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The Transferability of Goal Attainment Scaling (GAS) for Child Life Specialists Working in Pediatric Rehabilitation: A Critical Review of the Literature

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ABSTRACT

There is much variation in the way child life specialists implement and document their interventions and services, especially among practice arenas. This variation includes the methods child life specialists use to set individual goals with pediatric clients and families, as well as to evaluate the effectiveness of their interventions and services. The purpose of this paper is to highlight how goal attainment scaling (GAS) could and should be integrated into the daily practices of child life specialists working in a pediatric rehabilitation setting. GAS is a widely used individualized outcome measure, designed to assess whether individuals have achieved the goals of intervention by quantifying their progress (Kiresuk & Sherman, 1968). As there is currently no literature on the integration or utility of GAS as an outcome measure for child life specialists, this paper will critically examine the available peer-reviewed literature to demonstrate how and why GAS is currently being implemented in pediatric rehabilitative settings by other health care practitioners. Recommendations for the transferability of GAS in child life practice will subsequently be discussed to not only address this gap in knowledge, but to further emphasize the benefits of using an individualized outcome measure in clinical practice.

Introduction

In pediatric rehabilitation, goal setting is a core process that is frequently used by a variety of health care practitioners, as it is strengths-based and solutions-focused and promotes patient- and family-centered care (Bovend'Eerdt et al., 2009). Patient- and family-centered care has become a widely accepted form of service delivery and is considered a best practice (Bell et al., 2009; Bexelius et al., 2018; Calder et al., 2018; Øien et al., 2010; Rosenbaum et al., 1998). Goal setting approaches are focused on enhancing the health care experience by cultivating partnerships between clients, families, and practitioners, as each individual can bring a unique perspective (Bell et al., 2009; Calder et al., 2018; Rosenbaum et al., 1998).

Goal setting is essential in pediatric rehabilitation, as it not only identifies what is most important to the client and family, but it also allows members of the care team to be aware of the identified goals, the effective methods being used to help the client attain them, and each team members' role and relevance in meeting the client's unique needs (Bexelius et al., 2018; Bovend'Eerdt et al., 2009). However, when goal setting is used in clinical practice, it is often vague, biased, irrelevant, unreliable, time consuming, and done without adhering to a formal framework (Angeli et al., 2019; Bovend'Eerdt et al., 2009; McDougall & King, 2007; McDougall & Wright, 2009). Therefore, when practitioners are setting goals with clients and families, they should be developed, monitored, and evaluated in thoughtful and systematic ways to ensure they are meaningful and relevant and that the aim of the interventions are clear (King, et al., 2000a; Scobbie et al., 2009). As patient- and family-centered care is considered best practice in pediatric rehabilitation, it can be challenging for practitioners to find formal

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evaluation tools that can reflect personalized care plans and account for individualized goals (Angeli et al., 2019; Bexelius et al., 2018; Harpster et al., 2018).

Goal attainment scaling (GAS) is an individualized outcome measurement tool that has become increasingly popular in the field of pediatric rehabilitation, as it "facilitates the translation of clients identified needs into distinct, measurable goals set collaboratively by clients and their families and service providers" (McDougall & Wright, 2009, p. 1362). This is significant as goal setting has been shown to help improve clients' commitment, motivation, and progress towards meeting their rehabilitation goals (Krasny-Pacini et al., 2013; McDougall & King, 2007; Scobbie et al., 2009). This methodology was originally developed by Kiresuk and Sherman (1968) as a tool to evaluate community mental health services. Their methodology is free to access and can be found in their original article, as well as in many research articles and formal GAS resource guides. Kiresuk and Sherman's (1968) 5-point rating GAS methodology has since been used to evaluate health services and educational programs, as well as used to measure intervention-induced change in a variety of practice arenas where goal setting can inform treatment planning, including special education, nursing, social work, chronic pain, psychiatry, geriatrics, and pediatric rehabilitation (Harpster et al., 2018; King, et al., 2000a; King, et al., 2000b; Krasny-Pacini et al., 2013; McDougall & Wright, 2009; Turner-Stokes, 2009).

When looking to develop personalized GAS scales for individual clients, first an observable goal needs to be identified and defined, along with the client's baseline performance level with respect to the chosen goal (Krasny-Pacini et al., 2013). A range of potential goal attainment outcomes will then need to be defined and organized onto a 5-point rating scale, ranging from -2 to +2, where a specific number value is assigned to an outcome following an intervention or service (Harpster et al., 2018; Krasny-Pacini et al., 2013; McDougall & King, 2007; McDougall & Wright, 2009; Turner-Stokes, 2009). See Figure 1 for an explanation of the representation of each of the five levels.

When using GAS methodology, there are expected goal setting and goal rating applications. For example, in Figure 2, each 5-point GAS scale should represent one goal and only have one variable of change and should be created with equal intervals between each of the five levels of goal attainment (Harpster et al., 2018; McDougall & King, 2007; McDougall & Wright, 2009; Turner-Stokes, 2009). This is important, as goal attainment from level +1 to +2 should not be any more challenging or require a larger change in performance than progress from level -2 to -1 (McDougall & King, 2007). In addition, it is typical for three GAS goals (each represented by their own individual 5-point rating scale) to be developed for each client (Turner-Stokes, 2009).

