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ORIGINAL ARTICLE

Real gains: development of a tool to measure outcomes for urban First Australian children accessing culturally responsive interprofessional therapy

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ABSTRACT

Healthcare services are accountable to their clients, communities, governments and funding sources to clearly demonstrate the effectiveness of interventions. A First Australian children's therapy service delivering culturally responsive, interprofessional collaborative practice aimed to evaluate their service. However, this process was constrained by available outcome measures which lacked the flexibility necessary for meaningful use within the dynamic and relational nature of their service delivery. This paper outlines an action research process in three cycles which was used to develop the Australian Therapies Outcome Measure for Indigenous Clients (ATOMIC) with the aim of evaluating therapy outcomes for urban First Australian children engaged in culturally responsive interprofessional therapy. Interrater reliability values of 0.995 and 0.982 were established for ATOMIC pre- and post-therapy measures, respectively, during a pilot phase involving 16 participants. Participants in the main study were 80 First Australian children aged two to 16 years who attended between two and nine interprofessional therapy sessions with occupational therapists and speech pathologists. Pre- and post-therapy ATOMIC scores confirmed progress on pre-determined functional goals across a range of skill domains. Outcomes of this study demonstrated that real gains are being made in urban First Australian children's lives following interprofessional collaborative service provision.

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Introduction

In pediatric settings, interprofessional collaboration is increasingly seen as "best practice" to address the individual requirements of children who have multiple needs across many areas of performance, including children from vulnerable populations (Benson et al., 2002; Boyer & Thompson, 2013; Bridges et al., 2011; Neumayer, 2013). In First Australian contexts, interprofessional services which work collaboratively with individuals, families and communities are seen as a culturally responsive means of improving health and education outcomes (Neumayer, 2013; Reeves et al., 2013). Health professionals need to provide services in ways that acknowledge the context of First Australian families and their community, utilize strengths-based approaches and involve families in a manner that supports their engagement in the service. Effective and culturally responsive healthcare needs to align with First Australian worldviews and be established upon First Australian concepts of health (Australian Health and Medical Research Council, 2015; Nelson & Allison, 2007; Thomas et al., 2015). However, to date there is limited research on the implementation and outcomes of interprofessional collaborative service delivery for clients in First Australian contexts.

Evaluation of interprofessional collaborative services requires sensitive, functionally meaningful and culturally responsive assessment tools that can be used across disciplines. In First Australian contexts, the principles that underpin culturally responsive practice must be reflected in the evaluation of therapy outcomes and evidenced in outcome measures (Dockett et al., 2010; Nelson et al., 2017; Neumayer, 2013). For instance, measurement of therapy outcomes should reflect collaboration with First Australian families throughout the therapy process (Gould, 2008; Lewis et al., 2017).

Goal achievement is increasingly seen as an appropriate outcome measure in pediatric therapy for both research and clinical purposes (Kolehmainen et al., 2012; McLaren & Rodger, 2003). While norm-referenced measures rarely address functional outcomes, goal-based tools focus on function and can be more sensitive to clinically meaningful change (Doig et al., 2010; King et al., 2000; McLaren & Rodger, 2003). Furthermore, goal achievement tools allow for collaborative goal setting, and can thereby be more readily used in interprofessional contexts (King et al., 2000; Perry et al., 2004), including in First Australian contexts. Several goal achievement tools have been developed, including the Goal Attainment Scale (GAS) (Kiresuk & Sherman, 1968), the Australian Therapy Outcomes Measure (AusTOMS) (Perry et al., 2004) and the Canadian Occupation Performance Measure (COPM) (Law et al., 1990). However, there is limited

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documentation of the use of such goal achievement measures with First Australian families.

