A Review of Information and Communication Technology Enhanced Social Work Interventions

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A Review of Information and Communication Technology Enhanced Social Work Interventions

Chitat Chan[1] and Michael J. Holosko[2]

Abstract

Objectives: Information and communications technology (ICT) has impacted almost all human service disciplines and currently is evolving in social work. This study provides a systematic review of ICT-enhanced social work interventions, with particular reference to their intervention fidelity (IF), validity, and the role of ICT in the helping relationship process. **Method:** We assessed specific articles published in journals classified under the "Social Work" research area in the Social Science Citation Index (SSCI; *N* = 17). **Results:** All studies that met specific criteria indicated positive intervention outcomes, most of them were of "good" or "fair" quality in terms of their validity, and almost all of them upheld IF. However, there was room for improvement in the conceptualization component of the ICT intervention application. **Conclusions:** These ICT-enhanced intervention studies established a foundation to enable unique practice insights to advance social work practice knowledge. Additional practice and research in this area are necessary in order to further our understanding about ICT and their use in social work interventions. Implications are discussed and suggestions are provided.

Keywords

information and communication technology, interventions, systematic review

Information and communications technology (ICT) is a term generally used to refer to the convergence of audiovisual broadcast systems, telephones, and computer networks through a single cabling or linking system. ICT is an extended synonym for information technology, but is a term that stresses the role of unified communications and the integration of telecommunications. There are significant technology developments in recent decades that have brought about this media convergence, including the popularization of microcomputers, the development of the World Wide Web (WWW) that allows content searches on remote hosts, the invention of the Internet browser as a user-friendly interface for navigating the WWW, and the development of social media that has exponentially escalated the penetration of ICT in our daily life (Hill & Shaw, 2011; Lanfranco, 2008; Watling & Rogers, 2012). ICT has impacted almost all human service disciplines, such as counselling (Chester & Glass, 2006; Richards & Vigano, 2013), health care services (Halford, Obstfelder, & Lotherington, 2009; Poon et al., 2006), education (Fu, 2013; Markauskaite, 2003), and more recently social work (Giffords, 2009; Reamer, 2013). The impact of ICT goes beyond increased efficiency in the human service organizations and their delivery of services. New technologies force practitioners to expand their realities and have changed how they carry out social processes and interventions.

In social work, the trend of using ICT is steadily increasing. For example, accreditation training bodies across the globe, such as the National Association of Social Workers (NASW), Association of Social Work Boards (ASWB), and the Quality Assurance Agency (QAA) for Higher Education, have set new standards about social workers' abilities to use ICT to support their learning and practices (NASW & ASWB, 2005; QAA, 2008). There are books introducing the ways ICT can be used in social work practice (Dunlop & Holosko, 2007; Hill & Shaw, 2011; Watling & Rogers, 2012). Professional and academic websites have been developed for social work students and professionals to daily access updated information such as news and relevant Internet resources for practice (e.g., http://ifp.nyu.edu/). Social work professional bodies such as the Australian Association of Social Worker (AASW) and the British Association of Social Workers (BASW) have recently developed social media policies that explicitly acknowledge the value of social media in social work practice (AASW, 2013a, 2013b; BASW, 2013). There are increasingly more Internet-based

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frontline practices. For example, the Online Youth Outreach in the United Kingdom started in 2010, which provides online counselling to young people (http://www.onlineyouthoutreach.-co.uk/). Since 2011, the Social Welfare Department (SWD) in Hong Kong has subsidized nongovernmental organizations to pilot online youth outreach projects (SWD, 2011). The National Youth Council of Ireland established the Web Safety in Youth Work resource website in 2013, which provides youth work practitioners with practice examples and useful practical resources that concern Internet safety (http://websafe-ty.youth.ie/). There are also increasingly more intervention studies about various kinds of ICT-enhanced social work practice. For example, Bordnick, Traylor, Carter, and Graap (2012) reported a virtual reality (VR)-based treatment approach for smoking cessation; Holden, Bearison, Rode, Rosenberg, and Fishman (1999) tested the impact of a virtual environment for seriously ill hospitalized children; Bigelow, Carta, and Lefever (2008) described a parenting program that was enhanced through the use of cellular phones; and Lieberman et al. (2005) evaluated an online support group for Parkinson's patients.

Despite the increasing popularity of ICT-enhanced social work interventions, empirical research about their use and effectiveness is conspicuously absent. This is important because innovative practices can be meaningful but not replicable or sustainable. Further, interventions should be consistent and replicable, so they can inform practice, and their practical insights can add to timely social work practice knowledge (Bellg et al., 2004; Rosen, Proctor, & Staudt, 1999). Existing overview studies focus on analyzing the effects of ICT on clients (Best, Manktelow, & Taylor, 2014; Zilberstein, 2013), on specific types of ICT-related social services (Mishna, Cook, Saini, Wu, & MacFadden, 2011; Nieuwboer, Fukkink, & Hermanns, 2013), on overall practice directions (Parrott & Madoc-Jones, 2008; West & Heath, 2011), and on ethical dilemmas faced by practitioners (Mishna, Bogo, Root, Sawyer, & Khoury-Kassabri, 2012; Reamer, 2013). Taken together, none of these studies evaluates the efficacy and impact of ICT. This served as a primary rationale of the conduct of this study. The purpose of this study was to provide a systematic literature review of ICT-enhanced social work interventions, with particular reference to their intervention fidelity (IF), validity, and the role of ICT in the helping relationship process.