GAS 5-Point Rating Scale	
Score	Predicted Attainment
-2	Much less than expected outcome
-1	Less than expected outcome
0	Expected outcome after intervention
+1	Greater than expected outcome
+2	Much greater than expected outcome

Fig. 1. Scaled Levels of GAS (McDougall & King, 2007, p. 4)

Attainment Level	Score	Physiotherapy Goal
Baseline	-2	Is able to walk to the gym from classroom and back with no aids in 15 minutes falling 8 times
Less than Expected Outcome	-1	Is able to walk to the gym from classroom and back with no aids in 15 minutes falling 6 times
Expected Outcome	0	Is able to walk to the gym from classroom and back with no aids in 15 minutes falling 4 times
Greater than Expected Outcome	+1	Is able to walk to the gym from classroom and back with no aids in 15 minutes falling 2 times
Most Favourable Outcome Likely	+2	Is able to walk to the gym from classroom and back with no aids in 15 minutes falling 1 time

Fig. 2. Sample of GAS for a client receiving physiotherapy (King et al., 2000b, p. 10)

According to Mertens and Wilson (2012), a GAS scale can be used for three purposes: (1) to evaluate and/or monitor a client's progress towards goal attainment; (2) to assess the effectiveness of an intervention being implemented; or (3) to evaluate the program

that is providing an intervention. In clinical practice, a client's performance is typically observed and then rated by a practitioner or multidisciplinary health care team member, which can include the client and the family (McDougall & King, 2007). For evaluation purposes, the goals can be weighed and scored according to importance (as determined by the client and/or family) and difficulty (as rated by the practitioner) by using a formula developed by Kiresuk and Sherman (1968; Bovend'Eerdt et al., 2009; Harpster et al., 2018). The importance and difficulty scores are then used to calculate a mean aggregate T score, where a score of 50 or above typically indicates a clinically significant improvement in goal performance (Harpster et al., 2018; King, et al., 2000a; Steenbeek, et al., 2007; Turner-Stokes, 2009).

Goal setting and scale construction are frequently noted to be challenging, as scales can be very time-consuming to create and a client's performance can be difficult to predict (Bexelius et al., 2018; McDougall & Wright, 2009; Steenbeek et al., 2011). While the literature consistently mentions the importance of applying the methodology effectively to minimize bias in both scale construction (e.g., creating scales that are too easy or too challenging) and in rating the client's performance (e.g., showing inaccurate or false goal attainment), apart from formal user guides, very few articles have actually described their training or GAS orientation process (Harpster et al., 2018; McDougall & King, 2007; McDougall & Wright, 2009; Steenbeek et al., 2007). McDougall and King's (2007) resource guide suggests that practitioners wishing to use GAS methodology should engage in two hours of training procedures, followed by 10 additional hours of skill building to gain more proficiency in both goal setting and goal rating.

In the existing literature, many members of the multidisciplinary health care team working in pediatric rehabilitation are already familiar with GAS methodology in setting meaningful goals with clients and families. However, child life specialists, who are also valued members of the health care team, have not been shown to utilize such methods in their daily practice. Their focus in many practice arenas, including pediatric rehabilitation settings, is to "help infants, children, youth and families cope with the stress and uncertainty of acute and chronic illness, injury, trauma, disability, loss and bereavement" (Association of Child Life Professionals, 2019). Some common therapeutic interventions that are offered and facilitated by child life specialists to help promote coping include delivering developmentally appropriate psychological preparations for procedures and transitions; providing medical, therapeutic, and normative play opportunities; encouraging healthy expression of feelings; and exploring existing and developing new effective coping strategies (Association of Child Life Professionals, 2019). As child life specialists operate within the context of patient- and family-centered care and aim to improve their clients' coping and functional outcomes by helping them identify and make progress towards their goals, it is surprising there is no literature on the utility or application of GAS in child life clinical practice. Therefore, it is essential to examine the available peer-reviewed literature to identify the recent applications of GAS in pediatric rehabilitation, as it is hypothesized that GAS would be an effective outcome measure for child life specialists working in this setting.

Theories and Frameworks

Social Cognitive Theory and Goal-Setting Theory

Bandura's Social Cognitive Theory (1997), specifically the self-efficacy component, as well as Locke and Latham's Goal-Setting Theory (2002), are two specific frameworks that underpin the development and evaluation of individually tailored interventions (Scobbie et al., 2009). Self-efficacy refers to how confident an individual is in their ability to achieve their goals, and Goal-Setting Theory speaks to how goal specificity, level of difficulty, and performance feedback can directly influence goal-related behavior (Scobbie et al., 2009). According to Locke and Latham (2002), their theory is consistent with Bandura's Social Cognitive Theory (1997), as both acknowledge the importance of self-efficacy in goal setting. As these two theories can be used to help understand, predict, and inform the practice of setting goals, they could also be used to inform the transferability and utility of GAS, as it is known that goals are more likely to be attained if clients and families are actively involved in the goal-setting process (Scobbie et al., 2009; Krasny-Pacini et al., 2013; Turner-Stokes, 2009).