When considering principles of culturally responsive practice, existing goal attainment tools have several limitations. Whilst some tools lend themselves to family-centered practice, many utilize language that does not reflect the strengths-based approach that is central to culturally responsive practice. Administration processes are highly prescriptive or necessitate use of direct questioning in a semi-structured interview process, inconsistent with the flexible, dynamic and relational 'yarning' approach advocated in culturally responsive services (Lewis et al., 2017). The time needed to describe five levels of goal attainment has been considered onerous and problematic in clinical applications of the GAS (Krasny-Pacini et al., 2017). Existing tools such as the Child Occupational Self-Assessment (COSA: Kramer et al., 2014) and the Perceived Efficacy and Goal Setting (PEGS: Missiuna & Pollock, 2000), which were designed for use with specific age groups, lack the flexibility required to accurately measure outcomes for children of varying ages. Likewise, card sorting tools such as the PEGS (Missiuna & Pollock, 2000) limit goal setting to items depicted in the imagery, which are not necessarily reflective of the broad range of experiences and needs identified by First Australian clients.

Other tools such as the COPM are limited to use by specific disciplines. The importance of interprofessional collaborative service delivery (Bridges et al., 2011; Reeves et al., 2013) in achieving positive outcomes for clients is widely acknowledged yet, to the authors' knowledge, a tool which enables appropriate measurement of interprofessional service outcomes is not readily available. In order to support future research which builds an evidence base related to client outcomes following interprofessional collaborative service delivery, an outcome measure appropriate for the clients and context is required.

Given these limitations, development of a culturally responsive outcome measure was considered more beneficial than attempting to validate the use of an existing tool in First Australian contexts. This paper details the research process used in developing a culturally-responsive goal achievement tool for evaluating interprofessional therapy services with urban First Australian children, the Australian Therapy Outcome Measure for Indigenous Clients (ATOMIC). It then explores the sensitivity and reliability of the ATOMIC as a tool to evaluate the interprofessional therapy services provided by a First Australian children's therapy service.

Methods

Research design

Outcomes presented in this paper form part of a larger mixed-methodologies action research project (Kemmis et al., 2004) (see Figure 1) aimed at developing and establishing the reliability and clinical utility of the ATOMIC. An action research approach was considered appropriate to reflect on, improve and refine goal setting processes in a progressive manner (Stringer, 2007). This research was completed across three action research cycles. Action research cycle (ARC) 1 involved development of the tool, pilot testing and establishing inter-rater reliability. Pre- and post-therapy goal achievement data was obtained from the initial version of the tool (ARC 2) and a revised version following amendments (ARC 3). Qualitative findings from focus groups conducted within ARCs 2 and 3 supported the clinical utility of the tool and are presented elsewhere (Copley et al., submitted).

Ethical clearance was obtained from the relevant university ethics committee (2016–02-108-A-1). Guidelines for ethical research with First Australian children and families were followed, including reciprocity of research design and benefit, initiation and monitoring of the research by a First Australian Health Service, and rigorous processes to ensure informed consent of participants (National Health and Medical Research Council, 2018).

Context

The First Australian health service network that was the focus of this study serves Australia's largest and fastest growing

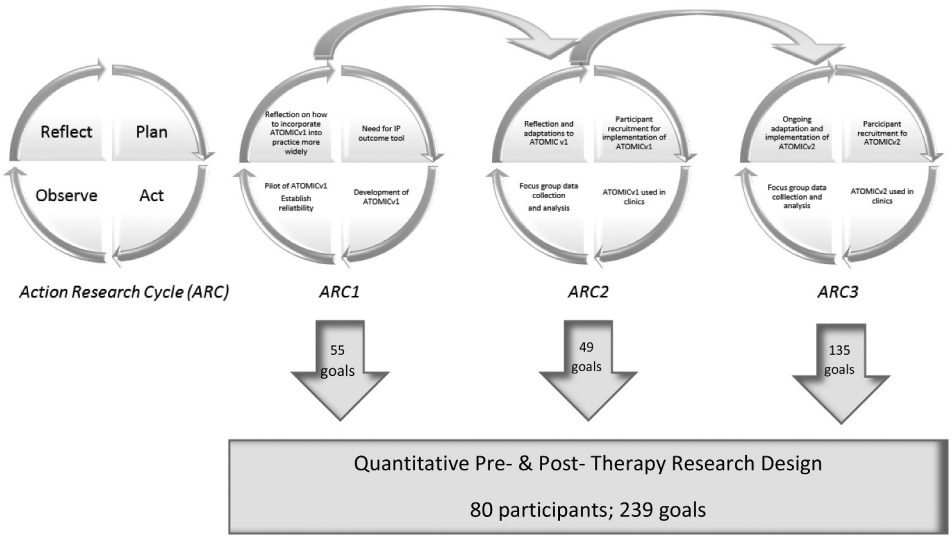

Figure 1. Research design.

