Computer Technology in Clinical Psychology Services for People with Mental Retardation: A Review

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Abstract: We provide a selective review, based mainly on publications from the past 10 years, of potential uses of computer technology in clinical psychology services for people with mental retardation and other developmental disabilities. The review is organized according to three general stages of a scientist-practitioner working model: assessment, formulation, and intervention. Examples of technologies that can facilitate the work of practitioners at each of these stages are given. In conclusion, we identify a number of practical difficulties with the uptake of computer technologies, and issues for future research. We also emphasize the potential for using computers to assist in staff training activities in mental retardation services, and supporting the advocacy activities of people with mental retardation and their carers.

The purpose of the present review is to provide an account of developments in the use of computer technologies to augment work of clinical psychologists with people with mental retardation. We reviewed relevant papers following an electronic search of two main databases from 1992 to April, 2002: Social Sciences Citation Index, and PsychINFO database. Combinations of the following search terms were used: computer*, microcomputer*, technolog*, simulat*, disabilit*, handicap*, mental retard* and mental def*. Target material was then hand-searched for studies relevant to the practice of clinical psychology with people with mental retardation. Due to the large number of articles generated by the search, papers discussing applications specifically to educational environments such as schools were excluded from the review. Further articles were acquired if sources cited in the target material appeared particularly pertinent to this review. Thus, some references used in the present review pre-date 1992.

This review is organized according to the “Scientist-Practitioner” model of working, following the structure of assessment, formulation, and intervention. For each of these three main stages of the scientist-practitioner model, a general overview of literature is given and examples of relevant computer technologies are described. We subsequently draw some general conclusions about the current status and future issues relating to computer technology and mental retardation clinical psychology services.

Assessment

Several sources and methods may be used to gather information about clinical problems including psychometric assessments, observations, interviews with clients, their family, or paid carers. Computer technology may serve a number of functions in this process. Outside of the field of mental retardation, a number of systems have been developed (e.g., Beck’s depression and anxiety inventories—White, Jones, & McGarry, 1999). However, many of these assessments rely on cognitive and language abilities within the normal range and may be too complex for use with people with mental retardation. A number of tools have been developed specifically for use in work with people with mental retardation, including assessments of adaptive behavior, reinforcer assessments, and a range of behavioral observation technologies.

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Many services use the American Association on Mental Retardation Adaptive Behavior Scales (ABS) to assess the adaptive behaviors of people with mental retardation. Traditionally, the ABS is completed using paper-and-pencil booklets (Nihira, Foster, Shellaas, & Leland, 1975). Hile (1990) described a computerized version of the ABS that aimed to ease scoring and report writing, and facilitate effective treatment and placement decisions. Hile reports that the program is user-friendly, and can be used within clinical practice. The printed reports produced from the program contain textual and graphical information about the client’s functioning during current, previous, and initial assessments. This may be used to evaluate current interventions and guide future interventions. Professionals who used the computerized ABS reported being satisfied with the program and its reports, and they also stated that the program encouraged them to review previous assessments that may otherwise have been “lost” within an individual’s file.

Despite the ABS program being developed some 12 years ago, traditional paper and pencil booklets continue to be used by clinical psychologists. Possible reasons why the computerized ABS has not been adopted may include lack of availability, lack of standardization of the computerized ABS on non-US populations, expense involved in purchasing the assessment, and/or the computerized ABS becoming outdated (the program was designed for computers running the MS-DOS operating systems).

Computerized Reinforcer Schedules

In order to identify and provide leisure activities for individuals with mental retardation, it is important that clients are given opportunities to make choices (Dattilo & Rusch, 1985). Unfortunately, the notion of choice making among individuals with mental retardation can receive little attention (Shevin & Klein, 1984). Under these circumstances it becomes important to develop strategies to identify individual preferences. Computer technology may aid clarification of such choices.