Method

The Search Strategy

This review initially targeted all ICT-enhanced social work interventions in academic journals classified under the "Social Work" research area in the Social Science Citation Index (SSCI) database. There were two primary reasons for using the SSCI. First, the SSCI almost has an incomparable status in the academia because of its sophisticated and widely recognized journal ranking system (Darlene, 2008). Second, the SSCI has a widely recognized subject area classification system with a demarcated partitioning of social work literature. Although
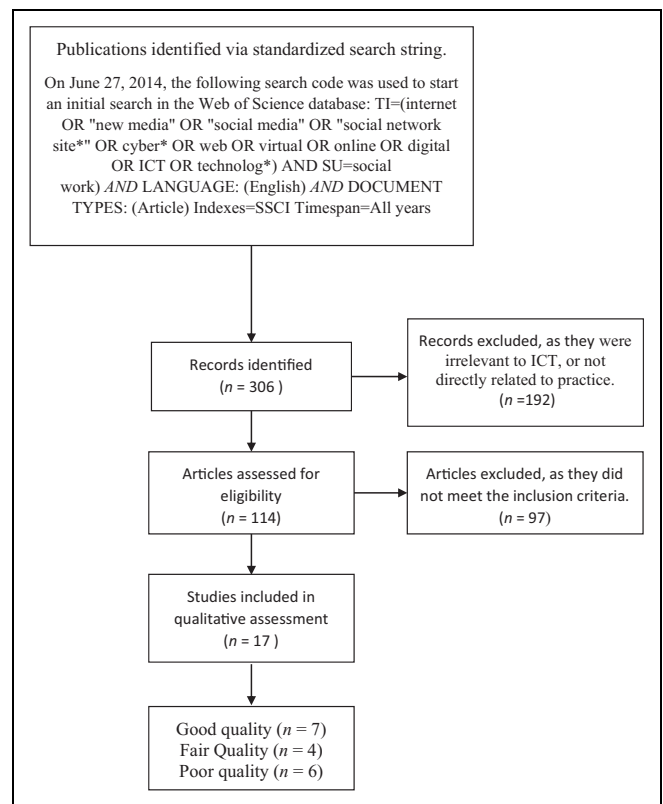
Figure 1. Search results and the study selection flow chart.

there have been criticisms about its statistical algorithm (Chadegani Arezoo et al., 2013; Darlene, 2008) and its categorization does not cover all social work-related research studies, the SSCI still constitutes a significant core set of academic literature.

In June 2014, this set of core collection in the SSCI covered 41 social work journals, including top ranked journals such as *Research on Social Work Practice*, *Journal of Social Work*, *Health & Social Work*, *Children and Youth Services Review*, *Social Service Review*, and *Social Work* (http://ip-science.thomsonreuters.com/mjl/). The initial search aimed at all English titles included ICT-related terms like "technology," "new media," "digital," "Internet," "online," "web," "virtual," "social network site," or "social media." This was the formative title search and it did not cover other fields, such as abstracts or key words indexed by the publishers. It was assumed that if none of these ICT-related terms appeared in the title of an article, it is highly likely that ICT did not occupy a core position in that article, and therefore, it was excluded.

Using a specific advanced search string (see Figure 1 for details), the initial search returned 306 titles. Titles identified as irrelevant to ICT (such as those having the term "technologies" related to "reproductive technologies") were deleted manually. Subsequently, the researchers identified 230 articles related to the use of ICT. Among the 230 articles, 42 studies related to social work education (i.e., teaching social work students by e-learning), 74 were about ICT-related social concerns

(e.g., analyzing Internet addiction problems), and 114 of them reported on issues at practice levels, such as studies that focused on particular intervention aspects or outcome studies that reported the effectiveness of interventions. The intervention research studies were then selected among these practice-related articles. The reasons for exclusion were noted using a modified QUOROM flow chart format (Moher et al., 1999; also see Figure 1).

Intervention research is the systematic study of purposive change strategies, which is characterized by both the design and the development of interventions (Fraser & Galinsky, 2010; Rothman & Thomas, 1994). In general, intervention research should minimally meet the following basic criteria: (1) the intervention itself is clearly defined; (2) the intervention, at minimum, had a one group pretest–posttest design; (3) the outcomes were clearly specified; (4) behavioral change outcomes were specified and assessed; (5) the comparison change statistics were evident; and was (6) theory-guided (these were the same criteria used by others in this special edition, as directed by the editor Michael J. Holosko). Among the 114 practice-related articles, eventually $N = 17$ studies were finally identified as meeting these criteria and included in this review. Each study was then independently reviewed using these criteria by both authors, to ensure their selection eligibility.

Coding Procedures

IF. First, the IF of each study was appraised. IF refers to whether a specific treatment or intervention is implemented as planned (Hogue, Liddle, & Rowe, 1996; Moncher & Prinz, 1991; Tucker & Blythe, 2008). This study makes reference to part of the identified indicators used by Tucker and Blythe (2008) to facilitate a comparison between the IF of ICT-enhanced social work interventions and those of general social work interventions. An intervention considered as having a concern for IF should indicate minimally that it used treatment fidelity terms such as "IF" or synonyms like "treatment adherence" or "treatment integrity." An intervention considered as having strategies to enhance IF should indicate that it (1) offered training for the practitioners, (2) used manuals/protocols to guide the practice, or (3) used supervision to monitor the practice. An intervention could include more than one type of strategy, and therefore these categories were not mutually exclusive to each other. An intervention would be considered as having strategies to enhance IF, if it had any one of these strategies.

Validity assessment. The validity of each study was then rated in terms of "good," "fair," or "poor." The *U.S. Preventive Services Task Force Group* (Harris et al., 2001), developed guidelines to assess evidence presented in quantitative research on the dimensions of both internal and external validity. Internal validity examines the study design and the reliability of outcome measurements. External validity examines such as generalizability of the study. Adapted from the framework of the Task Force Group, this study used the following criteria (also

as recommended by the journal editor) to evaluate the quality of an ICT-enhanced social work intervention study: (1) clear definition of the interventions; (2) initial assembly of comparable groups, including a control group; (3) maintenance of comparable groups (including attrition, crossovers, adherence, and contamination), including important differential loss to follow-up or overall high loss to follow-up; (4) measurements—equal, reliable, and valid (including masking of outcome assessment); and (5) outcomes specified.

