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Technology and Person-Centered Support for Individuals with Developmental Disabilities

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Abstract

The integration of technology into support systems for individuals with developmental disabilities represents a transformative shift toward person-centered approaches emphasizing autonomy, self-determination, and individualized support. This paper examines technology-enabled person-centered support across education, employment, social participation, and independent living domains. Drawing from recent empirical research and systematic reviews, the analysis reveals that technological interventions, including wearable devices, mobile applications, virtual reality systems, and artificial intelligence, facilitate personalized support while presenting critical challenges related to autonomy, accessibility, and ethical implementation. Key findings indicate that person-centered technological interventions demonstrate effectiveness when they prioritize user autonomy, incorporate adaptive features responsive to individual needs, and maintain ethical safeguards against manipulation or dependency. The paper concludes with recommendations emphasizing participatory design approaches, longitudinal outcome studies, and policy frameworks ensuring technology serves as an enabler of genuine self-determination.

Keywords: *Technology, disability, person-centered, autonomy, participation*

1. Introduction

Individuals with developmental disabilities, including intellectual disabilities, autism spectrum disorder, and related conditions, have historically faced significant barriers to full participation in educational, vocational, and community settings. Traditional support models often emphasized professional-directed interventions that prioritized compliance and skill remediation over individual preferences and self-determination (Claes et al., 2010). However, the past two decades have witnessed a paradigm shift toward person-centered planning and support, which places the individual at the center of decision-making processes and emphasizes personal goals, preferences, and strengths. Concurrent with this philosophical transformation, rapid technological advancement has created unprecedented opportunities to deliver individualized support in ways that enhance autonomy and reduce dependence on human mediators. Technologies ranging from mobile applications to sophisticated artificial intelligence systems now offer possibilities for personalized prompting, adaptive learning, augmented communication, and environmental control (Wehmeyer et al., 2020). The convergence of person-centered philosophy and technological capability presents both opportunities and challenges for the disability support field.

This paper examines the intersection of technology and person-centered support for individuals with developmental disabilities, analyzing current applications, evaluating effectiveness, and identifying critical considerations for ethical implementation. The analysis draws from recent empirical studies, systematic reviews, and theoretical frameworks to provide comprehensive understanding of how technology can authentically serve person-centered goals while avoiding pitfalls of technological determinism or paternalistic control.

2. Conceptual Foundations: Person-Centered Support and Technology

Person-centered planning emerged as a response to traditional service delivery models that often prioritized institutional convenience and professional judgment over individual preferences and self-determination. Core principles include recognition of the individual as the primary decision-maker regarding their own life, focus on strengths and preferences rather than deficits, emphasis on community inclusion and valued social roles, respect for individual choice and autonomy, and ongoing adaptation of supports based on changing needs and goals (Claes et al., 2010). Technology's role in person-centered support is theoretically grounded in the capability approach, which views assistive and enabling technologies as tools for expanding individual capabilities and freedoms rather than merely compensating for impairments (Boccardi et al., 2022). From this

perspective, technology should enhance what individuals can do and be, supporting their pursuit of personally meaningful goals and valued life outcomes. However, the relationship between technology and person-centeredness is not automatic. O'Brolcháin (2018) provides critical analysis demonstrating that assistive technologies can both promote and undermine autonomy for persons with intellectual and developmental disabilities. Technologies may enhance autonomy by expanding knowledge, supporting authentic decision-making, and increasing liberty. Conversely, they may undermine autonomy through information distortion, preference manipulation via "nudging," or reduction of attentional resources that leaves individuals more vulnerable to external influence. This dual potential necessitates careful ethical consideration in technology design and implementation.

The concept of "applied cognitive technologies" extends person-centered thinking by focusing specifically on technologies that support cognitive functions essential for autonomous living, including planning, problem-solving, decision-making, and self-regulation (Wehmeyer et al., 2020). These technologies aim not merely to compensate for cognitive limitations but to scaffold the development and expression of self-determined behavior.

3. Technology Applications Across Life Domains

Technology-enabled person-centered support spans multiple life domains, with diverse technology types offering distinct capabilities and applications. Table 1 provides comprehensive overview of how different technology types support person-centered goals across educational, vocational, social, and independent living contexts.