For example, Vatterott, Callier, and Hile (1992) developed the Missouri Automated Reinforcer Assessment (MARA) to identify reinforcers that may be used for behavioral programs, activity selection, and to provide information about general preferences of individuals with mental retardation. MARA aimed to increase the efficiency of reinforcer assessments because questions were tailored to individual responses. For example, if the person with mental retardation answers “Very much” to the question “Do you like snacks or desserts?” then lists of specific foods are presented. If the person responds “Not at all,” a different reinforcer question is presented. Vatterott et al. reported that MARA reduced scoring and reporting time over paper and pencil assessment methods. It also distinguished different levels of preference for groups of activities (e.g., sports watched on television). MARA has not been formally evaluated, but it is reported that most individuals enjoyed completing the assessment. However, completion of the MARA requires reasonable reading skill and an ability to use a computer keyboard. Therefore use of the assessment may be restricted to people with mild mental retardation that also have good literacy and computing skills.

Bearing in mind the potential limitation of the MARA, Dattilo (1986) developed a computerized assessment procedure for determining preferences of persons with severe mental retardation. A computer program was designed to interpret microswitch activations that produced visual (video clips), auditory (music), and tactile (vibration) events. Clients were able to distinguish between the microswitches producing the events, and demonstrated individual preferences for one type of event. The procedure was further used to assess discrimination (e.g., classical, pop, or rock music). Data were reported to demonstrate that the procedure enabled service providers and family members to develop a profile of preferences of individuals with severe cognitive and physical disabilities, thereby providing clients with greater control in selection of leisure activities (e.g., accessing music through a cassette-player operated by a microswitch). However, the program cannot be used to assess preferences outside of those presented. The assessment also requires a wide range of technology including a computer, and a variety of equipment operated by microswitches. This may be expensive to pur-
chase and difficult to transport, again restricting the range of choices presented to the client. Finally, preferences were deduced from the individual operating the microswitches. Some individuals may find microswitches difficult to operate due to physical disabilities and a lack of basic understanding about the choices presented to them. Assessment of preferences for these individuals presents different challenges to those who work with and care for them.

*Computer Assisted Behavioral Observations*

There has been a long history of the use of technology to assist in collection and analysis of observational data in the field of developmental disabilities (Thompson, Felce, & Symons, 2000). Compared to paper and pencil methods of collecting observational data, computerized systems may improve the reliability and accuracy of recording, and the efficiency of data calculation and graphing (Kahng & Iwata, 1998). As technology advances, systems have become more user friendly incorporating the use of hand-held computers. Computers have therefore become increasingly important in clinical work with people with mental retardation (Miltenberger, Rapp, & Long, 1999).

There are many different computerized observation systems (see Kahng & Iwata, 1998, for a review). Typical features include: recording a number of different responses per session, response frequency, duration intervals, time samples, inter-response time, and discrete trials. Data analysis programs are usually included, which may calculate response frequencies, percentage of intervals, percentage of trials, central tendencies, and create charts and graphs. Recent examples of clinically-relevant studies utilizing computerized data collection include: evaluating gentle teaching for people with mental retardation and challenging behavior (Cullen & Mappin, 1998), assessing stereotyped behavior in people with mental retardation and/or autism (Ross, Yu, & Kropla, 1998) and investigating effects of intermittent punishment on self-injurious behavior (Lerman, Iwata, Shore, & DeLeon, 1997).

Computerized observations have also been used in the evaluation of efficacy of various interventions including staff training. For example, Jones et al. (1999) evaluated impact of training staff in providing active support for adults with severe mental retardation. A broad range of staff-client interactions and client activities were coded for data collection using a Psion palmtop computer. Observational codes were programmed to enable recording of duration of behaviors, co-occurrence of behaviors, and behavior events. Observations were taken before and after the implementation of staff training. Results showed that the active support package increased levels of assistance by staff, engagement in domestic and general activities, but did not affect levels of social engagement. Gains were maintained at six and 8-12 months following the intervention. Jones et al. reported that the Psion computer made it possible to produce a complete record of behaviors and interactions. It is unlikely that such complex observations would have been achieved using pencil and paper methods. However, this example involved quite complex data collection the nature of which may be difficult to include in standard assessments within clinical psychology services. Further research is needed to explore the relationship between investment of resources and clinical utility of detailed observational methods using computers.

