ity of graded visual analogue scales to discern meaningful differences for a population of young manual wheelchair users and their practitioners within low- and middle-income countries.

Method: This paper reviews the literature on continuous scaling applicable to assistive technology outcomes. We then describe the development of graded visual analogue scales using grades as anchors within a mixed methods protocol. Studies drawing on eleven datasets related to wheelchair and prosthetic/orthotic functioning are reviewed to identify important parameters for validation and to critically evaluate tool performance.

Key results: Graded visual analogue scales with grades are anchors demonstrate strong ability to discern meaningful difference. This method provides data with enough detail to make it useful usable for clinical and design responses.

Conclusion: Meaningful outcomes measurement with useable tools is critical to evaluate and build assistive technology access globally, and a high priority considering the UN Sustainable Development Goals. This paper proposes a protocol for use of graded visual analogue scales and demonstrates evidence of its reliability and validity across a range of studies. The graded visual analogue scale approach to outcome measurement offers relevant, rapid and sensitive measures, widely applicable. The paper concludes with considerations for the potential use of continuous scaling from the twin perspectives of consumer usability and utility in low- and middle-income countries.

Keywords: outcomes, disabilities, person-centered, continuous

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Towards a Successful Match Between User and Assistive Technology: A Correlational Study on User's Satisfaction, Perceived Effectiveness, and Psychosocial Impact of an Assistive Solution

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Background: This work is an exploratory study to investigate the relation among three main psychosocial factors measured after an Assistive Technology (AT) system provision: (i) the user's satisfaction, (ii) the perceived effectiveness, and (iii) the psychosocial impact of the assistive solution. The main objective is to understand whether the correlated psychosocial measures can predict a successful outcome of the AT assignation process. The study embraces the ICF's biopsychosocial perspective of disability and the Matching Persons and Technology model by adopting the Assistive Technology Assessment (ATA) process, an ideal model for the effective outcome of AT assessing and provision (Federici & Scherer, 2018).

Method: The study was conducted in an AT service delivery center by following the guidelines provided by the ATA model. Fifty-five subjects (72.7% males, min 4 – max 14 years old) participated in the study, which consisted of five main phases. Two preliminary phases focused on the analysis of participants needs with the aim to identify the best AT solution through a psychological counseling process and the administration of the Matching Assistive Technology & Child (MATCH; Federici et al., 2009). Then, the third phase of post-assignation focused on the outcome of the assistive solution assignation process measuring the user's satisfaction and the perceived effectiveness, as well as the functional independence, well-being, and quality of life. The factors were assessed through (i) the Quebec User Evaluation of Satisfaction with assistive Technology (QUEST; Demers et al., 2002), (ii) the Individually Prioritized Problem Assessment (IPPA; Wessels et al., 2002), and (iii) the Psychosocial Impact of Assistive Devices Scale (PIADS; Jutai and Day, 2002). A final post-assessment phase consisted in providing the users with tailored training for the use of the assigned AT and in conducting interviews to caregivers (teachers and educators) and peers to investigate the impact of the AT solution in the users' milieu.

Key results: Findings after the AT system provision showed high levels of user's satisfaction (Total QUEST $M = 4.80$; QUEST device $M = 4.71$; QUEST services $M = 4.99$), an increase in quality of life levels and a decrease of about 40% of the perceived difficulty of use. A highly significant positive correlation among the three questionnaires QUEST, IPPA, and PIADS was found ($0.473 \leqslant r \leqslant 0.762; p \leqslant 0.01$). A significant linear relationship between the questionnaire scores and the abandonment rate shows that questionnaire scores can predict each other ($0.224 \leqslant R^2 \leqslant 0.581; p \leqslant 0.01$). Finally, the AT assessment outcome showed a 5.17% rate of abandonment.

Conclusion: A positive relation among psychosocial factors of users' satisfaction, perceived effectiveness, and the psychosocial impact of the assistive solution highlighted a statistical dependence among the three different metrics recommended by the ATA model for the post-assignation assessment process (QUEST, IPPA, and PIADS), also explaining the strength of each psychosocial factor on the AT assessment outcome in terms of abandonment of the assistive device. Future works will extend the age range and focus on designing a mathematical model for predicting the percent probability of AT getting abandoned by the user, immediately after the post-assignation assessment process.

Keywords: Assistive Technology Assessment model, Matching Assistive Technology & Child – MATCH, QUEST, IPPA.

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What is the pay-off? Usability and cost benefit of assistive technology at workplace

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Background: Assistive Technology (AT) devices enable individuals with disabilities (IWDs) to fulfill work roles and engage in meaningful employment. However, the employment rate of IWDs in the United States is significantly lower (18.7%) compared to that of able-bodied individuals (65%). A major factor here pertains to barriers with implementation of AT devices. To highlight the role of AT, we conducted a comprehensive survey of employees with disabilities on their use and utilization of workplace AT. Specifically, the study sought to: a) identify AT devices that are being used at work; b) examine how well the devices effectively and efficiently fulfilled work roles; c) examine perceived skills and accommodations for use of AT; and above all; d) analyze the cost-benefit of integrating AT devices at workplace.

Method used: The survey was developed using a pilot-tested work-driven framework, the Usability Scale for Assistive Technology-Workplace (USAT-W). The framework first delineates the work roles of the employee, focuses on tasks within each role, and then considers the AT support needed to fulfill each role. The effectiveness and efficiency with which the employee interacts with the AT devices, as well as the skills involved and accommodations received for each

device within the roles, are then evaluated. This framework was adapted into the survey, pilot tested with a small cohort of employees with disabilities, and then uploaded on Qualtrics survey database. We included an additional section seeking information on the employee's income and total cost with acquisition, training, and service for each AT device. Convenience sampling was used to recruit participants across the United States from multiple sources- Qualtrics health panels, disability support networks, and Centers for Independent Living.

Key Results: 206 employees with disabilities who used AT (with an average 8.1 years of work experience) completed the survey. The three main categories of AT were worksite modifications (25.7%), devices for mobility (23.8%) and computer access devices (21.8%). Nearly 90% of respondents rated themselves to be "productive" to "very productive" in all work roles involving AT. About 84% to 93% stated their AT devices to be "effective" or "very effective", and "efficient" or "very efficient" for fulfilling their work roles. Significant correlations (r ranging from 0.3 to 0.6; $p < 0.01$) were detected between AT skills, accommodations, and work productivity. In contrast to the average annual income of \$47,135 (Std.dev = \$33,558), the average total cost of AT devices was \$7074 (Std.dev = \$15,868), almost a 7:1 ratio. Despite the high variance, the one-time total cost of AT devices was a much smaller fraction of the respondents' annual income across all impairments and job categories.

Conclusion: These findings indicate the breadth and role of AT devices at work. The economic benefits of providing AT with respect to income and earning potential far surpass any associated implementation costs. While past research has delineated barriers to AT provision, underscoring the value and economic pay-off of workplace AT is critical to highlight the role of AT to service providers, employers, and policy makers.

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Technology's Impact on Tasks of Employees with Disabilities in Germany (2006–2017)

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Background: The ongoing computerization of our economy leads to a transformation of the world of