Abstract

Background: The assessment of Attention Deficit Hyperactivity Disorder (ADHD) requires the integration of many different sources of information. These sources of information are often subjective, so objective measures like the QbTest can be an asset to healthcare teams that diagnose ADHD. Method: The present study used a mixed-methods design to examine the impact of the introduction of the QbTest in Irish Child and Adolescent Mental Health Services (CAMHS). The main analysis consisted of three focus groups with clinicians (n = 19) working in CAMHS. A concurrent pilot was run that consisted of the administration of 50 questionnaires to CAMHS clinicians (n = 17), service users (n = 15) and their families (n = 18). Results: Thematic analysis of focus group transcripts highlighted that clinicians considered the QbTest a valued addition to ADHD assessment as it was efficient, objective and clear. Survey data suggested that clinicians, service users and their families found the QbTest helpful and acceptable. Conclusions: The findings indicated that participants in the present study (clinicians, service users, parents and guardians) all had positive reactions to their experience with the QbTest. Recommendations for future research are discussed.

Attention Deficit Hyperactivity Disorder (ADHD)

ADHD is a common neurodevelopmental disorder that affects 3–5% of children (National Institute for Health and Care Excellence [NICE], 2018, p. 26). ADHD is characterised by difficulties in three core symptom domains; hyperactivity, inattention, and impulsivity (NICE, p. 18). The assessment of ADHD relies on the synthesis of various sources of information as no single test exists that diagnoses the disorder (Bolea-Alamañac et al., 2014). These measures include the observation of the young person, the gathering of information from parents and teachers, and interviews for both the child and their parents (Reh et al., 2015). A common criticism of these sources is that they tend to be subjective and open to both clinician and informant bias (Edwards et al., 2007). Factors such as a time-consuming assessment process, inconsistencies between reports and the high co-occurrence with other disorders complicate the ADHD assessment process (Hall et al., 2016). The introduction of objective measures has the potential to make the ADHD assessment process more efficient and cost-effective (Gualtieri & Johnson, 2005). Continuous Performance Tests (CPTs) are objective measures that have been widely used to assess the three domains of ADHD through an individual's ability to pay attention over a set period of time (Hult, Kadesjö, Kadesjö, Gillberg, & Billstedt, 2018). Typically, a CPT involves stimuli that an individual is asked to respond to for a set period of time (Berger, Slobodin, & Cassuto, 2017).

The Quantitative Behavioural Test (QbTest)

The QbTest is an objective measure used in the assessment of ADHD. The QbTest (http://www.qbtech.com) is a CPT that measures both attention- impulse control and hyperactivity through a motion tracker (Qbtech, 2019). The assessment is 15–20 min and involves a participant responding to geometric shapes that appear on a screen through a hand held responder button (Qbtech, 2019). A camera located above the screen records the

participants' movement from a reflector that is attached to their forehead (Qbtech, 2019). When the assessment is finished, a summary report is created that provides information on the three symptom domains of ADHD and normative data for comparison. The QbTest is not considered a valid stand-alone measure of ADHD but should be seen as an additional piece of objective information that can be considered as part of an ADHD assessment process (Qbtech, 2018).The QbTest has good psychometric characteristics, with good test-retest scores and reported classification sensitivity ranging from 47% − 85% and a specificity ranging from 72% to 92% (Hult et al., 2018; Sharma & Singh, 2009; Ulberstad, 2012, unpublished data). The Qbtest correlated with clinical diagnosis in 90% of cases (Sharma & Singh, 2009) and has the ability to differentiate between children with and without ADHD (Hult et al., 2018; Oades, Myint, Dauvermann, Schimmelmann, & Schwarz, 2010).