*Formulation*

Formulations or hypotheses are generated through assessment and analysis of presenting information within a theoretical and research framework. These formulations are intended for use in the design of potential psychological interventions. Within the mental retardation field, researchers and practitioners have developed a number of technologies to aide clinicians in this decision-making process. In particular, a number of expert systems have been developed to enhance clinicians’ effectiveness, ease their tasks, and expand their competencies.

*Expert Systems*

Expert systems assist in making consistent decisions based on expert judgement (Wilson & Zalewski, 1994). Examples in clinical psychology more broadly include the diagnosis of eating disorders (Todd, 1996), and dementia/depression (Basavappa & Harish, 1996).
Within the mental retardation specialty, expert systems have been designed for abilities-oriented job analysis of carers working with people with disabilities (Wilson & Zalewski), and performance support systems for clinicians analyzing challenging behavior (Hile, Campbell, & Ghabary, 1994; Hile, Campbell, Ghabary, & Desrochers, 1993, 1994; Hile & Desrochers, 1994; Hile, Ghabary, & Campbell, 1995). The latter example will be used to illustrate expert systems in clinical practice.

The Mental Retardation-Expert (MR-E, e.g., Hile et al., 1995) is designed for clinicians working with individuals with mental retardation and challenging behavior. It has four modules: a decision support system to provide assistance in developing behavioral interventions, reviews and annotations of scientific literature, example behavioral interventions, and a glossary. The decision support system takes a functional analysis approach to challenging behavior. The clinician responds “Yes,” “No” or “Maybe” to a number of functional analysis screening questions. When responses of “Yes” or “Maybe” are made, further questions clarify functional hypotheses and identify appropriate treatments. The MR-E’s reliance on the clinician’s judgements and observations emphasizes how expert systems normally support assessment and treatment design while relying on a clinician’s training and experience (Hammer & Hile, 1985).

High caseloads, service pressures and other demands reduce opportunities for reading research and clinical literature essential for evidence-based practice. MR-E includes selected literature reviews and article annotations. Hypertext links access individual articles, which include client descriptions, experimental design, and effects of the intervention. Further links provide the full citation so that source articles may be obtained. The behavioral glossary contains terms used in MR-E (e.g., medical conditions, behavioral interventions, undesirable behaviors) and is accessible in two ways. First, a dictionary format enables unfamiliar words, concepts or abbreviations to be examined. Second, potentially unfamiliar words within other modules appear as hypertext links to the glossary.

MR-E also contains information about a number of interventions that might be applied to the problem. These are differentiated by topography of behavior, a client’s function-
niques can be used successfully with people with mental retardation (Kroese, 1998). The additional problem for people with mental retardation is the complexity of understanding computers and how to use them effectively. Despite these caveats, there are a number of potential applications for technology in interventions for people with mental retardation especially in skill development.

Facilitating Verbal Communication in Children with Mental Retardation

Research in amelioration of communication difficulties has focused on providing augmentative technologies for children who remain non-verbal (Lehman, 1999). There is little interactive software for children with limited language unless they begin to read (Steiner & Larson, 1991). Development of communication skills may be particularly important for children with autistic spectrum disorders (ASD) as advancing social and/or behavioral development may hinge on improving communication (Lehman). Children and adults with ASD have been reported to often prefer computer to human interaction (Wilson, 1996), have strong visual processing skills and rote memory, age appropriate articulation, and a preference for language that is patiently repeated with little or no variation in prosody, word choice or syntactic structure (Lehman). These points suggest that computers may be of benefit as one aspect of language interventions to increase communication skills perhaps especially in people with ASD.

Lehman (1999) designed software that combined animations with speech recognition, natural language processing, and computer-aided instruction. The “Simone Says” program was intended to create opportunities for meaningful language practice in simplified social contexts. The system consists of the presentation of simple graphical stimuli, the child (or Simone) producing referentially meaningful speech acts, and a rewarding natural-consequence animation. For example, an apple is presented on screen, Simone asks “What is this?” the child answers “Apple,” and then the apple dances and sings as a reward. The program then embeds language in simple social contexts by modeling connections between mental state and communication through thought bubbles with miniature versions of the target animations. This links the intention to produce an action and the language that makes that intention known to others. The software is currently being developed, therefore has not been fully clinically evaluated. The author reported that a longitudinal study of 18 months evaluating the program as an intervention tool began in spring 1999.