A good study met all the above-mentioned criteria; a fair study did not meet all criteria, but was judged to have no flaw that invalidates its results; and a poor study contained a flaw that invalidated its results, that is, the reliability and validity of outcome measures were unknown, important confounders were not controlled for in the study design, or the attrition rates were high. This assessment used the same criteria the same way in this special edition journal (see Choi & An (2015); Mowbray and Quinn (2015) in this special issue).

The type and roles of ICT. The type of ICT used in an intervention was then identified, and its usage was determined. Only the key ICT instrument that was explicitly noted by the author(s) as serving interventional purposes was counted as "the ICT type." For example, in an article titled "using a website to work with at-risk teens," the project website was counted as the ICT, as this was the main type used and noted in both the title and the abstract.

After identifying the ICT type as such, the functions of that type of ICT in the intervention were identified. One of the core features of professional social work practice is its activity to engage, assess, intervene, and evaluate with people and organizations at various levels (Miley, O'Melia, & DuBois, 2009; QAA, 2008; Taylor, Mulroy, & Austin, 2004). For example, the Educational Policy and Accreditation Standards noted by the Council on Social Work Education (CSWE) state that "professional practice involves the dynamic and interactive processes of engagement, assessment, intervention, and evaluation at multiple levels" (CSWE, 2008, subsection 2.1.10). This study analyzed how much these identified processes (engagement, assessment, intervention, and evaluation) in the intervention involved the type of ICT noted by the actual intervention. Therefore, the roles of the types of ICT in the intervention were non-mutually exclusively categorized as (1) engage, (2) assess, (3) intervene at a micro-level, (4) intervene a meso-level, (5) intervene at a macro-level, and (6) evaluate. For example, if an intervention only used a website to recruit clients, it would be coded in relation to engagement only. The same article could have multiple tags, for example, using a website to engage clients, assess clients' needs, and provide counselling would be tagged as engagement, assessment, and micro-level intervention.

Interrater reliability. An interrater reliability check was conducted. Both authors independently coded the articles using the same set of working criteria and their definitions. Results were compared, articles having differences in coding were

reviewed and discussed until all discrepancies were agreed upon consensually.

Results

All the intervention studies ($N = 17$) were published between 1999 and 2012, only one was published in the late 1990s, the remainder were published after 2000s. Among these $N = 17$ interventions, 3 primarily served children and youth, 7 served parents, 2 served both parents and children, and 5 served patients in health care settings. These studies were found in 10 journals. Journals having the most number of articles included in this review were *Research on Social Work Practice* (4 studies), *Social Work in Health Care* (3 studies), and *Child Maltreatment* (3 studies). Social work journals with less than three studies included *Family Relations, Health & Social Care in the Community, Australian Journal of Guidance and Counselling, Journal of Social Service Research, Child Welfare, American Journal of Community Psychology*, and *Families in Society*.

IF and Validity

Among the intervention studies ($N = 17$), 24% of them used IF terms or synonyms like "intervention adherence" or "treatment integrity," and 82% used specific strategies to enhance IF. These strategies included treatment manuals/protocols (77%), training for practitioners (6%), and supervision (12%). Many of the protocols noted were in forms of standardized web contents or web activities.

Among the intervention studies ($N = 17$), 41% of them were rated as good. A good study meets all the validation criteria adapted from the *U.S. Preventive Services Task Force Group* (Harris et al., 2001). Another 24% were rated as fair. A "fair study" does not meet all criteria, but it has no flaw that invalidates its results. The remainder (35%) were rated as poor, as there were flaws that invalidate their results, that is, the reliability and validity of outcome measures were unknown, high attrition rates, and so on. These data are summarized in Table 1.

Types and Roles of the ICTs

Among the 17 articles, 4 used ICT in the engagement process (e.g., Pacifici, White, Cummings, & Nelson, 2005; Soutter et al., 2004), 2 were in assessment (e.g., Calam, Sanders, Miller, Sadhnani, & Carmont, 2008; Kaganoff, Bordnick, & Carter, 2012), 17 (i.e., all of them) involved micro-level intervention, 5 involved meso-level intervention (e.g., Lieberman et al., 2005; Nicholas, Chahauver, Brownstone, Hetherington, & McNeill, 2012), none were noted in macro-level intervention, and 3 were in program evaluation (e.g., Bigelow, Carta, & Lefever, 2008; Feil et al., 2008). The functions of the ICT platforms regulated the forms and sequences of intervention activities, and therefore, helped implement the planned interventions. The main types of ICT used in these interventions ($N = 17$) include tailor-made project websites (53%), hardware and Internet connections (18%), VR programs (18%), cellular phones (6%), and general Internet surfing (6%).

Most of these interventions developed their own tailor-made official project websites (53%), therefore, they could potentially cover any intervention processes designed by the practitioners. In the set of included studies, project websites were related to all the previously categorized intervention processes (i.e., engage, assess, intervene, and evaluate). These websites were typically enabled by a user login and data tracking arrangement at the system end. For example, Feil et al. (2008) reported an Internet-based parenting program in which the "self-regulated learning activities" of the participants were in fact tracked and, therefore, progress monitoring and supervision could be facilitated. Similarly, Pacifici, White, Cummings, and Nelson (2005) evaluated a website for at-risk youth that required users to login with their usernames and passwords. Activities such as using virtual rooms, validating personal information, and viewing interactive cartoon animations were tracked and analyzed. Some of these interventions adopted the asynchronous mode of bulletin board systems (BBS), which allowed users to log in and perform functions such as reading news and exchanging messages (Nicholas, Fellner, et al., 2012). The text messages recorded on the BBS facilitated the program evaluations. Lieberman et al. (2005) evaluated an online support group for Parkinson's patients. Online supervisory sessions were used, and direct feedbacks were provided based on the digital copies of the text messages of the discussion of the support group.