Indigenous population (Markham & Biddle, 2018). This service has implemented an integrated system of care which reflects First Australian concepts of health and ways of being (The Institute for Urban Indigenous Health, 2019 35), and developed and implemented a suite of early intervention and children's developmental programs, the largest of their kind in Australia. First Australian families access interprofessional occupational therapy and speech pathology services aimed at supporting children aged 0–18 years to master the skills needed for engagement and participation in everyday life (Nelson et al., 2017; Paul & Norbury, 2012). Therapy is based on culturally responsive practice and is provided in both individual and group settings, offered weekly or fortnightly. Duration of sessions ranges from 30–60 minutes depending upon the age of the child and nature of the session (i.e., group or individual), and therapy 'blocks' of approximately 10 sessions typically run in alignment with school terms. The current study was undertaken in the context of this existing interprofessional therapy service.

ARC1: development of tool, ATOMIC pilot trial and interrater reliability

Tool development

In ARC1, a panel of experienced therapists, a First Australian project officer, therapists from the First Australian Health Service and a partner University developed the first version of the Australian Therapy Outcome Measure for Indigenous Clients (ATOMIC). This work was commissioned by the First Australian Health Service with senior First Australian leadership. The panel drew on expert knowledge of the clinical context, significant experience in delivering culturally-responsive services, and review of relevant literature and practice frameworks in developing the tool. The ATOMIC aimed to support a flexible, dynamic, client-centered approach by accommodating the child's individual needs and rate of development, and acknowledging First Australian views of health and wellbeing from a holistic perspective (Boddington & Räisänen, 2009; Dudgeon & Walker, 2015). A core development group drafted a draft version of the tool which was designed for both clinical goal-setting and evaluation. The tool was reviewed and trialed with several clients by two senior therapists working within the health service and minor wording changes were made. These therapists subsequently developed examples of completed goal forms to assist implementation by other therapists during the pilot phase.

Participants

The ATOMIC was piloted in order to test its utility with 18 children who participated in the interprofessional therapy service routinely provided at an urban First Australian school which was part of the health service. All participants were provided with verbal and written explanations of the study. Guardians' and children aged 8 years or older provided consent to participate. Two participants were unavailable at the time of post-therapy testing and therefore their data were not included in the results. The remaining group of 16 participants included 12 males and four females, ranging in age from 4 years 5 months to 15 years 7 months (mean = 8.03 years). Fifteen of the children identified as First Australians. Two participants were receiving their first block of therapy, four their second block, and the remaining ten participants had previously partaken in two or more blocks of therapy.

Procedure

Interprofessional collaborative therapy was delivered weekly and/or fortnightly by occupational therapy and speech pathology teams, with the length of the therapy block offered ranging from four to 11 weeks depending on the individual needs and goals of each child. Interprofessional therapist teams determined appropriate and relevant goals through yarning with children, their caregivers and teachers (Lewis et al., 2017). Therapy goals were developed and documented in a shared medical record system prior to the child's second therapy session. In subsequent sessions, therapist teams supported children to achieve identified goals through ongoing consultation and collaborative delivery of intervention. For example, a speech pathologist and occupational therapist might address language, literacy and handwriting goals within a joint paper and pencil activity.

Interrater reliability

To determine inter-rater reliability of the tool, 50% of the participants were randomly selected and their goal achievement ratings on the ATOMIC were scored by two blinded assessors during both the pre- and post-therapy data collection. These assessors attended either the first or second therapy session and the final session and observed the child's performance when completing tasks central to their goals.