The International Classification of Functioning, Disability, and Health

The International Classification of Functioning, Disability, and Health: Child and Youth Version (ICF-CY; World Health Organization, 2007) is a universal

classification system that considers the intersectionality and bidirectional relationship between an individual's contextual factors and their health condition (Rosenbaum & Stewart, 2004). Rather than solely focusing on an individual's biomedical impairments or functional limitations, the ICF-CY places great emphasis on one's assets and capabilities. In addition to the two previously mentioned theories, the ICF-CY can also be used to inform the use of GAS, as well as to influence collaborative goal setting in child life practice. The ICF-CY can provide a positive patient- and family-centered conceptual framework through which clients, families, and practitioners can together identify goals and functional outcomes (McDougall & Wright, 2009). The ICF-CY relies on a biopsychosocial and holistic perspective of health, functioning, and disability and is already a frequently used teaching tool and framework in both clinical and research-based settings (McDougall & Wright, 2009; Rosenbaum and Stewart, 2004). The domains within this classification system can be used to inform both goal setting and goal rating, as practitioners should be implementing interventions that consider each client's strengths, health condition, participation, functional ability, desired functional outcomes, and contextual factors (both environmental and personal; Rosenbaum & Stewart, 2004). Instead of setting vague goals that may not relate to the context of a client's life and development, the ICF-CY can encourage targeted goal-setting in relation to each client's level of functioning, activity limitations, participation restrictions, environmental factors, and personal factors (McDougall & Wright, 2009; World Health Organization, 2007).

Methods

Targeted searches were conducted on Google Scholar, CINAHL, PubMed, Ovid, and Web of Science using different combinations of search terms such as "outcome measures," "goal setting," "goal attainment scaling," "program evaluation," and "pediatric rehabilitation." The reference pages of retrieved studies were also examined to identify relevant articles. Publication types, dates, and peer-reviewed articles in English were also filtered to identify the most rigorous and evidence-based resources available. The review included all disciplines in the field of pediatric rehabilitation, including physical, occupational, and speech-language therapy, as well as the application of GAS in community-based school and therapy settings. The decision to include these settings assumed that GAS has broad applications and such evidence could further emphasize the flexible nature of the tool.

The search process initially resulted in 29 articles; however, 10 were more than 20 years old and were not specific to pediatric rehabilitation. A second search was conducted to retrieve more systematic reviews, meta-analyses, or randomized control trials. As a result, additional randomized control trials with high methodological quality were found. The Critical Appraisal Skills Programme (2018) checklists were subsequently used to critically appraise the retrieved systematic reviews and randomized control trials, as well as the cohort and case control studies, to further assess the rigor and validity of each article. The articles were then assigned a level corresponding to Melnyk and Fineout-Overholt's (2015) levels of evidence hierarchy. Twelve relevant articles remained that relate to the research topic and inclusion criteria specific to this literature review. However, this number is not exhaustive, as additional peer-reviewed literature reviews, resource guides, and textbooks were also examined and included in this review.

Results

Recent Uses of Goal Attainment Scaling in Pediatric Rehabilitation

In a systematic review by Harpster et al. (2018), the authors included 52 studies that used GAS as a tool to measure and evaluate the effectiveness of physical and occupational therapy interventions within a pediatric rehabilitation setting. The results from the review indicated that while 17 randomized control trials were included, 33 of the 52 studies were classified as low-level (IV or V) according to Sackett's hierarchy of evidence (1986; Harpster et al., 2018). Five-point GAS scales were used to assess a variety of therapy services for pediatric clients ranging from four months to 19 years of age, with diagnoses including cerebral palsy, traumatic brain injury, ADHD, and other developmental diagnoses (Harpster et al., 2018). Out of all diagnoses, the most common was cerebral palsy, representing 34 of the 52 studies, with the most reported intervention being goal-directed therapy (Harpster et al., 2018). The results from the review highlighted that while GAS appeared to detect small and meaningful change following an intervention and is consistently used to document progress toward the attainment of specific and relevant client-identified goals in a variety of interventions and diagnoses, the

majority of studies used low to moderate methodological rigor in their designs (Harpster et al., 2018).

The findings from the systematic review were consistent with many critical literature reviews (King, et al., 2000a; Mailloux et al., 2007; Steenbeek et al., 2007; Tennant, 2007). Please refer to Table 1. Such reviews demonstrated that while GAS is a useful tool for measuring therapeutic change and can be used for a variety of interventions, diagnoses, and disciplines, psychometric concerns regarding the tool's reliability (content and interrater) and validity (construct, content, convergent, and concurrent) are raised when the tool is not applied with enough precision or adequate training (King, et al., 2000a; Mailloux et al., 2007; Steenbeek et al., 2007; Tennant, 2007). Mailloux et al. (2007) and Steenbeek et al. (2007) purported that these findings are not surprising, as GAS is a highly individualized measure; however, they also stated that formal resource guides such as McDougall and King's (2007) and Turner-Stokes' (2009) should be consulted, as they can provide specific recommendations to help practitioners apply GAS methodology appropriately and effectively.