The second most frequently noted ICT type was VR program (18%). A VR program is a computer-simulated environment that can simulate the physical presence of users in places. For example, Bordnick and colleagues (2012) reported a VR-based treatment approach for smoking cessation, Holden and colleagues (1999) tested the impact of a virtual environment for seriously ill hospitalized children. The interventions were precisely structured and sequenced, and therefore the intervention strongly adhered to what was planned.

The third most frequently noted ICT type was computer hardware (18%). Some interventions provided hardware and Internet connections to the service targets to tackle digital divide (Finn, Kerman, & LeCornec, 2005; Soutter et al., 2004). These were mainly monitored and evaluated via off-line means, and made use of well-structured off-line curricula or training materials to ensure the implementation of the intervention.

Other less frequently noted ICT types were cellular phone and general Internet surfing. Bigelow and colleagues (2008) described parenting programs that were enhanced through the use of cellular phones. They particularly noted that cellular phones enabled the practitioners to maintain communication with families between visits, and the additional contact through phone calls and messaging also increased the dosage of intervention provided to families. Chi and Frydenberg (2009) evaluated a cyber-safety program for adolescents that was mostly about information literacy skills and proper Internet surfing. They largely relied on the instructor manual, student

Table 1. Summary of Evaluations of ICT-Enhanced Social Work Interventions.

Publication and Study Design	Quality Rating	Study Settings and Participants	Intervention and Follow-Up	Measurement Validation	Study Outcomes
1. Barrera, Glasgow, McKay, Boles, and Feil (2002). Randomized control clinical trial. Groups with different treatment conditions were compared. Pre–post assessments	Good	160 Adult participants (75 men and 85 women) who were diagnosed with type 2 diabetes mellitus, recruited through 16 primary care physicians	*A project website providing online articles.* Each participant accessed the website, they were in one of the following four treatment conditions: (a) diabetes information only, (b) a personal self-management coach, (c) a social support intervention, or (d) a personal self-management coach and the support intervention	Measurement items were adopted from validated instruments, such as the interpersonal support evaluation list. Moreover, a Diabetes Support scale was developed for the study, reliability test was conducted	After 3 months, individuals in the two support conditions reported significant increases in support on a diabetes-specific support measure and a general support scale. Participants' age was significantly related to change in social support
2. Bigelow, Carta, and Lefever (2008). Randomized control clinical trial. Groups with different treatment conditions were compared: PAT, CPAT, and control. Pre–post observations	Fair. The validity and reliability of the PAT observation guidelines were not clearly mentioned	19 Mothers have completed the PAT or CPAT interventions. They were generally unmarried and unemployed. Many of the families were living below the poverty level	*Planned Activities Training was enhanced by cellular phones* to promote the active engagement of parents (the CPAT group). Planned activities training (the PAT group) is a five- to seven-session intervention aimed at improving parent–child interactions, increasing child engagement in daily activities, and reducing challenging behaviors	Parents and children were observed by an independent observer. Observation guidelines were adopted from the original PAT program. CPAT had additional components compared with PAT (phone calls between home visits and daily text messages)	The average baseline PAT score was 32% correct. At post-intervention, the average percentage correct was 52%. All participants demonstrated improvements in their parenting behaviors. Significant different attrition rates between the two intervention groups: CPAT (16%) and PAT (30%)
3. Bordnick et al. (2012). Randomized control clinical trial. Virtual reality skills training (VRST) combined with nicotine replacement therapy (NRT) was compared to NRT alone. Assessment during treatment, at end of treatment, and at post-treatment follow-up	Good	86 Nicotine-dependent adults, completed the 10-week program. NRT group ($n = 42$), who received only nicotine patch; VRST + NRT group ($n = 44$), who received the same nicotine patch schedule plus 10 weeks of virtual reality training	*Virtual reality (VR) program is a technological medium that immerses individuals into realistic complex cue environments.* Directional stereo audio, graphics, vibration platforms, and scent cues all add to the immersive experience for the participant	Participants were assessed for smoking behavior and coping skills. Measurement items were adopted from validated instruments, such as the structured clinical interview for the DSM-IV, the Fagerstrom test for nicotine dependence, and the coping skills. Smoking confidence questionnaire	Smoking rates and craving for nicotine were significantly lower for the VRST group compared to the NRT group at the end of treatment. Self-confidence and coping skills were also significantly higher for the VRST group, and the number of cigarettes smoked was significantly lower compared to the control group at follow-up
4. Calam, Sanders, Miller, Sadhnani, and Carmont (2008). Randomized control clinical trial. Group with standard viewing condition was compared with group with technology enhanced viewing condition. Pre, post, and follow-up assessments	Fair. The comparison between the "standard viewing group" and the "technology enhanced viewing group" was not clear	723 Families participated and were randomly assigned to either a standard or a web-enhanced viewing condition	*Driving Mum and Dad Mad is a television program about parenting in families with severe conduct problems.* The training program was an 8-week course. The intervention was run by a clinical psychologist. Each episode showed families learning to implement positive parenting skills, group process	Scales adopted from validated instruments, such as the Parental Anger Inventory, Depression Anxiety Stress scale, and the Relationship Quality Index	Parents in both conditions reported significant improvements in their child's behavior, and parenting skills. Regressions identified predictors of program outcomes and level of involvement. Parents who watched the entire series had more severe problems at pre-intervention and high sociodemographic risk than parents who did not watch the entire series

(continued)

Table 1. (continued)