Data analysis

Raw scores were visually inspected to identify any trends in goal achievement according to age and gender. Inter-rater reliability was calculated for both pre- and post-therapy scores using an intraclass correlation coefficient (ICC). Given the data was from a small sample and was not normally distributed, an aggregated ICC was used by way of a mixed effects model to give an estimate of the correlation between therapist scores and secondary rater scores.

ARC 2/3: interprofessional therapy outcomes

Study design

A pre- and post- therapy research design was used to evaluate participants' goal achievement before and after participating in therapy.

Participants

Ten occupational therapists (OTs) and seven speech pathologists (SPs) provided interprofessional collaborative therapy to individuals and groups of children at one of 14 First Australian health services. Therapy was targeted toward furthering children's developmental and educational skills (e.g., language skills, handwriting, social interaction, attention to tasks) to promote their participation in school and home environments. Activities used in therapy were functional and relevant for the child. Two of the therapists (one OT; one SP) identified as

Aboriginal and/or Torres Strait Islander and all of the therapists were female. Therapists included four new graduates (two OT; two SP), seven therapists who had worked from 2–5 years (five OT; two SP), three therapists who had worked from 5–10 years (two OT; one SP), one speech pathologist who had worked approximately 17 years and two team leaders (OT and SP) each with more than 25 years clinical experience. Training related to use of the tool was conducted for therapists during a team meeting prior to its application.

Client participants were recruited from a range of services provided by the First Australian health service in different locations and included First Australian children attending interprofessional occupational therapy and speech pathology in 2017. Completed carer and child (aged >8 years) written consent was received for 107 participants. Data for two participants was excluded because they had attended fewer than two sessions and a further two participants were excluded because they did not attend the final therapy session. A further 23 participants were excluded because of incomplete data. In total, 80 First Australian children including 49 male and 31 female children between two and sixteen years (mean = 6.3 years; SD = 2.0 years) participated in the study.

Procedure

Following a general practitioner referral, participants and their families attended an initial consultation carried out jointly by the occupational therapist and speech pathologist. Therapists used an informal yarning and play-based style of communication to develop relationships with the child and their family in order to establish a shared understanding of the child's strengths and individual needs (Lewis et al., 2017; Nelson et al., 2017). Therapy goals were developed and documented prior to the child's second therapy session. Participants attended between 2 and 9 therapy sessions (mean = 4.4) between February and November 2017, depending on both attendance rate and identified need. Data on the number of sessions attended by each child was retained for 80 clients and therapy addressed 239 goals. Rate of attendance ranged from 20% to 100% of sessions offered (mean = 82%).

Data collection

ARC 2. Achievement on each of the participants' individualized therapy goals was rated using the ATOMIC on two occasions; at baseline following the initial consultation and at the participant's completion of interprofessional collaborative therapy. The first version of the ATOMIC (v1) was completed jointly by the occupational therapists and speech pathologists who provided the interprofessional therapy for each participant. Demographic data included the child's age, Aboriginal & or Torres Strait Islander identification, gender, number of interprofessional collaborative therapy sessions offered, and consent for research.

Using ATOMICv1, at baseline, therapists documented a detailed description of the *Skill or Domain, SMART goal* and *Measurement* (see Figure 2 for an example). In accordance with SMART goal setting, therapists were required to identify specific, measurable, relevant, attainable and timely descriptors of goal achievement levels to support scoring (Doran, 1981). They were provided with examples of how to write measurements to specify increments of achievement. A baseline measure of the child's skill was recorded visually for each goal on a scale with increments marking 20%, 40%, 60% and 80% intervals depicting progression from *Not yet achieved* (0%) to *Achieved* (100%). Therapists also made note of the child's specific percentage achievement and made comments where appropriate.

Documented goals informed therapy planning and at the completion of interprofessional therapy, treating therapists completed outcome ratings using the same scale format. To minimize response bias, therapists were instructed to complete outcome ratings on a separate ATOMIC outcome form without referring to initial baseline ratings.

At the end of this cycle, therapists participated in focus groups to gain their views of the tool's utility and to make recommendations for the next cycle. Findings from this qualitative data collection are reported elsewhere (Copley et al., submitted).