Literature review

To the best of the author's knowledge, no research has been published on the implementation of the QbTest in an Irish healthcare setting. This gap in the research is notable, as the QbTest could be useful in supporting Irish Child and Adolescent Mental Health Services (CAMHS) in overcoming the specific challenges that they face. CAMHS service users in the Republic of Ireland experience delayed and restricted access to services (McGorry, Bates, & Birchwood, 2013). As of July 2018, 2621 children were on CAMHS waiting lists for treatment in Ireland (Barnardos, 2018). Waiting list times are high, with 29% of children in CHO4 (Cork and Kerry) waiting for longer than one year (Barnardos, 2018). While numerous factors are contributing to these long waiting lists, it is vital to investigate innovative ways to reduce pressure o CAMHS (Barnardos, 2018). New technologies have the potential to transform mental healthcare delivery (Davies, 2014) and the QbTest is an initiative that could help CAMHS overcome the current difficulties that they face (Magaharan, 2018).

Previous research from the U.K. has found that the introduction of the QbTest to the ADHD assessment pathway reduced the number of visits needed to reach a diagnosis, increased the speed and efficiency of ADHD assessment, led to significantly less clinician consultations, reduced total spending and costs, contributed to a faster diagnosis, and was of particular assistance for complicated cases with conflicting assessment measures (Hall et al., 2016). The QbTest also improved clinical decision making, increased diagnosis robustness and provided more evidence for treatments and interventions (Vogt & Shameli, 2011). A randomised-controlled trial (Hollis et al., 2018) found that adding the QbTest to the ADHD assessment process resulted in the provision of a more efficient health care service through improved diagnosis and a reduction in the appointments and consultations needed to reach a diagnosis. In the cases where a diagnosis of ADHD was not given, the QbTest assisted clinicians in excluding ADHD and moving service users on. The QbTest was also found to contribute to service cost-saving and increased clinicians' confidence in their decision making (Hollis et al., 2018). These findings from other countries indicate that the Qbtest may also have the potential to improve the efficiency of ADHD assessment in an Irish healthcare setting but it is hard to make inferences between countries due to unique demographic, geographic, economic and cultural factors.

Previous qualitative research has explored the experiences of CAMHS and community paediatric clinic healthcare professionals involved in using the QbTest as part of ADHD assessment in the U.K. (Hall et al., 2017). Clinicians strongly supported the integration of QbTest and considered it a feasible, acceptable, valid and objective assessment of ADHD symptoms. Other important points made by clinicians included how they felt the QbTest facilitated communication between clinicians, families and schools, how the QbTest was deemed to be most useful when completed early in the assessment process and how further streamlining and savings could be achieved through the introduction of

QbTest administration staff (Hall et al., 2017). The literature highlights the need for further research on the experiences of staff involved in the administration of the QbTest (Hall et al., 2017) as clinicians involved in delivering mental health care need to be active in both the development and evaluation of new technologies for implementation to be successful (Davies, 2014).

Young people seeking mental health support need accessible services that are specific to their needs (A Vision for Change, 2006, p. 85). To create accessible services, service users and their families should be given the opportunity to share their experience of services and developments so that they can influence service provision (A Vision for Change, 2006, p. 90), be active in the development and evaluation of new technologies (Davies, 2014) and provide feedback so that CAMHS is youth-friendly, accessible and acceptable to young people (McGorry et al., 2013). Moving forward, research therefore needs to investigate the experiences of frontline staff, service users, and their families to guide and inform the future of CAMHS in the Republic of Ireland.

Aims

The current study aimed to answer two research questions;

1. What are clinicians' (CAMHS healthcare professionals) experiences of using the Qbtest as part of an ADHD assessment process?

2. What is the experience of service users and their families who have used the QbTest as part of an ADHD assessment process?

Method

This multi-site mixed-methods study examined the impact of the introduction of the QbTest in Irish CAMHS. Three different HSE CAMHS teams in CH04 (North Cork, South Lee 1,