Publication and Study Design	Quality Rating	Study Settings and Participants	Intervention and Follow-Up	Measurement Validation	Study Outcomes
5. Chi and Frydenberg (2009) Randomized control clinical trial. Control group, Best of Coping (BOC) treatment group, and Cyber Savvy Teens (CST) Treatment group. Pre–post assessments	Good	50 Adolescents (28 girls, 22 boys), aged 13–14, attending Year 8 in two secondary schools in Melbourne. They were divided into three groups, namely, control ($n = 23$), BOC ($n = 10$), and CST ($n = 17$)	A program teaching cyber-safety (CST program), and a program teaching coping skills (BOC program)	Scales adopted from validated instruments, such as Adolescent Coping scale and the Kessler Psychological Distress scale	Participants in both intervention groups demonstrated improvements in their overall mental health and in making better online choices post-program. The BOC program was found to be a better program for improving general coping than CST alone. The CST program was better at tackling issues related to the cyber space
6. Delaney, Nelson, Pacifici, White, and Smalley (2012) Randomized control clinical trial. Control group and Treatment group. Pre–post assessments	Good	92 Individuals enrolled in the program in two states were randomly assigned to a treatment group ($n = 41$) that viewed an online version of the class or to a comparison group that took the same class off-line ($n = 51$)	A single online training module adapted from the original Institute for Human Services (IHS) preservice training program for prospective foster, kinship, and adoptive parents. The complete IHS preservice training program consists of twelve 3-hr workshops. This study was the module on the impact of abuse and neglect on child developments	Scales adopted from validated instruments, such as the Empathic Concern and the Interpersonal Reactivity Index	Results showed the online training was more effective than the live training at increasing knowledge. Feedback indicated high satisfaction with the online course. It is concluded that online instruction is more effective than live instruction, because web-based training offers advantages like standardizing instruction, providing greater flexibility
7. Feil et al. (2008) Pilot feasibility test, pre–post assessments	Poor. No control or comparison group. Validation and reliability were not clearly mentioned	3 Adolescent girls, aged 15–17, who were pregnant, living in foster group home care, and involved with the local juvenile justice system	A parenting program was adapted in an online training course. The program was enhanced with participant-created videos of parent–infant interactions and weekly staff contact, which enable distal treatment providers to give feedback and make decisions informed by direct behavioral assessment	Items adapted from the playing and learning strategies program, which was proven to be effective. Validation and reliability test were not mentioned.	Results showed that post-assessment knowledge regarding both infant signals and responsive parenting behaviors increased by 30–40% from pre-assessment
8. Finn, Kerman, and LeCornec (2005) Randomized control clinical trial. Control group and Intervention group, with pre–post assessments	Good	Intervention group (34 foster families) received computers, Internet connection, and supportive services. Control group (30 foster families not in the program) using survey methods and a posttest only design	A program designed to promote information technology (IT) skills and access among children in long-term foster care and their foster families. The program combined computer distribution with casework activity that included individualized assessment, learning plan development, referral to community training, periodic review, and group activities	A survey instrument was developed for mailed data collection and then used for telephone interviewing with families. Reliability test conducted	After a year in the program, foster families increased their frequency of computer use, confidence in using computers and the Internet, and frequency of e-mail with social workers. Parents and foster children perceived the program to be useful in improving children's technology skills, homework, grades, and interest in technology related careers
9. Finn, Kerman, and LeCornec (2004) Clinical trial, an intervention group with subsets. Pre–post assessments	Poor. No control group. Validation and reliability were not mentioned	32 Foster families (43 foster children, 15 biological children, and 50 parents)	A program developed to increase IT access and skills among foster children and families. The model emphasizes continuity and integration of technology into ongoing service provision for life skills development in foster youth	A survey instrument (IT Questionnaire) was developed for the program. Validation and reliability were not mentioned	A "digital divide" was identified, indicating that foster children lag behind biological children in foster families in development of technology skills

(continued)

Table 1. (continued)

Publication and Study Design	Quality Rating	Study Settings and Participants	Intervention and Follow-Up	Measurement Validation	Study Outcomes
10. Gelatt, Adler-Baeder, and Seeley (2010) Randomized control clinical trial. Treatment group, control group. Pre, post, and follow-up assessments	Good	All participants had recently remarried having at least one child aged 11–15. They were recruited primarily online. At pretest: treatment group (n = 150) and control group (n = 150) were compared. At posttest: treatment group (n = 140, and control group (n = 148)	An online training program—Parenting Toolkit: Skills for Stepfamilies program. The treatment group participants were e-mailed login information and a link to the website. They were asked to make 3 weekly visits to the program to review a minimum of two family challenges at each visit	Participants were instructed to identify one-specific child or stepchild in their household to consider when responding to all the questions in the study. Outcome measures were organized into three domains, namely, parenting, family, and couple. The mean item score was calculated for each outcome measure. Most of the items were adopted from validated instruments	Participation in the stepfamily education program positively influenced several key areas of parenting and family functioning at post-program and follow-up
11. Holden, Bearison, Rode, Rosenberg, and Fishman (1999) Controlled clinical trial with randomized treatment conditions (with Starbright World [SBW] or without SBW). Treatments for a child were randomly and alternately assigned. A minimum of 10 observations per condition for each child	Fair. Attrition rate a bit high. Equivocal outcomes	9 Participants (4 girls, 5 boys), aged 9–19, hospitalized on the gastroenterology, hematology/ oncology, pediatric nephrology, or cardiology unit at Mount Sinai. All of them had not had any prior use of SBW. Some participants dropped out	SBW was an interactive, multiuser, virtual environment that linked up seriously ill hospitalized children into an online community. Children could play games and interact with each other through the use of a character that they chose to represent themselves in SBW (www.starbright.org)	The primary measures were visual analog scales for (a) pain intensity, (b) pain affect, and (c) anxiety. Items were adopted from validated instruments	At the individual level, results were equivocal. However, the meta-analytic view of the data for all nine children revealed that children in the SBW condition reported significantly less pain intensity and anxiety
12. Kaganoff, Bordnick, and Carter (2012) Randomized control clinical trial. Groups in two different treatment conditions, assessments at baseline, Week 4, and Week 10 of treatment	Fair. The rationale of the arrangement of the two groups is not clear	46 Participants were recruited through advertisements in a local paper in the Atlanta metropolitan area and were involved in a treatment study. Participants were randomly assigned to two treatment conditions. Condition 1: NRT only and Condition 2: NRT + behavioral therapy	VR uses computer graphics and input devices to create a simulation designed to immerse a user in the virtual environment mimicking the real world. A typical VR system uses a head-mounted display to present the virtual environment and a tracking device allows the user to look around as if they were in the environment	Smoking Attention Scale (SAS), a modified version of the 3-item Alcohol Attention scale, used in previous VR studies. The authors noted that both groups were combined into one group for analysis because the purpose of this study is to determine the feasibility of using VR-NCRAS rather than treatment modality	Feasibility of using VR-NCRAS was demonstrated. Findings support the use of the cue reactivity assessment during treatment, which can inform treatment decisions
13. Lieberman et al. (2005) Randomized control clinical trial. Intervention group and control group compared. Assessments conducted at different time points	Poor. High attrition rate. Participants in Study 1 were leaders, participants in the Internet group were general PD patients	Study 1: 23 leaders from general PD support groups in California were asked to share their experiences. Study 2: 66 people from PD support groups and PD clinics were assigned to a 20-week, professionally facilitated online support group. Online participants were further assigned to one of the two group types based on patient similarity: homogeneous and heterogeneous. Dropouts were high (39%)	Online support groups facilitated by trained Wellness Community mental health professionals. Participants were invited to go online with the project coordinator prior to the start of their group. Prior to beginning the groups, each of the group facilitators participated in an 8-hour educational orientation to PD	Depression and quality of life were assessed. Scales adopted from validated instruments, such as Center for Epidemiological Study Depression scale, Parkinson's disease questionnaire, and Severity of the disease, functional status questionnaire	Compared to PD patients in traditional support groups, the online were younger, less depressed, and had higher quality of life. Online group patients showed improved quality of life; no overall changes were observed in depression. Participants in the homogenous groups reported a significant decrease in depression