ARC 3. In response to qualitative findings in ARC 2, adjustments were made to ATOMICv1 to enhance its clinical utility (ATOMICv2: see Figure 3). Therapists were no longer required to define specific goals at the time of the initial consultation with the child and their family. Instead, therapists documented goals throughout the interprofessional therapy process in collaboration with the family. Rather than predict and define specific *Measurements* of goal achievement, therapists now

Skill / Domain	SMART Goal	Measurement	Baseline	Comments
Social communication	Sam will engage in interactions with others for a period of 5 minutes.	0% - not engaging in interactions 25% - engaging for 1 minute 50% - engaging for 2-3 minutes 75% - engaging for 4 minutes 100% - engaging for 5 minutes	25 %	
Play	Sam will participate in associative play with another child for 5 minutes.	0% - no associative play 50% - associative play with another for 2.5 minutes 100% - associative play with another for 5 minutes	0 %	
Receptive language	Sam will follow 1 step instructions without prompting on 3 occasions during an activity.	0% - not following instructions 25% - following with prompting 50% - following 1 instruction 75% - following 2 instructions 100% - following 3 instructions	0 %	
Self-regulation	Sam will use preparatory activities to enable him to be calm and attend to a task for 4 minutes without prompting.	0% - not calm/attending to task 25% - calm for 1 minute 50% - calm for 2 minutes 75% - calm for 3 minutes 100% - calm for 4 minutes	25 %	

Figure 2. Initial version of the ATOMIC (ATOMICv1) – Example of baseline form.

Skill / Domain	SMART Goal	Evidence for Rating	Baseline
Scissor use	Chelsea will cut out basic shapes with control and accuracy.	Chelsea has difficulties cutting along a curved line. She needs prompting to position 'thumbs up' when grasping paper and to turn the paper.	
Handwriting	Chelsea will write her name legibly with a visual model.	Chelsea is able to write her name though it is not legible.	
Phonological awareness	Chelsea will identify syllables in multisyllabic words.	Chelsea can identify syllables in 1 and 2 syllable words only.	
Receptive language	Chelsea will follow complex, 2-step instructions.	Chelsea can follow 2-step instructions but struggles when the instructions include complex concepts.	
Expressive language	Chelsea will accurately use prepositions in sentences to indicate position.	Chelsea cannot indicate the location of people and objects when describing illustrations.	

Figure 3. ATOMICv2 – Example of baseline form.

documented *Evidence for Rating*. This included key observations of the child's level of ability as well as the child's and family's reports of observed changes in daily life. The baseline and outcome measures were recorded using a Visual Analogue Scale (VAS) in place of the previous scale, and therapists were no longer required to record a specific percentage of goal achievement. No anchors or numbers appeared on the VAS. Therapists often asked parents and children to complete the VAS in rating the child's progress toward achieving therapy goals.

Data analysis

Documented pre- and post-therapy goal achievement percentages on ATOMICv1 were converted to scores from 1 to 5 with level 1 representing the lowest level of goal achievement (1 = -0–19%, 2 = 20–39%, 3 = 40–59%, 4 = 60–79% and 5 = >80%). For the purpose of analysis, results from the VAS on the ATOMICv2 were also converted using linear transformation to scores from 1 to 5, with level 1 representing the lowest level of achievement. Goals were sorted by the research team into 13 categories based on the core skill/domain that they addressed, for example, self-management or expressive language.

Pre- and post-therapy goal achievement data ranging from 1 to 5 were then analyzed using statistical software package STATA, Windows version 14. Data was checked for normal distribution and outliers. Following this, a paired t-test was employed to compare pre- and post-therapy scores and determine statistical significance based on the standard alpha of 0.05. Paired t-tests for pre- and post-therapy data were initially run separately for goals documented on the ATOMICv1 in ARC 2 and goals documented on the ATOMICv2 in ARC 3. This analysis revealed there was little difference in sensitivity between each version of the tool: therefore, the pooled dataset of both research cycles was used in further analysis. A paired t-test for pre- and post-therapy data was completed for the entire dataset and for each of the 13 core skills/domains. The impact of age (<5 years, 5+ years), gender (male, female), percentage of session attendance (0–100%) and ATOMIC baseline scores (1, 2, 3, 4 & 5) on clients' degree of goal progression was examined using mixed-effects linear regression modeling.