In Angeli and colleagues' (2019) retrospective chart review of GAS goals, the authors looked at the goal-setting process of 124 clients, aged two to 32 years who participated in episodic care programs. Clients received multidisciplinary therapy for approximately three months over an average of 11 visits. Clients presented with a range of disabilities including cerebral palsy, muscle weakness, developmental coordination disorder, hemiparesis, and language disorder (Angeli et al., 2019). The study analyzed 656 developmental therapy goals (averaging four goals per client) using 5-point rating GAS scales and found that half of the goals were solely established by the caregiver, 10% by the client, and the rest were established by unknown goal setter(s), possibly a combination of the caregiver, the client, and/or the practitioner(s) (Angeli et al., 2019). With respect to GAS, the results indicated that the goals established solely by the caregiver focused more on future-oriented problems, whereas the clients typically focused on more immediate problems (Angeli et al., 2019). This study is consistent with another relevant study by Vroland-Nordstrand et al. (2015), as it relates to collaborative goal setting and emphasizes the importance of including both the client's and the family's preferences when establishing goals. In this study, Vroland-Nordstrand and colleagues (2015) used an assessor-blinded, parallel, randomized design to evaluate the efficacy of client-identified goals and parent-identified goals on a goal-directed occupational therapy intervention. Thirty-four children with disabilities such as movement disorder, learning disability, and autism were included in the two, eight-week intervention groups, where one group used client-identified goals and the other used parent-identified goals (Vroland-Nordstrand et al., 2015). GAS was used in combination with the Canadian Occupational Performance Measure (COPM), which is a standardized outcome measure that is commonly used by occupational therapists to collect information about a client's goal progress in areas relating to their activities of daily living (McDougall & Wright, 2009; Vroland-Nordstrand et al., 2015). The study found that 79% of the client-identified group goals were reached at the expected level or higher, whereas 61% were achieved in the parent-identified group (Vroland-Nordstrand et al., 2015). This demonstrates the value and benefit of including pediatric clients and their preferences when setting high-quality goals with practitioners (Vroland-Nordstrand et al., 2015).

Several researchers (Bexelius et al., 2018; Bovend'Eerdt et al., 2009; Steenbeek et al., 2007, 2011; Krasny-Pacini et al., 2013; Turner-Stokes, 2009) recommend the use of SMART goals (smart, measurable, achievable, relevant, and timed) to help practitioners construct high-quality goals. In a retrospective multi-case study written by Bexelius et al. (2018), which included 42 children with a range of disabilities including cerebral palsy, Down syndrome, and other developmental disabilities, the participants received eight to 12 weeks of goal-directed multidisciplinary therapy (physiotherapy, occupational, speech-language therapy, and special education). The results showed that when SMART GAS goals were collaboratively set with the family, they were considered relevant by both the family and the practitioner. While formulating SMART goals can be challenging and time-consuming, the process can provide a clear and standardized approach to help ensure that the goals are not only meaningful to clients, families, and practitioners, but can also be used to try to minimize bias when constructing scales (Bexelius et al., 2018). However, the majority of the articles mentioned the need for formal training and practice in the use of GAS methodology in order to ensure good reliability and validity (Harpster et al., 2018; McDougall & Wright, 2009; Steenbeek et al., 2007).

In a study by Law et al. (2004), the responsiveness, reliability, and content validity of GAS was studied. Three individualized functional goals were created for 25 children ages one to six years with cerebral palsy, where each received a four-month intervention based on conductive education. The goals were written as behavioural objectives, as well as in a 5-point GAS scale format. The authors found GAS had good content validity, reliability, and was more responsive to change than the corresponding behavioural objectives (Law et al., 2004). Each child had pre- and post-test assessments for their gross motor functional performance, neuromuscular condition, and cognitive level using the Gross Motor Function Measure (GMFM; Law et al., 2004), a commonly used standardized outcome instrument designed to evaluate changes in the gross motor functioning of children living with cerebral palsy. In the study, the goals were collaboratively set with the child, the child's family, and the multidisciplinary care team. The overall results of the study supported the use of GAS in monitoring and evaluating motor changes of children with cerebral palsy (Law et al., 2004). The results also affirmed that GAS can provide precise information to practitioners wishing to evaluate the effectiveness of an intervention or monitor the progress of a client, as it encourages realistic goal setting (Law et al., 2004). Law et al. (2004) stated that "unlike standardized norm-referenced evaluative tools, GAS is a flexible set of procedures for evaluating change in individual performance" (Law et al., 2004, p. 27). Based on their findings, it was suggested that GAS might be used to complement other standardized outcome measures, such as the GMFM, or they could be used independently to replace behavioural objectives (Law et al., 2004).

Comparison of GAS and other Outcome Measures

As the combined use of GAS with other outcome measures such as the GMFM has been previously mentioned, literature reviews such as McDougall and Wright (2009) have also proposed the combined use of GAS and the ICF-CY. Such combined approaches may be beneficial as they can help standardize, as well as individualize the assessment and outcome evaluation practices (McDougall & Wright, 2009).

While there is evidence to support the benefits associated with the combined use of GAS with other standardized outcomes or frameworks, the literature also

Table 1. Recent Uses of Goal Attainment Scaling (GAS) in Pediatric Rehabilitation