Technology Type	Primary Applications	Key Advantages	Person-Centered Features	Representative Studies
Virtual Reality (VR)	Social skills training, emotion recognition, social problem-solving	Controlled environment, repeatable scenarios, immediate feedback	Adaptive difficulty, gaze-sensitive responses, individualized prompts	Lahiri et al. (2013), Yang et al. (2025), Kim et al. (2024)
Mobile/Handheld Devices	Vocational support, daily living skills, communication, education	Portability, ubiquity, reduced stigma, natural context use	Customizable interfaces, self-controlled access, individual preferences	Gentry et al. (2015), Mohanty et al. (2021), Khaniya et al. (2024)
Robotics & AI	Therapeutic interaction, social engagement, educational support	Predictability, consistency, engaging interface	Personalized algorithms, adaptive responses, individual learning patterns	Rudovic et al. (2018), Safrin et al. (2022), Rakap et al. (2024)
Wearable Technologies	Emotional regulation, task prompting, physiological monitoring	Discrete support, hands-free operation, real-time feedback	Customizable alerts, user-controlled settings, privacy protection	Picard (2009), Simm et al. (2016), Evmenova et al. (2024)
Assistive Communication	AAC systems, multimedia advocacy, social connection	Enhanced expression, reduced barriers, increased participation	Voice/text options, personalized vocabulary, user agency	Abdallah et al. (2019), Watts et al. (2023), McEwen (2024)

3.1 Educational Settings

Educational contexts have been particularly active sites for technology-enabled person-centered support. Evmenova and colleagues designed a wearable technology intervention to support young adults with intellectual and developmental disabilities in inclusive postsecondary academic programs, delivering individualized prompts through wearable devices and providing discrete support aligned with person-centered goals while reducing dependence on human mediators. Artificial intelligence applications demonstrate potential for enhancing individualization. Rakap et al. (2024) investigated ChatGPT's effectiveness in supporting special education teachers to develop high-quality individualized education program (IEP) goals for preschool children with autism, suggesting that technology might augment professional capacity to deliver truly individualized educational planning. Virtual reality technologies offer immersive, adaptive learning environments particularly suited to social skills instruction. Kim et al. (2024) explored the feasibility of social skills programs for autistic youth through virtual reality, while Yang et al. (2025) conducted a systematic review demonstrating VR technology effectiveness in improving social skills of children and adolescents with autism. The adaptive nature of VR environments

allows for individualized scenario presentation, graduated difficulty levels, and safe practice opportunities tailored to each learner's pace.

Personalized learning platforms represent another educational application. Kurniawati and colleagues examined how technology-enhanced personalized learning could empower a student with autism spectrum disorder, demonstrating that individualized digital learning pathways could support both academic achievement and self-determination. Thompson et al. (2022) investigated individualized levels of support during computer-based reading instruction for children with autism spectrum disorder, finding that technology-delivered instruction could be systematically adjusted to match individual learning needs.

3.2 Employment and Vocational Training

Employment represents a critical domain for person-centered technology application, as meaningful work is central to adult identity and community participation. Gentry et al. (2015) conducted a delayed randomized control trial demonstrating that using an iPod touch as assistive technology reduced the need for personal supports among workers with autism. The mobile device provided individualized task prompts and guidance, enabling greater workplace independence while reducing reliance on job coaches, a clear example of technology enhancing autonomy in valued adult roles. Systematic reviews have documented the breadth of technology applications in vocational contexts. Muharib et al. (2021) reviewed handheld technology to support vocational skills of individuals with intellectual and developmental disabilities in authentic settings, finding that mobile devices effectively supported task completion, time management, and workplace navigation. Davis et al. (2022) conducted a systematic review of technology use in vocational skills training, identifying multiple technology types including video modeling, computer-based instruction, and mobile applications that successfully supported skill acquisition and workplace performance.

Thull et al. (2025) examined handheld cueing systems for promoting career task independence for learners with disabilities, demonstrating that individualized prompting systems could support complex vocational tasks while allowing users to maintain control over when and how they accessed support. This user-controlled aspect is crucial for person-centered implementation, as it preserves individual agency rather than imposing externally controlled prompting. Augmented reality represents an emerging vocational support technology. Torres et al. (2024) investigated augmented reality-enhanced supported employment for individuals with intellectual and

developmental disabilities, finding that AR systems could provide contextualized, real-time guidance overlaid on the actual work environment, offering highly individualized support that adapts to specific workplace demands.