Results

ARC1: ATOMIC pilot trial and interrater reliability

Fifty-five goals were identified for the 16 students who participated in the pilot (M = 3.44 goals per child, SD = 1.15). The average rate of attendance at scheduled therapy sessions was 84.19% (SD = 14.77). Excellent reliability between the main rater and the secondary rater was demonstrated in the aggregated ICC when measuring students' goal achievement during both pre- and post-therapy scoring. The aggregated ICC for pre-therapy data was 0.995 (95% confidence interval; 0.988 to 0.998), and for post-therapy data was 0.982, (95% confidence interval; 0.960 to 0.992).

ARC 2/3: interprofessional therapy outcomes

In total, 239 goals were identified for the 80 First Australian participants, representing a range of skill domains (pre-writing and handwriting; expressive language; self-management; speech intelligibility; play and social skills; receptive language; language and phonological awareness; focus on activity; and hand and arm skills). Of these, 29 were goals jointly developed by both OTs and SPs, 106 were SP goals and 104 were OT goals. The number of goals written for each child ranged from one to five per block of therapy offered. On average, two to three goals were identified for each participant for each offered block of therapy (mean = 2.75 goals per child). More than half of the goals were addressed in the following skill domains: pre-writing and handwriting (n = 41), expressive language (n = 33), self-management (n = 30), and speech intelligibility (n = 29). Seven participants returned for a second block of therapy in line with standard practice. Twenty four of the goals recorded were for these returning participants.

One hundred and four goals were identified using ATOMICv1, with the remaining 135 goals documented on the

ATOMICv2. Comparison of the mean difference between pre- and post-therapy scores revealed goal progression along the 1–5 scale with a mean difference of 1.95 for goals documented on ATOMICv1 (n = 104, SD = 1.16, 95% CI = [2.18,1.73], p = .000) and 1.85 along the VAS for goals documented on ATOMICv2 (n = 135, SD = 1.24, 95% CI = [2.06, 1.64], p = .000). Likewise, a paired t-test of pooled ATOMICv1 and ATOMICv2 data (n = 239) revealed goal progression was evident with children demonstrating a mean difference of 1.89 on the ATOMIC scales for each goal (SD = 1.21, 95% CI = [2.05, 1.74], p = .000). This represents approximately 38% progress in goal achievement on the 100% scale.

Further analysis was undertaken on the 215 goals measured during the 80 clients' first block of therapy (one-sample t-test, n = 215, mean diff = 1.94, SD = 1.22, 95% CI = [1.78, 2.11], p = .000) to determine if age, gender, rate of attendance and baseline score impacted resulting goal progress. Mixed-effects linear regression modeling indicated that goal progression was not significantly different across gender (males = 49, 138 goals; females = 31, 77 goals; Coef = 0.02, p = .12) (bivariate model mean = 0.03, 95% CI (−0.35, 0.40), p 0.89; multivariate model mean = 0.15, 95% CI (−0.17, 0.47), p = .36).

Clients were grouped according to ages <5, 5, 6, 7 and 8 and older to determine whether age had an impact on the degree of goal progression for individual clients. The largest cohort involved 23 children aged 5, while children under 5 made up the smallest cohort of 11. Thirteen 6-year olds, fifteen 7-year olds and eighteen children aged 8 and older participated in the study. Bivariate modeling suggested children under 5 years old (n = 11, 25 goals) made greater goal progression compared with children over 5 (n = 69, 190 goals; mean −0.68, 95% CI [−1.21, −0.14], p = .013). However, after adjusting for other covariates (gender, baseline score and number of completed sessions), differences in age did not significantly account for variance across participants' goal progression (multivariate model mean diff = −0.035, 95% CI [−0.84, 0.14], p = .16).