South Lee 2) were involved in the research. Ethical approval was granted by the University College Cork Clinical Psychology Research Ethics Committee (CPREC). Permission to conduct research was obtained in writing from a representative from each of the three teams (Appendix A). The present study consisted of two pieces of original research. The main piece of research was a qualitative thematic analysis of focus group data. In addition to this, the current study also piloted a quantitative survey. The survey pilot was included as it was felt that some quantitative data may further inform or add to qualitative findings. Additionally, running a pilot would provide information on the feasibility of the survey for future researchers looking to conduct research on the QbTest. Surveys were chosen as a method of data collection as they are an effective method of gathering a lot of data quickly (Jones, Baxter, & Khanduja, 2013) from the various QbTest stakeholders being examined in the current study. The survey also complimented the qualitative data as it addressed one of the inherent weaknesses of focus groups, which is compliance (Breen, 2006) and bias resulting from verbally dominant participants (Nyumba, Wilson, Derrick, & Mukherjee, 2018). By using anonymised surveys, the research team was able to address this limitation as participants were given an opportunity to share their views on the QbTest privately. Focus groups were chosen as one of their key features of highlighting participants' views and beliefs (Kitzinger, 1995) mapped onto the current studies aim of capturing clinicians' experiences of the QbTest. Additionally, focus groups add a level of depth and explanation to quantitative data like the surveys used as part of this research (Breen, 2006).

Quantitative Data

Surveys.

Participants.

Participants consisted of children/adolescents and their parents/guardians. Inclusion criteria for young people required them to have taken a QbTest as part of the ADHD assessment process in one of the three CAMHS teams involved in the study, with a questionnaire also being given to their parents/guardians. The child, adolescent and parent/guardian survey forms had slight variations in wording (Appendix B, C and D). CAMHS clinicians involved in using the QbTest as part of ADHD assessment were also given a questionnaire to complete (Appendix E). The questionnaire used in the present study was based on a template provided by QbTech that had previously been usedin research by Hall et al. (2017). Slight alterations were made to the survey, such as changing the word "patient" to "client". Two psychologists in the research team examined the questions and concluded that the survey did not contain any leading questions.

Procedure.

` As part of the ADHD assessment process, the administering clinician made the family aware of the current study. If the family was interested in knowing more on the study, they were provided with an information sheet and consent form (Appendix F and G) whereas young people were provided with a more accessible information sheet and assent form (Appendix H and I). Clinicians were sent the survey via email by their clinical lead, with an attached information sheet (Appendix J). Participants were given a debriefing form once they finished the survey (Appendix K and L).

Qualitative Data

Focus groups.

Participants.

Participants were clinicians working in CAMHS in the Health Service Executive (HSE) in the Republic of Ireland. Inclusion criteria for clinicians was that they were professionals working in one of the three CAMHS teams that had been selected for this research and that were involved in using the Qbtest as part of an ADHD assessment process. Three focus groups were run (n = 6, n = 6, n = 7). Professional disciplines at the focus groups included representatives from administration, nursing, occupational therapy, psychology, psychiatry, social work and speech and language therapy..

Procedure.

Participants were sent an email from their clinical lead inviting them to take part in a focus group and providing them with an information sheet and consent form (Appendix M and N). All focus groups were run by SP (Psychologist in Clinical Training) and recorded on an encrypted audio device. The focus groups were semi-structured to allow for flexibility in attending to individual participants responses (see Appendix O for focus group questions). All questions were posed to participants, but follow-up questions varied depending on the participant's responses. The questions were created with the aim of getting participants settled into the focus group, gathering information on different types of experiences that participants may have had with the QbTest, and to clarify the importance that participants gave to points that they had made. Each focus group lasted for approximately 30 min. Participants were provided with a debrief form once the focus group had finished (Appendix P). The qualitative comments from the clinician surveys were collated to the focus group transcripts. Audio recordings were transferred from the recording device to an encrypted laptop before analysis.

Analysis.