Heimann, Nelson, Tjus, and Gillberg (1995) also used an interactive computer program to teach communication skills to children with autism. The program was used to teach children nouns, and to combine the nouns with verbs to create sentences (e.g., “the bear” “jumps over” “the horse”). Animations are created showing the action the child describes. The computer generates animations of new noun-verb-noun sequences. The child selects words to describe the sequence, and is thus tested on session content. Results of the evaluation showed that children with autism improved their word reading and phonological awareness (Heimann et al., 1995). However, these gains were not maintained one semester after the intervention ended. The authors suggested that this is consistent with general clinical observation that children with ASD need continuing support to maintain gains in communication. Observations of classroom behavior indicated that the intervention also increased verbal expressions among the children with ASD. These gains were maintained one semester after the intervention had ended. However, comments outside of the teaching situations did not increase, suggesting limited generalization of learned language. In contrast to the results for children with ASD, pre-school children without mental retardation included in the same study demonstrated learning regardless of whether they used the computer program as a learning aide. Thus, there was some support for the hypothesis that computer software might be especially effective for children with autism.

Computer programs may well assist with teaching a restricted range of language skills. However, without careful planning, it may be unlikely that these will generalize to other situations or be maintained over time. A number of general conclusions about factors likely to improve effectiveness can be drawn from the research literature. For example, selection
of appropriate software (Haugland, 1992) including developmentally appropriate content (Neuman, 1991), and provision of a positive learning experience (Steiner & Larson, 1991) may be crucial. As new programs are developed, clinicians will be able to select appropriate software for their clients’ needs. Observation suggests that children enjoy using computers as a tool for increasing their communication skills (Heimann et al., 1995), and computer technologies may have a strong motivational potential for particular groups of children such as those with ASD (see also Parsons & Mitchell, 2002).

However, a potential limitation of evaluation studies reported to date is that they involved children who were selected for their readiness to learn language. The introduction of innovative computer programs may also have increased positive attention from those interacting with the child. Further research is needed before results can be generalized to all children with developmental disabilities. Due to the individual nature of communication difficulties, it may be expected that computer-aided interventions may help some, but not all, people with mental retardation (Heimann et al., 1995).

Teaching Independent Functioning and Adaptive Behavior Skills

Improved community integration for people with mental retardation has resulted in a need for effective interventions to help individuals cope with increased demands on their daily living skills (Cromby, Standen, & Brown, 1996). The skills needed include community living skills (e.g., shopping, money recognition and budgeting, and completion of daily living tasks) and independent living skills (e.g., awareness of personal safety, increased social skills). In terms of computer technology, a wide range of applications has been developed; and we focus on five areas below: daily living skills, task analysis prompting, virtual reality rehearsal, social functioning, and awareness of personal safety. Computer technologies may have particular advantages when considering interventions for people with mental retardation because computer programs respond in predictable ways, give consistent feedback and do not get tired of repeating the same task over and over.

There is considerable research about training people with mental retardation in community living skills using conventional education. More recently the possibility of using computer technology has been investigated, with mixed success. For example, Nicol and Anderson (1997) compared computer assisted and teacher-implemented instruction to teach money handling and budgeting skills to people with mental retardation. Although both the computer-assisted and teacher-led instruction groups increased their skills compared to the control group (no instruction), only the teacher-led group made statistically significant gains. There are a number of reasons why there may not have been an advantage for computer-based instruction in this study. First, authors highlight that this may be due to the teacher-led group also actively using community resources (e.g., visiting a department store following learning about clothing sizes). Second, lack of appropriate computer software made it difficult for the computer instruction group to cover the same breadth of topics as the teacher led group. Finally, the measurement used may not have been sensitive to gains by money handling and budgeting skills in the computer instruction group, as this was only assessed with one scale on community skills within a global measure of adaptive behavior.