Rate of attendance at interprofessional therapy ranged from 20% (n = 2 participants, 3 goals) to 100% (n = 34 participants, 87 goals) and positively impacted goal achievement (bivariate models 0.97 (95% CI [0.05, 1.88], p = .038). More than 70% of clients (n = 58 participants, 159 goals) attended 80% or more of offered interprofessional therapy sessions, while only seven clients (8.75%; 16 goals) attended less than 60% of their offered interprofessional therapy sessions.

Effect of baseline measures on overall goal progression was also evident. Baseline scores ranged from 1 (n = 114) to 5 (n = 2) with most (93.95%) of baseline scores equal to or less than 3 (mean = 1.78, SD = 0.98) for 215 goals. Each client had a mean of 2.75 goals. Differences in baseline scores across goals for individual clients ranged from 0 to 3.78. Baseline measures explained mean difference in goal progression of −0.52 (95% CI [−0.68, −0.37], p = <0.001) in bivariate modeling, with a higher score at baseline correlating with a lower goal progression score.

Results from multivariate modeling indicated that after adjusting for the other three covariates (age, gender, and % of completed sessions), baseline scores (mean diff = −0.51, 95% CI [−0.66, −0.36], p = <0.001) were significantly associated with goal progress, with lower baseline scores linked to a larger increase in goal achievement. Similarly, once adjusted for age, gender, and baseline score, % of completed sessions (mean diff = 0.96, 95% CI [0.17–1.75], p = .018) was also significantly positively associated with goal progress.

Discussion

In keeping with culturally responsive practice, this study did not attempt to modify an existing 'mainstream' tool, in essence to fit the proverbial square peg in the round hole, but rather, started with First Australian health service needs and used practice-informed evidence to reflect what therapists were reporting as best practice. This is consistent with Hoffmann et al.'s (2013) model of evidence based practice where the practice context, the client's values and the therapist's clinical expertise are all valued as forms of evidence in addition to pertinent research. Importantly, in the current study, the action research process enabled culturally responsive practice to inform the initial development and refinement of the ATOMIC, thereby supporting its utility.

Findings from this study indicate that meaningful and individualized gains are being realized for First Australian children with a range of needs following participation in interprofessional collaborative occupational therapy and speech pathology services delivered within a First Australian health service. Pre- and post-therapy ATOMIC scores confirm progress on functional goals across a range of skill domains. Occupational therapists and speech pathologists were able to address discipline specific performance areas (for example, speech intelligibility or handwriting) dependent on individual children's needs and goals within an holistic and comprehensive therapy experience. Additionally, this research has confirmed the reliability of the ATOMIC as a tool for effectively measuring therapy outcomes.

These findings add to literature recognizing the benefits of providing interprofessional collaborative therapy for children who have needs across multiple areas of performance (Benson et al., 2002). Importantly, access to effective interprofessional collaboration may support families by reducing overall appointment numbers and increasing appointment efficiency as professionals gather and share information among themselves and with the family. While statistics show that First Australians are at a higher risk of missing medical appointments (Nancarrow et al., 2014), the high attendance of children at their therapy sessions in this study demonstrates that culturally responsive interprofessional services are valued by First Australian clients. Integrated service delivery appears to better support the needs of families, thus increasing both therapy attendance and outcomes. Importantly, higher rates of attendance were associated with greater goal progression, indicating that engagement in interprofessional therapy enabled goal achievement. This finding lends further support to the importance of integrated interprofessional care in facilitating client gains.

The research findings support the use of the ATOMIC as a culturally responsive tool for evaluating interprofessional collaborative therapy outcomes, with high inter-rater reliability recorded for pre- and post-therapy measures, indicating the robustness of this tool when used across disciplines and with a diverse caseload. Significantly, the development of the ATOMIC allowed measurement of meaningful outcomes

identified in consultation and collaboration with First Australian families (Lewis et al., 2017), broadening the scope of traditional practice beyond measuring performance components using norm-referenced standardized tools. The goal-based focus of the ATOMIC allowed therapists to work toward a more holistic view of health and wellbeing and utilize familiar and relevant activities for therapy and assessment. As Nelson (2007) highlights, this is what often makes standardized assessments inappropriate for use with First Australian children, since they focus on components of a child's ability rather than a strengths-based holistic view of their development.