The recordings were transcribed by hand by SP and thematicallyanalysed following a six phase process (Braun & Clarke, 2006). Transcribing the recordings by hand allowed the lead researcher to begin to familiarise himself with the data. During this phase, ideas relating to possible themes were thought of and noted. Once the recordings had been transcribed, the focus group recordings were played again and the entire transcript was read aloud to ensure transcription accuracy. This process was completed three times to ensure complete data immersion. Initial codes were then generated from the transcript. At this phase, codes were purely descriptive, simply trying to capture and summarise the words of the speaker (see Appendix Q for initial codes). All data in the transcript was given equal attention with no quotes being coded in a way that suggested they were more important than other parts of the transcripts (regardless of emphasis, repetition or noted importance that speaker placed on their quote). The next phase involved searching for themes. The initial codes were read and re-read until similar codes that could be characterised under a common theme were observed and noted. These early ideas for themes were noted and codes related to that theme were searched for, collected and collated (Appendix R). If these candidate themes had many quotes supporting them then the theme was kept, whereas themes that did not occur repeatedly in the transcript were discarded. During this phase some themes that were closely related were merged to form larger themes. Themes were then reviewed, firstly to ensure that the quotes within them formed a coherent pattern, and secondly to check that the themes actually captured what was being conveyed in the transcripts, leading to the creation of the final themes (Appendix S). The final step involved coming up with theme names that captured the essence of the theme but in a punchy and concise way (Braun & Clarke, 2006). Quotes that best captured the theme in question were selected and presented. The final themes were examined reflexively, and the lead researcher considered how his experiences may have

contributed to factors within the research process. Final themes were reviewed by two psychologists in the research team to minimise bias.

Results

Quantitative data results

Surveys.

In total, 50 surveys were administered. 17 CAMHS healthcare professionals completed the surveys (see Table 1 or Appendix T for full response data). Percentages in all tables are rounded to the closest whole number. 15 young people (children and adolescents) completed the questionnaires (see Table 2 or Appendix U for full response data). An independent-samples t-test was conducted to check for differences between the scores of children and adolescents. There were no significant differences between the scores of children or adolescent respondents on any survey questions (Appendix V). 18 family members (parents or guardians) completed the service user surveys (see Table 3 or Appendix W for full response data).

Table 1. CAMHS clinicians survey responses (n = 17)

	Strongly Agree/ Disagree (%)	Neither agree/ disagree (%)	Strongly disagree/ disagree (%)
QbTest is easy for me to use	76	11	11
Helps to visualise and quantify symptoms	100	0	0
The QbTest report helps facilitate better communication with clients and families	94	6	0
The QbTest report enables me to inform clients and their families about their condition and treatment in a clear way	94	6	0
Is a great addition to other investigative techniques	100	0	0
QbTest is helpful in monitoring the effects of treatment	94	6	0

QbTest is helpful to standardise assessment and treatment	100	0	0

Table 2. Child/adolescent survey responses (n = 15)

	Strongly Agree/ Disagree (%)	Neither agree/ disagree (%)	Strongly disagree/ disagree (%)
The Qbtest results helped me understand my symptoms	87	13	0
The Qbtest results were difficult to understand	40	7	53
Overall the experience was helpful	93	7	0
When the clinician talked through the results with me, it helped me understand how they had reached their diagnosis	73	13	13
I found the task difficult to complete	27	7	67
I found the stool/chair very uncomfortable	39	15	46

Table 3. Parent/guardian survey responses (n = 18)

	Strongly Agree/ Disagree (%)	Neither agree/ disagree (%)	Strongly disagree/ disagree (%)
The Qbtest results helped me understand my child's symptoms	100	0	0
The Qbtest results were difficult to understand	28	6	67
Overall the experience was helpful	100	0	0
When the clinician talked through the results with me, it helped me understand how they had reached their diagnosis	100	0	0

Focus groups.

Two prominent themes emerged from the focus group data. The first theme captured how the QbTest was a welcome addition to ADHD assessment, and sub-themes consisted of the reasons as to why this was. The second theme delineated insights that CAMHS clinicians

had developed through their experience of using the QbTest, with sub-themes outlining challenges and considerations that could inform future service provision of the QbTest (see Table 4).

Theme 1: Welcome to the team.

Efficacy

CAMHS clinicians had a positive reaction to the implementation of the QbTest and a key reason for this was the increased efficacy of the ADHD assessment process "its timeliness, it is efficient, it is accurate and it confirms what we've been questioning." Improved efficiency was viewed as a support for clinicians "it's a more efficient way of assessing a person in the service, I think it helps clinicians who are already very busy to do it in an efficient, accurate way." Reference was made to the time and cost savings that the QbTest had created "so for clinical time, for efficiency, that's a huge saving, and you can see many other cases in that time". The impact of these savings was discussed in relation to clinicians, service users and the larger organisation. The QbTest was presented as having the potential to streamline CAMHS and improve it for future service users.