Study	Intervention	Population	Design	Results	Conclusion of Study
Angeli et al., 2019	Task-oriented PT/OT interventions	124 children with DD	Retrospective chart review	Decreased level of assistance was a robust dimension of change	Evidence supports use of collaborative goal-setting and client/family preferences in goal-setting
Bexelius et al., 2018	Goal-directed multidisciplinary therapy	42 children with CP, down syndrome, DD	Retrospective multicase study	All goals reliably linked to ICF	Goals set with SMART criteria showed high quality
Harpster et al., 2018	Studies targeting effectiveness of PT/OT interventions	52 studies were reviewed	Systematic review	GAS was clinically useful but not a lot of methodological rigor in research	GAS can be used for a variety of diagnoses and interventions
Law et al., 2004	Conductive education	25 children with CP	Longitudinal pre/post design	GAS was more useful than BO in monitoring client progress and intervention effectiveness	GAS was applicable to children with CP given its reliability, responsiveness, and validity
Vroland-Nordstrand et al., 2016	Goal-directed OT interventions	34 children with LD, MD, ASD	Randomized control trial	16/17 children reached expected goal or higher on GAS in child-goal group	Higher goal achievement in child-identified goal group compared to parent-identified goal group, which supports the inclusion of children in the goal-setting process

Abbreviations: GAS, Goal Attainment Scaling; CP, Cerebral Palsy; DD, Developmental Disabilities; PT, Physical Therapy; OT, Occupational Therapy; ICF, International Classification of Functioning, Disability and Health; BO, Behavioural Objectives; LD, Learning Disability; MD, Movement Disorder; ASD, Autism Spectrum Disorder

suggests that the use of GAS as an individualized measure is more sensitive and responsive to small changes in performance compared to the use of standardized measures alone (Harpster et al., 2018; McDougall & Wright, 2009; Miller et al., 2007; Steenbeek et al., 2011). Please refer to Table 2. Standardized measures are often used to assess and monitor a client pre- and post-intervention to measure changes following an intervention or service; however, these measures usually focus on one aspect of a client's health and may not take an individual client's or family's needs, goals, and preferences into account (McDougall & Wright, 2009). Apart from the differences in sensitivity and responsiveness, standardized outcome measures also tend to have floor and ceiling effects (Turner-Stokes, 2009). Due to these effects, according to McDougall and Wright (2009), standardized measures are often modified or tailored to better suit a client's needs and/or situation; however, individualizing standardized measures may impact its psychometric properties. This could be an indication as to why so many practitioners are incorporating individualized outcome measures into their daily practice or are using them in combination with standardized outcome measures.

In a randomized control trial by Cusick et al. (2006), GAS was compared to the COPM, using an adapted version of the original GAS methodology that employed a 7-point rating scale to further increase the sensitivity of the scale. A two-group pre- and post- design was used to evaluate the impact of a three-month occupational program involving 41 children with cerebral palsy. The results from the study demonstrated that both instruments are robust and sensitive to within-group change, and both detected significant between-group change (Cusick et al., 2006). However, GAS was shown to be more flexible and therefore preferable if a study required unique or family-generated goals, while the COPM was shown to be more time-efficient when it came to training practitioners on its use and developing scales (Cusick et al., 2006). These findings were consistent with an observational pre- and post-test study conducted by Steenbeek et al. (2011), where they assessed the responsiveness of a 6-point GAS scale compared with the GMFM and the Pediatric Evaluation of Disability Inventory (PEDI). The PEDI is another standardized performance measurement tool; however, it is used to evaluate both the capability and performance of functional activities relating to self-care, mobility, and social functioning (Steenbeek et al., 2011). In this study, the 5-point GAS scale was modified into a 6-point rating scale to account for the potential deterioration of a client's baseline performance, which was represented by "-3." Twenty-three children with cerebral palsy, aged two to 13 years, participated in six months of physical, occupational, and speech-language therapy, and the three measures were used pre- and post-treatment. The results showed that 20% of GAS items were not covered by items of the PEDI or the GMFM, indicating that relying solely on standardized measures could have excluded relevant or meaningful rehabilitation goals (Steenbeek et al., 2011).

In a randomized control trial, Miller et al. (2007) evaluated the effectiveness of three occupational therapy treatment groups (occupational therapy, alternate treatment, and no treatment) using a sensory integration approach on 24 children with sensory modulation disorder. Five standardized outcome measures were administered pre- and post-treatment to assess behavior, sensory and adaptive functioning, and

Table 2. Comparison of GAS and other Outcome Measures

Study	Intervention	Population	Design	Results	Conclusion of Study
Cusick et al., 2006	Use of Botox and OT	41 children with spastic CP	Randomized control trial	GAS detected significant changes between groups	Both GAS and COPM were sensitive to change after intervention
Steenbeek et al., 2011	Multidisciplinary therapy	23 children with CP	Longitudinal pre/post design	GAS scales scored complete goal attainment	GAS, PEDI, and GMFM were complementary as evaluative outcome tools
Miller et al., 2007	OT	24 children with sensory modulation disorder	Randomized control trial	OT-SI approach may be effective in ameliorating difficulties of children with SMD	GAS was most meaningful and sensitive outcome measure in study

Abbreviations: GAS, Goal Attainment Scaling; CP, Cerebral Palsy; PEDI, Pediatric Evaluation of Disability Inventory; GMFM, Gross Motor Function Measure; SMD, Sensory Modulation Disorder; OT-SI, occupational therapy sensory integration; OT, occupational therapy

sympathetic nervous system activity (Miller et al., 2007). GAS was used as an individualized outcome measure by subjects' parents, with assistance from the study's primary interviewer to determine and rank-order five goals that identified changes deemed achievable over 20 sessions (Miller et al., 2007). A trained practitioner wrote the GAS items and defined the five levels of possible goal attainment for each participant. Not only did the results indicate that an occupational therapy sensory integration approach may be effective for children living with sensory modulation disorders, but the study also demonstrated that out of all the outcome measures used, GAS was the most meaningful and sensitive (Miller et al., 2007)