(continued)

Table I. (continued)

Publication and Study Design	Quality Rating	Study Settings and Participants	Intervention and Follow-Up	Measurement Validation	Study Outcomes
14. Nicholas, Chahauver, et al. (2012) Clinical trial, single intervention group, pre–post assessments	Poor. No control or comparison group	21 Fathers of children with a brain tumor at The Hospital for Sick Children in Toronto, Canada. 11 lived relatively near the hospital, 5 resided in surrounding suburban areas, and another 5 were from smaller cities within commuting distance	*It was a closed online forum.* Participating fathers were invited to engage in the network a minimum of once per week for 3 months. The network was semistructured, asynchronous, and led by an experienced, Master of Social Work (MSW)–trained facilitator	Evaluation comprised pre-/post-intervention questionnaires, content analysis of online network postings, and post-intervention qualitative interviews. Scales adapted from validated instruments, such as Coping Health Inventory for Parents, Multidimensional Support scale and meaning of illness questionnaire	Positive effects on paternal coping were demonstrated. Participating fathers recommended a combined resource of online and face-to-face support, including the development of a support network with a larger participant base
15. Nicholas, Fellner, et al. (2012) Randomized control clinical trial. Intervention group, control group, with pre–post assessments	Good	31 Adolescent participants at The Hospital for Sick Children in Toronto, Canada, were assigned to an intervention ($n = 15$) or control group ($n = 16$). No attrition	*An online program addressing diabetes-related issues.* The modules were administered weekly (8 weeks) in an online, text-based, asynchronous manner. Participants discussed module-based topics in an online forum, resulting in rich, online peer-to-peer dialogue that was moderated by a master's-level social worker with experience in pediatric diabetes care	Mixed-method evaluation design, comprised both quantitative and qualitative data collection. For quantitative outcomes, validated instrument was used (the Children's Inventory of Social Support [CISSI]	Post-intervention qualitative interviews with intervention group participants identified beneficial impacts of decreased isolation, knowledge gain, and normalization of experience
16. Pacifici, White, Cummings, and Nelson (2005) Clinical trial, single intervention group, assessed 3 times at baseline (Time 1), 2 weeks after baseline (Time 2), and again after a 2-week intervention period (Time 3)	Poor. No control or comparison group. Validation and reliability were not mentioned	151 Adolescent trainees from a Job Corps Center in the Southwest, mean age 19.2 years. 125 completed the study, 54% female, 46% male. The ethnic composition of the group includes Hispanic, White, native American, African American, multiracial, and Asian/Pacific Islander	*Vstreet.com was a website for at-risk youth designed to teach life skills and build community.* Every user has his or her own virtual room, a personal space that resembles a teen's room in a residential facility. Teens can personalize it by changing the style of the furniture and other things. The room was intended to create a sense of ownership, something at-risk teens cherish but with which they have little experience. Each user had their own e-mail account, calendar, and address book	Scales were developed for the study. Validation and reliability were not mentioned	Findings showed that the website was highly effective in increasing their knowledge of apartment hunting skills, feelings of peer social support, and intentions of staying in touch with their agency
17. Soutter et al. (2004) Clinical trial, single intervention group. Evaluations of equipment usage and parental perceptions of the project were carried out at 3 and 12 months post-installation	Poor. No control or comparison group. Validation and reliability were not clearly mentioned	79 Families in the north of England with a boy with Duchenne muscular dystrophy	*Participating families were provided with a personal computer connected via a telephone modem to the Internet.* The computer was configured to connect to an Internet service provider; an e-mail account, and an ID and password to allow access to the private section of the project website. The equipment was installed and maintained, with ongoing support for users. Basic training was given at installation	Quantitative analysis. Based on a framework having five steps, namely, familiarization, identifying a thematic framework, indexing, charting, and mapping and interpretation. Validation and reliability were not mentioned	Results from interviews indicated that benefits accrued to the families and to the boys themselves: family relationships can be extended, and the boys can acquire a degree of independence which, according to parents' views, can boost self-confidence and self-esteem. The greatest use of the computer was for schoolwork with siblings sharing in this. Cost proved to be a problem for a number of families

Note. PAT = planned activities training; CPAT = cellular phone–enhanced PAT; DSM-IV = diagnostic and statistical manual of mental disorders IV; PD = parkinson's disease; VR-NCRAS = virtual reality nicotine cue reactivity assessment system.