"…so on the ground level it's helping us with our picture of the child, but in the bigger picture of things, if we are dealing more efficiently and more correctly with each child, that's going to make the service more efficient and better for the next child coming in the door, so there's a bigger picture knock on effect happening with a tool like this…"

Table 5. Themes

Prominent themes	Sub-themes
Welcome to the team	Efficacy
	Subjectivity versus objectivity
	I can see clearly now

Onwards and upwards	We are currently experiencing technical difficulties Moving forward

Subjectivity versus objectivity

The old ADHD assessment process was compared to the new QbTest process, with flaws of the old system being highlighted. A considerable limitation of the old ADHD assessment process was its reliance on subjectivity "… these screening questionnaires that are so heavily open to bias". The objectivity of the QbTest was deemed to be a key feature contributing to its favourable reception by clinicians, as traditional ADHD assessments were perceived to be more subjective and subsequently less reliable.

"It's quite a good tool, in that it's so objective, in terms of the results are very objective, they're not really influenced by, you know, any other kind of - some of the other tools that we use would be very subjective in, in manner, and I think, that's what I really like about it - it's very objective".

Other advantages of the objectivity of the QbTest were that it allowed clinicians to externalise findings and that the standardisation of the QbTest prevented findings being discarded as opinions.

I can see clearly now.

The QbTest provided clarity to clinicians and improved communication and understanding between professionals, young people and their families. CAMHS professionals reported that the QbTest provided information that helped them to better understand a young person's subjective experience "It feels as if it brings another layer into knowing some of the

children". The detailed reports from the QbTest helped clinicians with diagnosis, differential diagnosis and medications, and offered additional information to consider in complex cases. Clinicians reported that observing a young person complete the QbTest yielded extremely valuable information. The insight from this observational piece appeared to supersede the value that a team would receive from a QbTest administrator. Clinicians noted that the QbTest gave them increased confidence in their decisions and overall clarity with regards to a young person's presenting difficulties. Clinicians also noted that the QbTest facilitated better communication between colleagues, improved team-working and helped clinicians spot difficulties that would have otherwise been missed. Clinicians valued how the QbTest increased the understanding of the young person, their families and their schools. The accessible and visual QbTest reports were cited as a major reason for this.

"I just thought it was really useful for me as a clinician, and also as a process for the young person and her mum to give them a framework of understanding, am, in a very accessible way, and I think that the feedback session it was very useful for them as well."

This experience of an increased understanding was shared by the parents and guardians of service users. Qualitative data provided by families through their survey responses sheets noted how the QbTest improved their own understanding, as well as how it provided clear information to give to schools "It was really helpful because we were able to feedback to the school and they could understand more where he is struggling."

Theme 2: Onwards and upwards.

We are currently experiencing technical difficulties.

We are currently experiencing technical difficulties. The introduction of the QbTest to CAMHS brought forth some technical challenges that the teams had to overcome. The

technological aspects of the QbTest were a concern for CAMHS professionals as they noted that this is an area that they did not have much expertise in "The technology for me as well, I can find that a bit intimidating". Specific technical issues included managing environmental factors affecting the QbTest, QbTest reports disappearing, connectivity problems and physical components of the QbTest breaking. Clinicians offered potential solutions to overcoming technical problems that differed between teams and individuals. One example of this was the suggestion to hire an administrator to handle the technical aspects of the QbTest "Am, I think going forward, it would be great to – if we could have an administrator just to administer the QBs" whereas other clinicians felt that they would lose out a valuable observational piece "but you have to take all the bits and by that I mean really the observation – what you see in the room, what you are observing is as important as how the child does in the test."

Moving forward.

Clinicians offered insights gained through experience of using the QbTest that would be useful to consider if the QbTest was to be used in future. Clinicians requested more access to the QbTest, continued supervision and information on service user experiences of the QbTest. Limited access to the QbTest caused frustration, and contributed to nervousness regarding technical difficulties "…and so for me it's just been about trying to get into and trying to practice it so I can just get more comfortable with it". Clinicians acknowledged their inexperience with regards to the interpretation of the QbTest, and noted the value in having continued supervision and learning.