Recent Uses of GAS in Alternative Settings

A longitudinal descriptive study by Chiarello et al. (2016) included 109 physical therapists and 296 students, aged five to seven years, with disabilities, including cerebral palsy, Down syndrome, and global developmental delay. The purpose of the study was to describe the individualized outcomes for each student receiving school-based physical therapy services (Chiarello et al., 2016). Using GAS as the outcome measurement tool, and each student having one to four goals, the findings showed that some students made progress, achieved, and even surpassed their expected functional, adaptive, and academic-related goals (Chiarello et al., 2016). These results demonstrated that meaningful and individualized goal setting can help support student outcomes (Chiarello et al., 2016). In King and colleagues' (2000b) feasibility study, the effects of multidisciplinary therapy services provided in a school-based setting were evaluated. The study involved collaborative and meaningful goal setting between the parents, practitioners, and teachers of 16 students with physical or communication needs, for 13 therapy sessions over a four to five-month period (King et al., 2000b). The study found that the 5-point rating GAS methodology was a suitable outcome measurement tool and that the majority of children showed expected or greater than expected improvement on their GAS goals (King et al., 2000b). The authors highlighted that "therapy services targeting functional goals can have important effects on children's goal attainment and level of functioning in the school setting" (King et al., 2000b, p. 20).

Chiarello and colleagues' (2016) and King and colleagues' (2000b) findings are also consistent with those found in Keenan and colleagues' (2014) retrospective study, in that goal-focused and community-based interventions were shown to support functional outcomes and skill development. Keenan et al. (2014) used GAS in combination with the COPM to evaluate the effectiveness of group-based and one-on-one life skills coaching interventions for 50 youths, aged 15 to 21 years, living with a disability such as cerebral palsy, spina bifida, acquired brain injury, or autism. The results indicated that experiential, community-based coaching interventions were effective, and found the combined use of the COPM and GAS provided different but complementary perspectives on the same goal area (Keenan et al., 2014). These findings are consistent with the available research supporting the combined use of GAS and COPM. However, Keenan and colleagues' (2014) findings that pointed to GAS and COPM having different perspectives on the same goal area are somewhat inconsistent with Cusick and colleagues' (2004) finding that the two instruments measured different goal areas altogether. This may be due to Keenan et al. (2014) implementing the COPM first and then developing a GAS goal based on the results, whereas Cusick et al. (2004) created the GAS goal first and then implemented the COPM.

Apart from school-based therapy services, GAS has also been frequently used in early childhood intervention services (Calder et al., 2018). Please refer to Table 3. Calder et al. (2018) conducted a systematic review to examine the use of outcome measures in evaluating the effectiveness of multidisciplinary early childhood interventions. From their search, 10 studies were used, and 14 outcome measures were identified. Of those measures, eight, including GAS, were recommended in the early intervention literature and were considered multidimensional and authentic with moderate to strong robustness (Calder et al., 2018). The methodological quality of the studies included were mixed; however, they were consistent with the existing literature. According to the authors, "GAS has been identified as clinically useful in documenting change over time and is more sensitive to change than normative measures" (Calder et al., 2018). The review also notes the same psychometric concerns that are raised in the available research which relate to user/practitioner bias and the need for adequate training to improve the application of GAS methodology (Calder et al., 2018). In addition to formal training and orientation to GAS method-

Table 3. Recent Uses of Goal Attainment Scaling (GAS) in Alternative Settings

Study	Intervention	Population	Design	Results	Conclusion of Study
Calder et al., 2018	Early childhood multidisciplinary intervention services	10 studies met the inclusion criteria	Systematic review	GAS was 1 of 8 outcome measures recommended in literature	GAS has moderate to strong robustness; is multidimensional and clinically useful/sensitive in documenting change over time
Chiarello et al., 2016	School-based physical therapy	296 students with CP, down syndrome, DD, 109 PTs	Longitudinal pre/post design	Students established/achieved meaningful PT goals using GAS	GAS is useful for progress monitoring and documentation of outcomes
Keenan et al., 2013	Life skills coaching	50 children/youth with CP, spina bifida, ABI, ASD	Retrospective study	Goal attainment was statistically/clinically significant for all interventions	Goal-focused life skills coaching is effective in supporting life skill development for youth with disabilities
King et al., 2000b	School-based multidisciplinary therapy services	16 students with AD, DCD, CP, along with their parents and teachers	Longitudinal pre/post design	Majority of children showed expected or greater than expected improvement on functional goals	GAS is suitable for evaluating treatment outcomes for children receiving school-based therapy services

Abbreviations: GAS, Goal Attainment Scaling; CP, Cerebral Palsy; FMD, Fine Motor Difficulties; ABI, Acquired Brain Injury; ASD, Autism Spectrum Disorder; DD, Developmental Delay; PTs, Physical Therapists; AD, Articulation Difficulties; DCD, Developmental Coordination Disorder

ological applications and procedures, the authors also recommend that GAS should be used in combination with standardized measures (Calder et al., 2018).