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workbook, and CD ROMs to ensure the implementation of the intervention.

Discussion and Application to Social Work Practice

ICT-Enhanced Social Work Interventions: A Practitioner Versus Programmer Issue

In general, all ICT-enhanced interventions reviewed here indicated positive outcomes in one way or another. Further, most of them (65%) were of good or fair quality in terms of their validity, and almost all of them upheld IF. A comparison between these ICT-enhanced interventions and general social work interventions may help portray the extent to which these interventions upheld IF. Tucker and Blythe (2008) reviewed social work intervention studies ($N = 128$) in the 1990s, found that less than 10% indicated concerns about IF, and only about 39% noted strategies to enhance IF. However, the present study reports that 24% showed concerns for IF, and 82% noted had strategies to enhance IF. A further comparison between the IF strategies adopted by ICT-enhanced interventions and those adopted by general social work interventions further explains these differences. Tucker and Blythe (2008) found that 27% of the intervention studies ($N = 128$) offered training, 15% used supervisions, and 31% used manuals/protocols. Nevertheless, among these ICT-enhanced interventions, only 6% of them offered training, 12% used supervision, and 82% used manuals/protocols. That is, compared with general social work interventions, the rate of using protocols in ICT-enhanced interventions is obviously much higher, and the rate of using training is obviously much lower.

These differences indicated a paradigm shift triggered by the use of such technology. The functional features of these various ICTs have supported particular forms of strategies to ensure the intervention can be implemented as planned. For example, online communications were tracked and analyzed (Feil et al., 2008; Pacifici et al., 2005), computer-based training activities were structured and sequenced (Bordnick, Traylor, Carter, & Graap, 2012; Holden, Bearison, Rode, Rosenberg, & Fishman, 1999), online learning tasks were systematically assigned and assessed (Calam et al., 2008; Delaney, Nelson, Pacifici, White, & Smalley, 2012). In other words, the use of ICT has helped standardize and control the implementation of the intervention. This arguably explains why IF is much more commonly upheld in ICT-enhanced social work interventions than more general non-ICT social work interventions. The technological medium by default is a protocol that shapes activity sequences, and the role of human intervention has become less significant, and therefore rigorous training or supervision is usually not required. As Gelatt, Adler-Baeder, and Seeley (2010) stated, "perfect implementation fidelity is ensured because the content is not interpreted, facilitated, or delivered by an educator, but is contained and provided by the program itself" (p. 583).

This viewpoint is consistent with these findings which show that the ICT-enhanced interventions usually have strategies enhancing IF, but they may not explicitly discuss precise terms related to it. Among the intervention studies reviewed, only 24% used IF terms, but 82% noted strategies to enhance IF. That is, the extent to which an intervention is implemented as planned can be detached from a practitioners' awareness. The implication here is double edged. This represents IF improvement resulting from the application of ICT, but it also implies a reliance more on well-designed technologies, than on skilled practitioners. This technological dominance was noted among the studies reviewed here. Although some of the interventions used ICT as a supportive component in the professional-led intervention process (Bigelow et al., 2008; Chi & Frydenberg, 2009; Kaganoff et al., 2012), some of them just required minimal professional intervention in the actual implementation process, such as content-driven e-learning (Gelatt, Adler-Baeder, & Seeley, 2010) or mutual-aid online community (Holden et al., 1999). As social work evolves technologically, this may raise questions about the extent to which such ICT-enhanced professional practice really needs a professional, and what is their role? Indeed, this practitioner versus programmer issue was a unique finding of this study.

Addressing a Void in the Literature

While most of these ICT-enhanced interventions obviously upheld IF, ironically only a few of them specifically examined in what ways or to what extent the effectiveness of the intervention was enhanced by ICT. Among these, only three of them (2 rated as *good* and 1 rated as *fair*) made effort to evaluate the role of ICT in the intervention. Bigelow and colleagues (2008) compared participants in a parenting training program enhanced by cell phones with participants in the same program without using cell phones. They found that participants in both groups demonstrated improvements in their parenting behaviors, and attrition rates of the cell phone-enhanced group (16%) were much lower than the group not using cell phones (30%). Bordnick and colleagues (2012) compared participants in a nicotine replacement therapy (NRT) using VR program with participants in NRT alone. They found that smoking rates and craving for nicotine were significantly lower for the VR-enhanced group, compared to the NRT group. Self-confidence and coping skills were also significantly higher in the VR-enhanced group than the NRT group. Delaney, Nelson, Pacifici, White, and Smalley (2012) compared participants in an online parenting program with participants in the off-line version of that program. Their results showed online training was more effective than the face-to-face training at increasing knowledge, user feedback also indicated higher satisfaction with the online course. They concluded that online instruction is more effective than live instruction and has positive implications for practice, because web-based training offers advantages such as standardizing instruction and providing greater flexibility.

Researchers and evaluators use the term "black box" to describe the lack of specificity in describing processes leading

to intervention outcomes, and this ambiguity makes replication almost impossible (Conn, 2012; Fraser & Galinsky, 2010). In some ways, most studies reviewed here presented a type of "theoretical black box" on the part of ICT. For instance, although most of the intervention studies described the operational details of the ICTs, such as functions, web links, and hosting companies, they did not offer any framework to theorize or evaluate the effects of the ICT used directly in the intervention. For example, most studies compared participants who were participated in a program and those who did not participate in any intervention program (e.g., Gelatt et al., 2010) or compared participants in different intervention modalities all using the same ICT (e.g., Barrera, Glasgow, McKay, Boles, & Feil, 2002). This infers that the effects of the ICT were not a researchable component in the research design, and they were not really evaluated.