While the previous study used an instructional model to teach community skills, other studies have used computer technology in-vivo (e.g., Furniss et al., 2001; Lancioni, Van den Hof, Boelens, Rocha, & Seedhouse, 1998; Lancioni, Van den Hof, Furniss, O’Reilly, & Cunha, 1999). People with severe mental retardation in these studies were given palm top computers with a visual display, an auditory output device, and a vibration box. Individuals accessed pictorial instructions to help them complete daily living and/or supported employment tasks (e.g., preparing a dining table for a meal, object construction in an assembly line). The system also provided verbal/vibratory reminders to access instructions if the person became distracted, and alerted a supervisor should the person’s interaction with the system suggest they were having difficulties.

Significantly higher levels of performance were achieved with the computer-aided than card-based systems. This may be because the
system provided reminders to engage users in the task, or because of simplicity of the response (key-press) to access instructions, or the time controls to co-ordinate access to instructions with task completion. Most participants also preferred computer-aided to card based systems; carers were positive about the benefits of the system; and co-workers in supported employment environments considered it physically and socially suitable for the work setting. However, the system is not available as an off-the-shelf product due to the appropriate technical support and instruction in task analysis required by supervisors (Furniss et al., 2001).

Due to further developments in computer hardware and software, the possibility of rehearsing daily living skills using virtual environments is becoming reality. Cromby et al. (1996) investigated the crucial issue of whether skills learnt in virtual environments transfer to the real world. People with severe mental retardation received twice weekly sessions using a virtual grocery store, and were significantly faster and more accurate when shopping in a real grocery store compared to controls (twice weekly sessions with other virtual environments). This and other research (e.g., Standen, Brown, & Cromby, 2001) suggests that virtual environments facilitate acquisition of living skills that transfer to the real world. However, the researchers do not report whether gains are maintained over time.

Cromby et al. (1996) proposed three reasons why virtual environments are appropriate for people with mental retardation. First, virtual environments create opportunities for people with mental retardation to learn by making mistakes but without suffering the real, humiliating or dangerous consequences of their errors. Second, virtual worlds can be manipulated in ways that the real world cannot. Simple worlds can be constructed within which tasks can be performed, and these tasks can be made more complex as competence is gained. Third, rules and abstract concepts in virtual environments can be conveyed without language or other symbol systems in that the qualities of objects and situations can be discovered through direct interaction. Future developments might include programs similar to those used in research cited above, or developments in new areas (e.g., social skills training using computer-generated “people” - Cromby et al.). Awareness and availability of such technologies within clinical settings needs to increase as programs are developed. However, these technologies may be expensive for clinical services unless developers are willing to use the Internet to widen access to these products (see Standen et al., 2001).

Although virtual reality has potential for the future with regard to social skills training, other computer technologies already exist in this domain. For example, Margalit (1995a, b) developed a computer-assisted social skills intervention to increase social competence of adolescents with mental retardation and/or behavioral disorders. Adventure games that reflected difficult social events within various environments were presented via a computer screen. The participant selected from aggressive (e.g., hitting, swearing), passive-avoidant (e.g., running away, crying) or assertive/negotiating solutions to these events. Evaluation suggested that the adolescents reported feeling less lonely, more accepted by peers, had higher levels of self-control, and displayed less internalizing (e.g., social anxiety) and externalizing (e.g., bulling others) symptoms after the intervention. While this suggests that the computer program was successful, the evaluation did not differentiate between adolescents with mental retardation and behavioral disorders. Further research is needed to establish limits of the intervention.

Computer-based intervention has also been targeted at domains of functioning crucial to reduction in vulnerability of people with mental retardation. In particular, research has identified a high prevalence of sexual abuse directed against individuals with mental retardation (e.g., Knutson & Sullivan, 1993), and interventions have been developed in response to this problem. For example, Lee, McGee, and Ungar (1998) developed a personal safety program for children with severe mental retardation. Children were introduced to the program through two group sessions and then used the computer to select appropriate behaviors for a “child” shown on the screen. These researchers proposed that the “cartoon like” quality of the characters enabled the presentation of scenes that might be considered unethical in video format (Lee et al.). Concepts covered during the program were further explored in role-plays and group discussions. Results of formal evaluation of the
program and maintenance of concepts learned were not reported although anecdotal reports were positive. Due to variety of teaching methods used (didactic teaching, computer program, role-play, discussion), it is also rather difficult to evaluate the contribution of the computer technology to the intervention. However, the technological component could well facilitate more standard intervention techniques and this outcome is potentially valuable in itself.