Discussion

The aim of this literature review was to examine the current utility and recent applications of GAS in pediatric rehabilitation to support its transferability into child life practice. The retrieved articles for this review were consistent in their descriptions, definitions, and psychometric limitations of GAS, as well as in their use of the original GAS 5-point rating scale (apart from the Steenbeek et al. [2011] study, which employed a 6-point rating scale and the Cusick et al. [2006] study, which used a 7-point GAS scale). However, the purposes, study designs, and methodological rigor when applying GAS were mixed. Sample sizes for the included studies ranged from 16 to 296 participants, with ages ranging from four months to 32 years and diagnoses including cerebral palsy, fine motor difficulty, sensory modulation disorder, acquired brain injury, autism spectrum disorder, developmental delay, developmental coordination disorder, articulation difficulties, learning disability, hemiparesis, and movement disorder. With such a wide range of ages and diagnoses, the results demonstrate that GAS can be used with infants as young as four months of age, as it is an individualized evaluation tool that is capable of detecting small but meaningful changes in performance (King et al., 2000a; McDougall & King, 2007; Miller et al., 2007). The interventions used in the studies included physical, occupational, and speech-language therapy; goal-directed therapy; conductive education; sensory integration activities; school-based therapy; life skills coaching; and early childhood multidisciplinary interventions.

The most prominent considerations derived from the studies collected for this review included being aware of user/practitioner bias, referring to proposed methodological recommendations to ensure good reliability and validity, considering the combined use of GAS with standardized measures or frameworks, and adopting a collaborative and SMART goal setting approach. Most of the articles within this review were categorized as having low to moderate methodological quality in accordance with Melnyk and Fineout-Overholt's (2015) levels of evidence hierarchy. Consistent with the conclusions presented by Harpster et al. (2018), the mix of methodological designs indicate that users/practitioners and researchers/program evaluators should adopt a more rigorous and standardized approach when applying GAS methodology. As evident throughout the available literature, the most significant limitation of GAS is its dependence on its users and their ability to generate unbiased, SMART, valid, and reliable 5-point scales that are meaningful to the client and family. Some recommendations found in this review to help ameliorate this limitation included the combined use of GAS with a standardized outcome measure or frame-

work when developing and rating scales (King et al., 2000a; Keenan et al., 2014; McDougall & Wright, 2007; Law et al., 2004; Turner-Stokes, 2009), using multiple and/or separate raters when setting and evaluating goals (Keenan et al., 2014; King et al., 2000a; King et al., 2000b; McDougall & King, 2007; Maillioux et al., 2007), using predetermined "item-banks" for commonly identified goals to increase generalizability (Krasny-Pacini et al., 2013; McDougall & Wright, 2007; Tennant, 2007), relying on formal resource guides and their procedures (King et al., 2000a; King et al., 2000b), being precise when developing the five levels of goal attainment (King et al., 2000a; McDougall & King, 2007), and receiving formal training in the tool's use (Calder et al., 2018; Harpster et al,. 2018; McDougall & King, 2007; Steenbeek et al., 2007; Tennant, 2007).

While the recommendations proposed in the existing literature aim to improve the overall reliability and validity of GAS scales, the evidence is mixed on whether all these recommendations would be applicable or appropriate if used in actual clinical practice. For example, while many studies suggested the use of different practitioners when it comes to setting a goal, providing an intervention, and then rating the client's changes in performance, McDougall and King (2007) stated that it is more realistic and cost effective for the treating practitioner to be involved in the goal setting process. Another example is the use of predetermined item-banks, or commonly identified goals, to help with generalizability, as this recommendation may defeat the purpose of using an individualized outcome measurement tool (McDougall & Wright, 2009). Overall, the findings from this literature review indicate that while GAS has proven to be a flexible and collaborative evaluation tool that is frequently used in pediatric rehabilitation, the current research suggests that users/practitioners need to be aware of the tool's limitations, as well as consider some of the proposed recommendations to ensure robust, valid, and reliable scale construction (Harpster et al., 2018; Krasny-Pacini et al., 2013).

In relating the findings gathered from this literature review back to Bandura's Social Cognitive Theory (1997), Locke and Latham's Goal-Setting Theory (2002), and the ICF-CY (World Health Organization, 2007), GAS provides a collaborative, biopsychosocial, and patient- and family-centered approach to goal setting. This means that goals should be created to reflect what is most important in the client's and family's life and should resonate with any of the domains embedded in the ICF-CY framework (Krasny-Pacini et al., 2013; McDougall & Wright, 2009). While practitioners tend to focus on impairment-based goals, clients and families typically focus on achieving goals that are consistent with the activity and participation domains (McDougall & Wright, 2009; Rosenbaum & Stewart, 2004). Therefore, by involving and valuing the client and family in the goal-setting process, some potential advantages of using GAS could include increased client and family satisfaction; increased client motivation toward goal attainment; increased content validity; as well as the establishment of realistic client, family, and practitioner expectations about treatment planning (McDougall & King, 2007; Miller et al., 2007).