Further, the use of ICT was not rigorously discussed or supported by any conceptual framework or theory. For example, Calam, Sanders, Miller, Sadhnani, and Carmont, (2008) investigated the impact of a television program-based parenting training. They randomly assigned participants to either a standard TV viewing condition or a web-enhanced TV viewing condition. Their findings indicated that both groups have significant behavioral changes, but the two groups do not indicate significant differences in their outcomes. Our question here is why would a standard TV viewing and web-enhanced TV viewing be demarcated and researched? The significance of differentiating these two viewing modes was not really rationalized, discussed, or theorized, and the study did not yield useful findings regarding the use of web-supported methods. Chi and Frydenberg (2009) investigated a program tackling cyber bullying, in which a core component is a training program that helped participants to cope with the cyber-world. Complex social activities on the Internet were more or less reduced to individuals' psychological coping skills, and what counted as proper or safe cyber activities were not really mentioned. This observation partly echoes with what Wodarski (2011) noted that social work practitioners use "homogeneous interventions for heterogeneous clients" (p. 578), and that this is "potentially counterproductive to the helping process" (p. 580). In this present study, we observed that the manipulation of ICT and the matching between the types of ICT and the types of clients are not adequately discussed. At least, it is questionable whether an ICT literate patient and an ICT dummy can equally benefit from an online support group.

As such, these theoretical black boxes concords raise questions about whether the existing intervention studies could have provided any frameworks to hypothesize and guide the use of ICT at a working level. We are aware that there is a long-standing debate of the role of theory and its use and nonuse in social work research which caused Thyer (2001, 2008) to conclude about theory having negative or harmful effects in social work research, as we use it. Our concern here, however, is not to suggest ICT-enhanced interventions should make references to a theory, but that the conceptual consideration on the part of ICT application

should be minimally strengthened. Although recent systematic reviews in the social work literature commonly call for more theoretical discussions of the impact of ICT on therapeutic relationship and clients' daily life (Best et al., 2014; Zilberstein, 2013), the intervention studies reviewed here did not present equivalent theoretical rigor on the part of ICT application, although most of them were of fair or good quality in terms of their overall validity.

Concluding Remarks

This present study had three major limitations. First, it merely covered articles included in the SSCI. As such, journal sources, databases, and "grey literature" sources were not included. Second, no attempt was made to assess studies presented in languages other than English. Third, the rating criteria were based upon the quality of methodology and design, other factors such as the quality of theorization, findings, and usability were not determined.

In conclusion, we were pleased that all the studies reviewed herein indicated positive intervention outcomes, most of them (65%) were of good or fair quality in terms of their validity, and almost all of them (82%) upheld IF. However, there was room for improvement in the rationalization and conceptualization on the part of ICT selection, rationale for use and application. These ICT-enhanced intervention studies established a foundation to enable some unique practice insights advance social work knowledge. In order to deepen our understanding about ICT in social work, further practice and research are recommended. We offer some friendly suggestions toward this goal.

First, as indicated, the disproportionate examples of ICT micro-level interventions can serve as a foundation to inspire further research. And we fully accept the fact that this is where "the field is" with regard to growing awareness and implementation of ICTs. However, this also means that there is room to further develop, theorize, and utilize alternative applications of ICT at meso-level and macro-level interventions. Although this may also mean that macro-level interventions are not common in the ICT in social work literature, it may also imply the potential of ICT has not yet been fully developed or realized in such areas.

There is also a need to conduct more studies that can critically evaluate the roles of ICT in social work interventions. A key consideration here is the use of comparison groups to render study inferences (Holosko, 2010). A comparison between participants who participated in ICT-enhanced interventions and those who did not receive any intervention does not really help depict the precise role and effectiveness of the ICT. To better examine this effectiveness, a study may need to manipulate different modes of ICT interventions or compare participants in an intervention enhanced by the ICT with participants in a comparable intervention without using the ICT (Bigelow et al., 2008; Bordnick et al., 2012; Delaney et al., 2012). To meaningfully demarcate different ICT usages and set up suitable comparable groups, the conceptual consideration on the part of ICT application should be strengthened.

As noted herein, some practices were more empirically informed and feasible than others. For example, several intervention studies in this review commonly assumed that social support can be mediated and enhanced by ICT (Barrera et al., 2002; Bigelow et al., 2008; Holden et al., 1999; Lieberman et al., 2005; Nicholas, Chahauver, et al., 2012; Nicholas, Fellner, et al., 2012; Pacifici et al., 2005). Although not all of these had significant findings, they do represent a cohort in social work academia who have studied and advocated for more ICT use in the profession. Moreover, we also noted social media have been increasingly adopted by recent interventions (Best et al., 2014; Giffords, 2009; Reamer, 2013; Zilberstein, 2013). Compared with the system-end technologies such as hardware provision (e.g., Soutter et al., 2004) or advanced computer programs (e.g., Bordnick et al., 2012) that largely rely on technical support from computer experts, social media are user-end applications that can be mastered and replicated by frontline practitioners. Therefore, this form of social network-based practice has enormous potential to be adopted and further developed among frontline social work practitioners.

We recommend that more research studies should be conducted in non-Western countries, especially those regions with high Internet penetration rates. Internet penetration rates in many Asian regions, such as South Korea or Japan, are comparable to many metropolitan cities in the West (http://www.internetworldstats.com). Further, the young people in these Asian regions present quite diverse and vibrant online cultures. However, this review did not identify any selected intervention studies in non-Western countries in the SSCI collection. Omitting the experiences in Asian regions might omit unique and/or significant practice experiences and issues arising from cultural differences (e.g., attitude toward user-driven contents) and juridical differences (e.g., data privacy, confidentiality, intellectual property rights, etc.).

Finally, ICT has unquestionably brought fresh opportunities for the future social work practice. Nevertheless, newer technologies may also bring more challenges than solutions. These challenges notwithstanding, this systematic review fills a gap in the social work literature and echoes a burgeoning and new social work research and practice area on the profession's horizon. Indeed, social work has finally arrived in the digital age.

Declaration of Conflicting Interests

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