The ATOMIC facilitated clients and/or their families to provide baseline measures of their goal achievement in the initial stages of therapy through the goal setting process. Each client provided a different baseline measure for each of their own goals, indicating that they approached each goal from a different starting place according to their experience, capacity and needs. Factors which influence clients' perceptions of baseline scores could be further explored and inform therapists in their documentation of supporting evidence on the ATOMIC.

Importantly, the ATOMICv2 continued to detect clients' goal progression on individualized goals following adjustments that were made to the ATOMICv1 measurement process. These adjustments aimed to improve the flexibility and applicability of the ATOMIC within dynamic and responsive therapy services and have been shown to improve the tool's clinical utility (Copley et al., submitted). Results from this study indicate that while these changes enabled a dynamic assessment process that was more responsive to the needs and contexts of the clients and their families, the adjustments to the measurement process did not detract from the ATOMIC's sensitivity to changes in the clients' progress toward goal achievement. Comparison of the pre- and post-therapy data for the ATOMICv1 and ATOMICv2 validates the use of the visual analogue scale with associated supporting evidence for detecting clinically meaningful therapy outcomes. The more time-consuming measurement process of the ATOMICv1, which involved therapists pre-defining specific and incremental levels of measurement, was not shown to improve the robustness of the ATOMIC.

Dynamic and flexible assessment processes allowed therapists to accommodate the individual developmental needs of each child, and observe the different strategies used, or support needed, to work toward goal achievement. In addition, the ATOMIC facilitated collaborative goal setting, meaning it can be more readily used in interprofessional contexts. In this study, therapists were able to document joint OT/SP goals alongside separate OT and SP goals on a single measurement tool, enhancing collaboration and communication whilst reducing reporting and documentation demands on professionals (Copley et al., submitted). While joint goal setting was apparent, the large proportion of goals reflected discipline specific foci, which may be explained by the recency of the ATOMIC's development and the time often taken to alter typical practices. It is plausible that as therapists continue to work together using the ATOMIC to evaluate therapy outcomes, the number of interprofessional goals may increase. Future research could explore barriers and facilitators of interprofessional goal setting particularly with regard to using the ATOMIC as an outcome measure. Given the importance of goal-setting and measurement of goal achievement (Perry et al., 2004), such research would potentially lead to more robust and authentic evaluation of client outcomes from interprofessional collaborative service delivery. Indeed, the availability of a valid outcome measurement tool may foster interprofessional service provision where goal-setting has been identified as a barrier to its implementation. However, it is also critical that attention is not paid just to the tool itself but to the *process* used in order to involve families in interprofessional goal setting, an aspect often missed.

The current study determined the reliability and robustness of the ATOMIC for evaluating outcomes of speech pathology and occupational therapy interprofessional service provision. Application of the ATOMIC for goal-setting with additional professionals such as within social work, podiatry, dietetics and exercise physiology is a direction for future research which could serve to further validate the tool as a means to measure outcomes from interprofessional service delivery in these health contexts. The ATOMIC offers a 'discipline-neutral' framework for goal-setting and measurement in contrast to discipline-specific tools such as the COPM (Law et al., 1990). Its capacity to facilitate mutually-supported goal-setting using a common language is an important contribution to interprofessional service delivery across a range of clients and contexts.

Finally, although this study evaluated outcomes related to 239 goals, the data of an additional 27 participants were excluded due to lack of attendance at the final session or incomplete recording of data. Further explanation of the tool instructions, examples of goals, and training for therapists in its use could enhance rates of full completion of the ATOMIC. Future research comparing the ATOMIC with other therapy outcome measure tools may be useful to further explore the validity, reliability and clinical relevance of this tool in measuring the impacts of therapy within the First Australian context.

Conclusion

First Australian community-controlled health services are facilitating gains in health outcomes for urban First Australian children, with this study supporting the ATOMIC as a culturally responsive outcome measure for evaluating interprofessional collaborative therapy services.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article

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