Implications

GAS is an individualized outcome measure designed to not only monitor or evaluate change over time for individual clients, but it can also be used to evaluate the effectiveness of interventions, services, and programs (McDougall & King, 2007). GAS is frequently used in pediatric rehabilitation settings by multidisciplinary practitioners, as it can be applied to a variety of interventions, ages, and diagnoses; however, its "success depends upon formulating unambiguous goals and methods… it is flexible to cover most situations, it is patient-specific, and can be easily taught and used by the whole team" (Bovend'Eerdt et al., 2009, p. 359; Donnelly & Carswell, 2002; Harpster et al., 2018; Mertens & Wilson, 2012). The primary benefit of using GAS is rooted in its collaborative nature and its ability to measure clinically significant change in individual performance and goal attainment (King et al., 2000a). This is different from standardized measures, as they typically rely on generic scales that may not capture meaningful and relevant outcomes that are important to the client or family (Krasny-Pacini et al., 2013). Therefore, as GAS uses a biopsychosocial and patient- and family-centered approach to goal setting, its methodology is unique and appealing to practitioners working in pediatric rehabilitation settings (Bovend'Eerdt et al., 2009; King et al., 2000a; Maillioux et al., 2007).

Implications from the literature review findings indicate the need for more rigorous and standardized applications of GAS methodology, as well as the need for more robust study designs moving forward. In

terms of implications for research and training and to allow for more accurate applications of GAS, future studies should also consider including descriptions of the specific and formal training that was implemented as part of their research. Prospective studies should continue to apply GAS to a variety of diagnoses, age groups, and disciplines, such as the child life specialty, as this methodology is in keeping with patient- and family-centered care approaches valued by the profession (Scobbie et al., 2009; Steenbeek et al., 2007).

In terms of implications specific to child life practice, it is known that professionals today should be relying on current and relevant evidence-based research to provide high quality care to their clients (Bexelius et al., 2018). Considering many practitioners are already using GAS as a validated and individualized outcome measure, child life specialists should also strive to make high quality, relevant, and meaningful goals with their clients and families. More specifically, they should develop goals with clients and families in systematic ways that adhere to an overarching framework. This is especially true for child life specialists working with long-term clients or client populations that are already accustomed to using 5-point rating GAS scales with other members of the multidisciplinary health care team, such as children living with cerebral palsy who are accustomed to setting physiotherapy GAS goals. Goals that are collaboratively set with clients, families, and child life specialists could focus on a myriad of interventions. For example, specific child life GAS goals could focus on improvements to a client's coping and their ability to utilize coping strategies without assistance or even improvements in a client's ability to express and communicate their emotions without assistance. Whenever a client is expected or anticipated to demonstrate a change in individual performance following a child life intervention or service, GAS could be implemented, as its 5-point rating scale could help target individual and unique intervention changes (Miller et al., 2007).

Should a child life specialist choose to utilize this tool in their daily practice, they would ultimately need to receive comprehensive training on the tool's use and be made aware of the common errors and biases associated with GAS methodology (McDougall & King, 2007; Turner-Stokes, 2009). This is important, as new users need to ensure that they are applying the tool reliably, effectively, and with enough methodological rigor (King et al., 2000b; Steenbeek et al., 2007). In addition, as many practitioners outside of the child life profession are already utilizing this methodology in their daily practice, child life specialists could also take the opportunity to observe and collaborate with these allied health professionals in order to thoroughly understand the tool's practical and wide applications. This collaboration could potentially enhance communication among the multidisciplinary health care team by encouraging the development and/or expansion of shared goals, as well as the establishment and awareness of clear roles and allocation of responsibilities. Not only would the adoption of GAS methodology be consistent with collaborative and patient- and family-centered care approaches, it could also provide a means to evaluate child life interventions, as well as the program itself (Wilson & Cross, 2009). For example, GAS could be used to ensure that a child life specialist's goals for interventions are congruent with the overall goals, missions, and values held by their program (Wilson & Cross, 2009). As stated by Wilson and Cross (2009), while "the attributes of child life programs vary, the most crucial elements remain constant: to ensure quality services to patients and families, and to maintain professional competency and consistency of programming" (p. 218). Therefore, it is evident that GAS would likely be both compatible and complementary with the daily practices of child life specialists.

Conclusion

When providing rehabilitation interventions and services to individual clients and families, health care practitioners should rely on the knowledge and unique perspectives held by their clients and families to inform the setting of clear, meaningful, and relevant goals. Considering that goals have the ability to enhance an individual's competence, motivation, and participation, as well as improve their functional outcomes, it is not surprising that goal setting has become a core process in pediatric rehabilitation (McDougall & King, 2007; Øien et al., 2010; Turner-Stokes, 2009). What is so unique about GAS and its collaborative approach to the setting and rating of individual client goals is its ability to include and evaluate the outcomes that are most important to each client in the context of their own life (Steenbeek et al., 2007; Turner-Stokes, 2009). As there is so much variation in the way child life specialists set goals and implement their interventions and services, they should consis-

tently utilize individualized outcome measures such as GAS in their daily clinical practices, as they have the ability to target the unique goals and perspectives held by clients, families, and practitioners.

By specifically examining the current applications, advantages, and psychometric properties of GAS used in pediatric rehabilitation, this paper argues that GAS could and should be integrated into child life practice, not only for the evaluation of client's progress towards meeting goals, but also for assessment of the effectiveness of child life interventions, services, and programs. According to Hollon and Skinner (2009), "the success of child life work is dependent on the accurate and ongoing assessment of a child and [their] family as they experience and respond to health care encounters" (p. 116). Based on the information gathered from the studies included in this review and the recommendations provided for the potential transferability of GAS into child life practice, this outcome measurement tool would likely be effective for child life specialists working in pediatric rehabilitation settings, as it can help them create more personalized care plans for clients and families.

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