"I think that supervision is a really key piece at this stage, in terms of being able to interpret the information accurately. I think that our skills are still developing, am, and that that, for me has been really interesting in terms of everytime that I had supervision I learned

something completely new and huge and actually another insight into how, how helpful the test can be."

A concern was ensuring that the QbTest is acceptable to young people. Clinicians were curious as to whether CAMHS service users and their families understood how the QbTest works, and what their experience of it was "…what's that [The QbTest] like for the young person and the parents, so from our perspective and theirs, you know, what's their perspective, so it's good for us, but is it good for them? and what's the experience like?"

Confounding factors that may be affecting the QbTest were highlighted and discussed. Clinicians queried the role of a young person's current mental and physical status, time of day effects and the impact of traveling on QbTest results. Other considerations included the acknowledgement that the QbTest is not a standalone test as it requires additional information, and that it would be useful to establish where the QbTest falls on the ADHD assessment process pathway.

Discussion

The current study had two research questions to investigate, the experiences of staff and service users in relation to the QbTest.

Clinicians

Irish healthcare workers in the current study embraced the integration of the QbTest into the ADHD assessment process. The findings of the thematic analysis indicated that clinicians are very much in favour of keeping the QbTest as part of ADHD assessment. CAMHS clinicians viewed the QbTest as a more efficient and objective tool that brought increased clarity to their work. Clinicians noted that the QbTest brought benefits to service users, themselves, their team and the larger organisation. CAMHS workers listed barriers and

considerations for future use of the QbTest, which suggests that clinicians seem eager to overcome difficulties as they are worth the benefits that the QbTest provides.

Data from the current study was in keeping with previous qualitative research on the experiences of healthcare professionals (Hall et al., 2017). Common themes included the advantages of the QbTest over the old ADHD assessment process (increased understanding, objectivity and communication), barriers and facilitators to the effective use of the QbTest and the placement of the QbTest on the ADHD pathway. This is noteworthy, as it indicates that past research on the QbTest conducted in the U.K. seems to generalise to the healthcare organisations of different countries.

Survey data gained from clinicians provided support to the findings of the thematic analysis. Survey responses mapped onto specific themes, such as 94% of clinicians agreeing to some degree with the question “The QbTest report helps facilitate better communication with clients and families” and the sub-theme “I can see clearly now”. The anonymised questionnaires tallied with the thematic analysis findings and this would indicate that the content of the focus groups reflected the views of the majority of the participants.

While the objectivity of the QbTest was heralded as one of its most useful features of the QbTest by clinicians, some clinicians felt that observing a young person completing the QbTest also provided them with valuable subjective information. This subjective information differs from older, more biased ADHD assessments as the observational data is simply an additional piece of information that does not affect the outcome of the objective data. Getting to observe young people completing the QbTest also allowed professionals to implement and use their clinical knowledge and expertise.

Family

There was no significant difference between the survey responses of children or adolescents. This indicates that the QbTest is being experienced in a similar way by young people of various ages. Survey data from young people suggested that they are finding the QbTest experience helpful and that it supports them to better understand their symptoms. A relatively high number of respondents noted that they found the QbTest results difficult to understand (40% agreed to some degree) but this appeared to be offset by having a CAMHS clinician present to discuss QbTest results (73% agreed to some degree that having the clinician talk through the results helped them to understand the QbTest findings). Multiple respondents actually drew lines between these two questions on the survey sheets to highlight the link the clinician explaining results offsetting difficulties understanding results.

There was mixed survey responses from young people on the topic of QbTest difficulty and how they experienced the physical environment during testing. Almost 30% of child and adolescent respondents agreed to some degree that the task was difficult and almost 40% agreed to some degree that the stool or chair was uncomfortable. Future studies could investigate this area further and explore the characteristics of young people who are finding the QbTest difficult. It is possible that young people with ADHD are finding the QbTest more difficult as a result of their presenting difficulties.