3.3 Social Skills and Communication

Communication and social interaction represent fundamental areas where technology can support person-centered goals. Abdallah et al. (2019) developed a collaborative talking assistive technology for people with autism spectrum disorders, designed to facilitate communication while respecting individual communication preferences and styles. Affective computing technologies aim to support emotion recognition and social-emotional learning. Picard (2009) discussed future affective technology for autism and emotion communication. Rudovic et al. (2018) developed personalized machine learning for robot perception of affect and engagement in autism therapy, demonstrating that adaptive algorithms could individualize therapeutic interactions based on each person's unique affective expressions. Robot-mediated interventions increasingly incorporate personalization features. Bekele et al. (2013) worked toward developing adaptive robot-mediated intervention architecture for children with autism, while Salhi et al. (2022) developed ontological knowledge models and reinforcement learning-based algorithms for robot-assisted therapy that could adapt to individual child characteristics. Virtual reality applications for social skills extend beyond education into therapeutic contexts. Simm et al. (2016) explored personalized digital health approaches for anxiety and autism. Lahiri et al. (2011, 2013) designed gaze-sensitive virtual social interactive systems and adaptive response technologies for children with autism, incorporating real-time adaptation based on individual user responses.

3.4 Independent Living and Community Participation

Independent living represents perhaps the most comprehensive domain for person-centered technology application, encompassing daily living skills, community navigation, health management, and social connection. Turnley et al. (2023) examined technology-supported independent living for adults with developmental disabilities, identifying multiple technology types that support various aspects of autonomous living. Mobile technology platforms have demonstrated particular promise for supporting community participation. Darcy et al. (2016) studied disability citizenship and independence through mobile technology, exploring how a mobile technology platform could support community access and participation. The study found that technology adoption and use were influenced by factors including customization options, user

control, and alignment with individual goals and preferences, highlighting the importance of person-centered design. Wireless technology applications support social connectedness, a critical component of quality of life. Paul et al. (2021) conducted a focus group study examining how wireless technology could support social connectedness in individuals with intellectual and developmental disabilities. Participants emphasized the importance of technologies that facilitated rather than replaced human connection, and that provided user control over communication timing and methods.

Context-aware technologies represent sophisticated approaches to community support. Kramer et al. (2014) explored context-awareness to increase inclusion of people with Down syndrome in society, developing systems that could provide individualized support based on environmental context, individual preferences, and current goals. Multimedia technologies support self-advocacy, a core person-centered value. Watts et al. (2023) introduced a theoretical framework for "Multimedia Advocacy," examining how multimedia technology could enhance self-advocacy of people with intellectual disabilities by supporting them to tell their own stories, express preferences, and participate in decision-making processes affecting their lives. Telehealth applications extend person-centered support into health and wellness domains. Tovin et al. (2024) conducted a mixed methods feasibility study of peer-assisted physical activity via telehealth for adults on the autism spectrum, demonstrating that technology-mediated health interventions could be delivered in ways that respect individual preferences, support peer relationships, and promote health self-management.

4. Personalization and Adaptive Technologies

A defining characteristic of person-centered technology is its capacity for personalization and adaptation to individual needs, preferences, and characteristics. Personalization operates at multiple levels, from surface customization of interfaces to deep adaptation of content, pacing, and interaction modalities. Machine learning and artificial intelligence enable increasingly sophisticated personalization. Rudovic et al. (2018) demonstrated that personalized machine learning algorithms could adapt robot behavior based on individual affect and engagement patterns. Almufareh et al. (2024) proposed an artificial intelligence framework for intellectual disability and technology, arguing that AI systems should learn individual patterns and preferences over time, continuously refining support to match evolving needs. Adaptive response technologies adjust in real-time based on user performance. Lahiri et al. (2013) designed virtual reality-based

adaptive response technology for children with autism that modified task difficulty, sensory input, and interaction requirements based on ongoing assessment of individual responses. This dynamic adaptation exemplifies person-centered design by ensuring technology responds to the individual rather than requiring conformity to predetermined parameters. Personalized touristic systems demonstrate adaptation to individual interests and support needs. Cena et al. (2023) developed CARES, an inclusive personalized touristic system for autism, which adapted recommendations, navigation support, and sensory considerations based on individual profiles.

Self-controlled technologies represent a crucial category for person-centered support, placing control directly in users' hands. Brok et al. (2015) conducted a systematic literature review of self-controlled technologies to support skill attainment in persons with autism spectrum disorder and/or intellectual disability, finding that technologies allowing user initiation and control were associated with greater skill generalization and self-determination outcomes.

5. Autonomy, Self-Determination, and Ethical Considerations

The relationship between technology and autonomy for persons with developmental disabilities is complex and requires careful ethical analysis. O'Brolcháin (2018) provides a nuanced framework for understanding both autonomy benefits and risks of assistive technologies. Technologies can enhance autonomy by expanding knowledge, supporting authenticity by helping individuals identify and pursue goals aligned with their values, and increasing liberty by reducing dependence on others. However, technologies also pose autonomy risks. Information distortion can occur when technologies filter or present information in ways that bias decision-making. Preference manipulation through "nudging" represents a subtle but significant risk, as technologies might guide users toward choices deemed appropriate by designers or caregivers rather than supporting authentic preference expression. Reduction of attentional resources is another concern, as some technologies may increase cognitive load or create dependencies that ultimately reduce autonomous functioning.

