (21). Overall, our results suggested that physicians-made educational resources may aid educators' comfort level with identifying childhood anxiety in the classroom, and will hopefully translate to appropriate referrals to SBHCs.

#### 4.1. Limitations

Our study had a relatively small sample size and was based on one SBHC referral form; thus, the generalizability of the findings would not be possible. Additionally, some of our participants worked outside of the school system, who accessed the SBHC, and therefore represented a convenience sample. That said, the researchers felt there was value asking for the opinion of educators who had not yet seen this referral form as they would have an unbiased opinion. Finally, the validity and reliability of the tools were not formally assessed, but the collaborated clinical form was designed based on the existing clinical referral form in our paediatric department we adapted for the school clinic. The purpose of the form is to collect the relevant clinical information in order to complete an intake consult for a new patient.

Future studies can consider measuring the usability and overall validity of the co-designed SBHC referral form by educators within the school system the clinic serves and thereby complete the final act stage of the second PDSA cycle. It would also be pertinent to measure the change in the number of new clinic referrals and relevance of referrals after implementation of the co-designed form. Similarly, future studies should be considered to determine if the childhood anxiety pamphlet increases the appropriate referrals to the SBHC owing to enhanced educators' knowledge of anxiety symptoms present in the classroom.

## 5. Conclusions

This study described a quality improvement assessment of a SBHC referral form co-designed by SBHC physicians and educators. By reducing the medical jargon and providing specific examples of the descriptors, the educators increased the understanding of the referral form. An educational pamphlet about childhood anxiety was created, which boosted the educators' knowledge about childhood anxiety. Overall, this collaboration enabled enhanced communication between SBHC healthcare providers and educators, and ideally, will help identify more students who require the support of the SBHC.

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**Conflict of Interests:** None declared.

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