Parent and guardian survey data heavily supported clinicians' opinion that the QbTest increases understanding for families. As outlined by clinicians in the "I can see clearly now" sub-theme, service users parents and guardians also reported increased clarity regarding their child's symptoms and diagnosis (100% agreeing to some degree on both of these survey questions). Similar to the data gained from the children and adolescents survey, a notable percentage of families found the QbTest results confusing (28% agreed to some degree). This further reinforces the need for clinicians to ensure that QbTest results are properly explained to young people and their families.

Conclusions

The qualitative findings of the present study add context for the quantitative results, and give an indication as to why CAMHS professionals found the QbTest helpful. Now that the survey has been piloted, a large-scale survey could be conducted from which more meaningful conclusions could be drawn. At present, the findings from the current survey suggest that clinicians, young people and their families seem to find the QbTest acceptable and helpful. A logical next step for future research would be to conduct an audit to examine if the QbTest is impacting on measures of efficacy and efficiency in an Irish CAMHS setting.

Limitations of the current study are that the survey was only a pilot and a relatively small number of responses were collected. Another limitation is that the research was completed soon after the introduction of the QbTest in CAMHS. Perhaps if teams had more time to familiarise themselves with the QbTest the findings may have been different. The experiences of service users and their families could also be investigated qualitatively to add another perspective to that of the clinicians. To conclude, there is a need to investigate novel ways of making CAMHS more accessible, youth-friendly and acceptable and the present study indicated that there is considerable buy-in from professionals and service users. The QbTest was perceived as useful and feasible to clinicians, young people and their families but further research on the QbTest in an Irish setting is required to support the rolling out of the QbTest nationally.

Acknowledgements

We would like to thank all the members of the QbTest steering group committee for their help in completing this research. We also thank all participants for their time.

Appendix

Supplementary material Supplementary data to this article can be found online at https:// doi.org/10.1016/j.childyouth.2020.105032.

References

A Vision for Change. (2006). Report of the expert group mental health policy Dublin: Department of Health and Children.

Barnardos (2018). Winter Waiting List Report. November 2018. Retrieved at https://www.barnardos.ie/media/2798/barnardos-2018winter-waiting-list-report.pdf.

Berger, I., Slobodin, O., & Cassuto, H. (2017). Usefulness and validity of continuous performance tests in the diagnosis of attention-deficit hyperactivity disorder children. Archives of Clinical Neuropsychology, 32(1), 81–93. https://doi.org/10.1093/arclin/acw101.

Bolea-Alamañac, B., Nutt, D., Adamou, M., Asherson, P., Bazire, S., Coghill, D., ... Young, S. (2014). Evidence-based guidelines for the pharmacological management of attention deficit hyperactivity disorder: Update on recommendations from the British Association for Psychopharmacology. Journal of Psychopharmacology, 28(3),179 203.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101 ISSN 1478–0887.

Breen, R. (2006). A practical guide to focus-group research. Journal Of Geography In Higher Education, 30(3), 463–475. https://doi.org/10.1080/03098260600927575.

Davies, S. C. (2014). Annual report of the chief medical officer 2013, Public mental health priorities: Investing in the evidence. London: Department of Health.

Edwards, M., Gardner, E., Chelonis, J., Schulz, E., Flake, R., & Diaz, P. (2007). Estimates of the validity and utility of the conners' Continuous performance test in the assessment of inattentive and/or hyperactive-impulsive behaviors in children. Journal Of Abnormal Child Psychology, 35(3), 393–404. https://doi.org/10.1007/s10802-007-9098-3.

Gualtieri, C. T., & Johnson, L. G. (2005). ADHD: Is objective diagnosis possible?. Psychiatry (Edgmont (Pa. : Township)), 2(11), 44–53.

Hall, C., Selby, K., Guo, B., Valentine, A., Walker, G. and Hollis, C. (2016). Innovations in Practice: an objective measure of attention, impulsivity and activity reduces time to confirm attention deficit/hyperactivity disorder diagnosis in children - a completed audit cycle. Child and Adolescent Mental Health, 21(3), pp.175-178.