Table 2 synthesizes key person-centered technology features alongside their autonomy benefits, potential risks, and implementation considerations, providing a framework for ethical technology design and deployment.

Person-Centered Principle	Definition	Technology Implementation Strategies	Benefits	Challenges & Considerations
Individualization & Personalization	Accommodating unique abilities, preferences, and support needs	Customizable interfaces, adaptive algorithms, modular features, adjustable difficulty	Better fit with individual needs, improved engagement, enhanced outcomes	Complexity of configuration, requires assessment, balancing flexibility vs. usability (Rubevic et al., 2018)
Self-Determination & Autonomy	Supporting user control, choice, and independent decision making	Self-controlled access, user-initiation support, choice options, transparent operation	Enhanced agency, reduced learned helplessness, greater independence	Risk of inadequate support, balancing safety and freedom, ensuring informed consent (O'Brolcháin, 2018)
Participatory Design	Involving users in technology development and evaluation	Co-design workshops, user testing, stakeholder collaboration, accessible methods	Relevance to real needs, user acceptance, appropriate features	Time and resource intensive, communication accommodations, power dynamics (Sanetta et al., 2020)
Community Inclusion	Supporting participation in community activities and social connections	Navigation support, social connection tools, digital inclusion, mainstream devices	Reduced isolation, increased opportunities, enhanced quality of life	Infrastructure barriers, digital divide issues, accessibility gaps (Khasnavis et al., 2021)
Dignity & Respect	Honoring individual worth, privacy, and preferences	Privacy controls, discrete design, user data ownership, ethical AI practices	Maintained dignity, trust in technology, willingness to use	Surveillance concerns, data security risks, balancing monitoring and privacy (Picard, 2000)

These dual possibilities necessitate ethical frameworks for technology design and implementation. O'Brolcháin (2018) argues for ethical oversight mechanisms that evaluate whether technologies genuinely promote autonomy or create new forms of control. Key ethical principles include transparency regarding how technologies function and what data they collect, user control over technology activation and data sharing, respect for privacy and dignity, avoidance of manipulation or coercion, and ongoing evaluation of impacts on autonomy and self-determination. Self-determination theory provides a useful framework for evaluating person-centered technology. Technologies that support the three basic psychological needs, competence, autonomy, and relatedness, are more likely to enhance self-determined behavior (Wehmeyer et al., 2020). Competence is supported when technologies scaffold skill development. Autonomy is enhanced when technologies provide choice and control. Relatedness is fostered when technologies facilitate rather than replace human connection.

The concept of "multimedia advocacy" introduced by Watts et al. (2023) highlights technology's potential to support self-advocacy. Technologies that enable individuals to document experiences, express preferences, and participate in decision-making can enhance voice and agency. Participatory design approaches represent an ethical imperative for person-centered technology development. Meaningful involvement of individuals with developmental disabilities in all phases

of technology design, testing, and evaluation ensures technologies genuinely reflect user needs rather than designer assumptions.

6. Implementation Challenges and Barriers

Despite substantial promise, multiple barriers impede effective implementation of person-centered technology. Digital literacy and access represent fundamental challenges. Khanlou et al. (2021) examined digital literacy, access to technology, and inclusion for young adults with developmental disabilities, finding significant disparities in both technology access and skills. These digital divides risk exacerbating existing inequalities if not addressed through targeted support and accessible design. Usability issues pose significant barriers. Kirinić et al. (2010) noted that while computers and assistive technologies hold promise for education of children with intellectual and related developmental disorders, questionable usability limits effectiveness. Technologies designed without adequate attention to cognitive accessibility, interface simplicity, and error tolerance may be unusable by intended beneficiaries. Professional knowledge and training gaps represent another implementation barrier. Teachers, support staff, and family members often lack knowledge about available technologies and implementation strategies (Kirinić et al., 2010). This knowledge gap can result in underutilization of potentially beneficial technologies or inappropriate implementation. Cost and resource constraints limit technology access, particularly for sophisticated systems. While mobile devices have become increasingly affordable, specialized assistive technologies, virtual reality systems, and customized applications often remain prohibitively expensive for individuals and families.