Conclusions and Implications

There are a number of issues relating to use of computer technology in clinical psychology with people with mental retardation that emerge from the preceding illustrative review. In particular, there are limitations to the research and evaluation data published to date, and there are a number of practical problems with the use of technology in this context. Finally, we also identify some areas with potential for further research and development.

In terms of existing research and evaluation, there are relatively few controlled studies of the impact of computer technologies in assessment, formulation or intervention in clinical psychology with people with mental retardation. Perhaps most advanced has been evaluation of intervention tools focused especially on the development of various skills in people with mental retardation and related difficulties. However, as discussed at various points above, there are a number of problems with the design of evaluation studies, the small size of samples studied, the appropriateness of outcome measures, and the lack of generalization and maintenance data. Given the potential of computer technologies to contribute to the work of clinical psychologists in mental retardation services, a key priority for the future is an increased focus on testing the efficacy of computer technologies to achieve positive outcomes in clients, or to facilitate the processes of clinical assessment and formulation.

A neglected topic in evaluation of computer interventions for people with mental retardation has been social validity (cf. Kazdin, 1981; Wolf, 1978). In particular, systematic study of staff and family perceptions of the acceptability of computer-based instruction is often missing from existing research, and the perceptions of people with mental retardation are rarely sought beyond the reporting of anecdotal data. These data are crucial in augmenting decisions in services about the evidence base for a particular intervention. At present, there are insufficient data to inform decision-makers in clinical psychology services. Several authors have indicated that computer technologies may be perceived positively by people with mental retardation and may be especially useful with this group. Furthermore, there are data to suggest that people with mental retardation find using computer technology an enjoyable activity in its own right (Standen et al., 2001). However, there is very little published literature regarding opinions of people with mental retardation who are able to use computer technology within their clinical services.

Even if computer technologies are proved to be effective in aiding assessment, formulation or intervention, there remain a number of practical difficulties incorporating new technologies into clinical psychology services for people with mental retardation. First, although the technology often exists to help support people with a range of disabilities (Aspinall & Hegarty, 2001), several of the systems described earlier rely heavily on visual ability and manual dexterity. People with mental retardation often have additional disabilities that need to be taken into account when designing computer intervention tools. An intriguing possibility for the future is continued development of acoustic virtual environments. A specific deficit may also relate to understanding of concepts of space when dealing with three and two-dimensional interfaces (Standen et al., 2001). Second, a lack of resources and expertise may be a problem within services. For example, use of computer technology may be facilitated by specialist devices such as concept boards, touch monitors, touch screens, tracker balls and light pens, microswitches, and speech output devices. However, Aspinall and Hegarty found that few organizations own anything other than a standard keyboard and mouse.

A third implementation problem with technologies to aid assessment, formulation and intervention with clients is the level of skill and knowledge in staff required to use systems or monitor their use by clients (Bryant, Erin, Lock, Allan, & Resta, 1998). The level of support required by staff may be considerable
and is often under-estimated (Aspinall & Hegarty, 2001). In the excitement of obtaining or implementing new technology, professionals may overlook critical family and/or career factors such as familiarity and training (Parette & Brotherston, 1996). Without appropriate training input, it is unlikely that new technologies will be adopted within services no matter how efficacious they may be. This compounds the problems of cost and availability of new technologies (Blydorp, 1993; Wehmeyer, 1998).

A very much-neglected issue in the use of computers for psychological intervention with people with mental retardation is the concept of the therapeutic relationship. Many professionals state that non-specific factors are important in the process of psychological intervention (Omer & London, 1989). Non-specific factors refer to factors that are not exclusive to, and are independent of, any one particular therapeutic model or approach. These may include age (Frank, Kupfer, & Perel, 1989), gender (Sexton & Whitson, 1991), and ethnic similarity between client and therapist (Atkinson & Schein, 1986). Adler, Rauchfleisch, and Mullejans (1996) suggested that greater “client identification” with the therapist during therapy is associated with more successful outcomes, regardless of the psychological approach used. When using computer technologies to aide intervention efforts, the potential benefits of non-specific therapeutic factors are likely to be lost. Thus, there is a need for research to address whether improving the client’s identification with a computer therapy program (e.g., through the use of a virtual therapist encompassing characteristics that they value) might enhance efficacy of these technologies.