Hall, C., Valentine, A., Walker, G., Ball, H., Cogger, H., Daley, D., ... Hollis, C. (2017). Study of user experience of an objective test (QbTest) to aid ADHD assessment and medication management: A multi-methods approach. BMC Psychiatry, 17(1).

Hollis, C., Hall, C., Guo, B., James, M., Boadu, J., Groom, M., ... Williams, A. (2018). The impact of a computerised test of attention and activity (QbTest) on diagnostic decision- making in children and young people with suspected attention deficit hyperactivity disorder: Single-blind randomised controlled trial. Journal of Child Psychology and Psychiatry, 59(12), 1298–1308.

Hult, N., Kadesjö, J., Kadesjö, B., Gillberg, C., & Billstedt, E. (2018). ADHD and the QbTest: Diagnostic validity of QbTest. Journal of Attention Disorders, 22(11), 1074–1080.

Jones, T., Baxter, M., & Khanduja, V. (2013). A quick guide to survey research. The Annals Of The Royal College Of Surgeons Of England, 95(1), 5–7. https://doi.org/10.1308/003588413x13511609956372.

Kitzinger, J. (1995). Qualitative Research: Introducing focus groups. BMJ, 311(7000), 299–302. https://doi.org/10.1136/bmj.311.7000.299.

Magaharan, S. (2018). OPENING STATEMENT Joint Committee on Future of Mental Health. In https://www.oireachtas.ie/en/debates/debate/joint_committee_on_future_of_mental_health_care/2018-04-18/3/. Retrieved from https://data.oireachtas.ie/ie/

oireachtas/committee/dail/32/joint_committee_on_future_of_mental_health_care/submissions/2018/2018-04-18_opening-statement-sonia-magaharan-clinical-nursespecialist_en.pdf.

McGorry, P., Bates, T., & Birchwood, M. (2013). Designing youth mental health services for the 21st century: Examples from Australia, Ireland and the UK. British Journal of Psychiatry, 202(s54), s30–s35. https://doi.org/10.1192/bjp.bp.112.119214.

National Institute for Health and Care Excellence. (2018). Attention deficit hyperactivity disorder: diagnosis and management. In https://www.nice.org.uk/guidance/ng87/resources/attention-deficit-hyperactivity-disorder-diagnosis-and-management-pdf-1837699732933. NICE guideline [NG87].

Nyumba, T., Wilson, K., Derrick, C., & Mukherjee, N. (2018). The use of focus group discussion methodology: Insights from two decades of application in conservation. Methods In Ecology And Evolution, 9(1), 20–32. https://doi.org/10.1111/2041-210x.12860.

Oades, R., Myint, A., Dauvermann, M., Schimmelmann, B. and Schwarz, M. (2010). Attention-deficit hyperactivity disorder (ADHD) and glial integrity: an exploration of associations of cytokines and kynurenine metabolites with symptoms and attention. Behavioral and Brain Functions, 6(1), p.32.

Qbtech. (2018). Clinical Documentation for QbTest and QbCheck. Retrieved from https://cdn2.hubspot.net/hubfs/2173087/docs/clinical%20documentation/Clinical%20Documention%20QbTest%20QbCheck%20-%20EN.pdf.

Qbtech. (2019). Qbtest Frequency Asked Questions. In https://www.qbtech.com/adhdtests. Retrieved from https://cdn2.hubspot.net/hubfs/2173087/docs/faqs/QbTest%20FAQ.pdf.

Reh, V., Schmidt, M., Lam, L., Schimmelmann, B. G., Hebebrand, J., Rief, W., &

Christiansen, H. (2015). Behavioral assessment of core ADHD symptoms using the QbTest. Journal of Attention Disorders, 19(12), 1034–1045. https://doi.org/10.1177/1087054712472981.

Sharma, A., & Singh, B. (2009). Evaluation of the role of Qb testing in attention deficit hyperactivity disorder. Archives of Disease in Childhood, 94(Suppl. 1), A72.

Ulberstad, F. (2012). Discriminant validity for the Quantified Behavioral Test (QbTest) in children.

Vogt, C., & Shameli, A. (2011). Assessments for attention-deficit hyperactivity disorder: Use of objective measurements. The Psychiatrist, 35(10), 380–383.