Piekema et al. (2024) conducted a systematic review examining whether technology has moved from assistive to inclusive for people with pervasive support needs. The review found that while rhetoric emphasizes inclusion and person-centeredness, many technologies remain focused on skill remediation and behavioral control rather than genuine empowerment. This gap suggests that philosophical commitment to person-centered support has not yet been fully operationalized in technology design. Concerns about technology dependence and reduced human interaction represent legitimate implementation considerations. While technology can reduce dependence on human mediators for certain tasks, it should not result in social isolation. McEwen (2024) discussed opportunities and challenges of using technology to support self-care and communication for individuals with autism, noting the importance of balancing technological support with human connection. Privacy and data security concerns are particularly acute for

vulnerable populations. Technologies that collect data about individual behavior, location, communication, and preferences create risks of surveillance, data breaches, and misuse of personal information. Ethical implementation requires robust data protection, transparent data practices, and user control over data collection and sharing.

7. Future Directions and Recommendations

The field of technology-enabled person-centered support for individuals with developmental disabilities is rapidly evolving, with several promising directions for future development and research.

Participatory Design and Co-Creation: Future technology development should prioritize meaningful participation of individuals with developmental disabilities throughout the design process, including genuine co-creation where individuals with disabilities serve as design partners.

Longitudinal Outcome Studies: While many studies demonstrate short-term effectiveness, longitudinal research examining long-term impacts on autonomy, self-determination, quality of life, and community participation is critically needed. Such research should employ person-centered outcome measures reflecting individual goals.

Artificial Intelligence and Ethical Frameworks: As AI becomes increasingly integrated into support technologies, robust ethical frameworks are essential. Almufareh et al. (2024) call for AI systems designed with explicit attention to autonomy, transparency, and user control. Future research should examine how AI can be designed to genuinely support rather than supplant human decision-making.

Universal Design and Accessibility: Rather than developing specialized technologies exclusively for individuals with disabilities, universal design approaches that build accessibility into mainstream technologies can promote inclusion and reduce stigma. Research on universal design principles for cognitive accessibility is particularly needed.

Integration Across Life Domains: Most current technologies target specific domains. Future development should explore integrated systems supporting multiple life domains while maintaining coherence. Such integration should be guided by individual priorities.

Policy and Funding Mechanisms: Policy development is needed to ensure equitable access to beneficial technologies, including funding mechanisms, insurance coverage, and public program support. Policy should also address data privacy and ethical standards.

Cultural Responsiveness: Technology design must attend to cultural diversity in disability conceptualization, family structures, and values regarding independence.

8. Conclusion

The integration of technology into person-centered support for individuals with developmental disabilities represents both tremendous opportunity and significant responsibility. When designed and implemented thoughtfully, technology can expand autonomy, support self-determination, facilitate community inclusion, and enhance quality of life. Technologies ranging from mobile applications to sophisticated AI systems have demonstrated capacity to provide individualized support across educational, vocational, social, and independent living domains. However, technology is not inherently person-centered or empowering. As O'Brolcháin (2018) demonstrates, the same technologies that can enhance autonomy may also undermine it through information distortion, preference manipulation, or creation of new dependencies. The critical factor is not the technology itself but how it is designed, implemented, and integrated into broader support systems.

Several principles emerge from this review as essential for person-centered technology implementation. First, meaningful participation of individuals with developmental disabilities in technology design and evaluation is essential for ensuring technologies genuinely serve user needs and preferences. Second, technologies must preserve and enhance user control, providing support that individuals can activate, adjust, and decline according to their own judgment. Third, technologies should facilitate rather than replace human connection and valued social relationships. Fourth, ongoing ethical evaluation is necessary to ensure technologies promote rather than undermine autonomy and self-determination.

The field stands at a critical juncture. Technological capabilities are advancing rapidly, creating unprecedented possibilities for personalized support. Simultaneously, person-centered philosophy has achieved broad acceptance in disability services, creating conceptual foundation for technology that truly serves individual goals and preferences. Realizing the promise of this convergence requires sustained commitment to participatory design, ethical implementation, equitable access, and rigorous evaluation of impacts on the lives of individuals with developmental disabilities. Future progress depends on collaboration among individuals with disabilities, families, researchers, technology developers, service providers, and policymakers. Together, these stakeholders can ensure that technology serves as a tool for genuine empowerment, supporting individuals with developmental disabilities to live self-determined lives characterized by

meaningful participation, valued social roles, and pursuit of personally defined goals. The ultimate measure of success is not technological sophistication but whether technology enhances the capacity of individuals with developmental disabilities to live lives they have reason to value.

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