A further factor that may be of relevance is the notion of the therapeutic alliance. Therapeutic alliance is defined as the conceptual nature of the therapeutic relationship, the client’s and therapist’s ability to agree on intervention goals, and the affective bond between client and therapist (Martin, Garske, & Davis, 2000). Research suggests that therapeutic alliance is an important vehicle for change, some arguing that the quality of the relationship is more significant in determining a positive outcome than particular therapeutic strategies or models (Safran & Muran, 1995). Schaffer (1982) described the key personal qualities of therapists as being warmth, empathy, likeability, and perceived sincerity. Furthermore, therapeutic skill includes qualities such as persuasiveness, timeliness, verbal ability, and the capacity for neutrality. Both skillfulness and personal qualities of the therapist have been shown to contribute to positive outcome (Roth & Fonagy, 1996). The extent to which these variables contribute to the success of interventions with people with mental retardation is unclear and needs to be addressed in future research. Furthermore, in the context of the kind of psychoeducational interventions described above, these variables may be much less crucial and thus there may be little problem with the fact that they will be missing from most computer technologies. However, dimensions of the therapeutic relationship may well become crucial if clinical psychologists in mental retardation services aim to develop computer-based interventions for a broader range of psychological problems such as anxiety and depression disorders.

By way of conclusion to the present review, we will briefly consider two areas where there may be further potential to facilitate the work of clinical psychologists in mental retardation services: staff training, and the use of computer technology by people with mental retardation to organize self-advocacy services. In terms of staff training, there have been a number of calls to improve staff training technologies (e.g., Parsons, Reid, & Green, 1996). A creative way in which this might be achieved is through the simulation of clinical problems. Computer technology may contribute to this through generating simulated clinical problems. Two applications to the challenging behavior of people with mental retardation can be used to illustrate this point.

Desrochers and colleagues (Desrochers & Hile, 1993; Desrochers, House, & Seth, 2001) developed Simulations in Developmental Disabilities (SDDS). SDDS was designed to provide opportunities to acquire and practice skills in behavioral psychology. The person interacting with the computer assumes the role of a behavior analyst working with a clinical case. At each stage of treatment, the person using the program makes decisions about further information required and the treatment process. Desrochers and Hile highlighted the lack of a visual display as a disadvantage of SDDS, as observation can help determine possible causes of behaviours. They
suggested that future simulations include visual displays depicting clients engaging in problem behaviors. This potential has been developed in a research tool designed to explore carer responses to self-injurious behavior (Hastings, Remington, & Hall, 1995; Remington, Hastings, Hall, Bizo, & Brown, 2000). Such computer simulations may be particularly beneficial to teaching behavioral management strategies, as they overcome ethical objections of staff behaving in a manner that may temporarily increase clients’ difficulties. In real life, behavioral interventions may also take a long time to be effective, thus limiting staff experiences of success. Using a simulation to demonstrate positive outcomes over a short period of time may persuade staff of the validity of behavioral interventions by making long-term objectives more apparent.

A final issue for discussion is that incorporation of computer technologies into clinical psychology services may be driven by the agenda of people with mental retardation themselves as well as professionals and services. An example is that discussion forums for people with mental retardation have developed on the Internet and several self-advocacy groups have their own websites. Some of these groups are also advertising their services as trainers or as consultants in the use of the World-Wide-Web by people with mental retardation (Ramcharan & Grant, 2001). Increased awareness of these resources by professionals working with people with mental retardation, as well as those involved in managing services, will ensure that the voice of people with mental retardation can also be heard via the deprivation (Ramcharan & Grant, 2001). Increased provision of computer technologies into clinical psychology services may be driven by the agenda of people with mental retardation: SIDD software. Desrochers, M. N., & Hile, M. G. (1993). SIDDs: Simulations in developmental disabilities. Behavior Research Methods, Instruments and Computers, 25, 308–313.


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