Virtual Reality in the 1990s: What Did We Learn?

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ABSTRACT

Facts and figures are presented that highlight the growth of virtual reality (VR) in the mental health area from its inception in January 1993 to its status at the end of December 1999. In a short 7-year time span, the area of mental health and VR has grown from a fledgling field to one in which controlled studies have been completed, funding has become available, and wider acceptance by psychological and psychiatric communities is recognized. Research has shown promise in four areas: anxiety disorders, eating disorders, neuropsychological applications, and as a distraction technique during painful or uncomfortable medical procedures.

INTRODUCTION

THE USE OF VIRTUAL REALITY (VR) in mental health is generally agreed to have begun in the public sector in 1993, although the military and entertainment industry had been using various non-medical applications prior to this time. Over the past 7 years, VR applications in mental health have experienced an explosive growth, moving past the conceptualization phase and culminating in 1999 with several controlled studies being completed and published. Many participants at the Medicine Meets Virtual Reality 2000 Virtual Reality and Mental Health Symposium contributed information provided in this article to be used in a cumulative fashion to demonstrate the effective growth of this area from its inception in 1993 to the present. Although not all-inclusive, this trend appears to be representative of the field as a whole.

PROMISING AREAS

Anxiety disorders, eating disorders, neuropsychological applications, and distraction techniques for painful medical procedures represent the majority of work conducted by the international community. These areas have demonstrated successful incorporation into existing clinical protocols and are recognized as appropriate adjuncts to clinical practice.

FUNDING

As efficacy has been shown by initial studies, government funding has begun to increase, with two peaks: one in 1995, with funding reaching $500,000; and one in 1999, with funding reaching $674,000. Private sector funding has also become available, with 1998 seeing $100,000 given by private foundations to per-
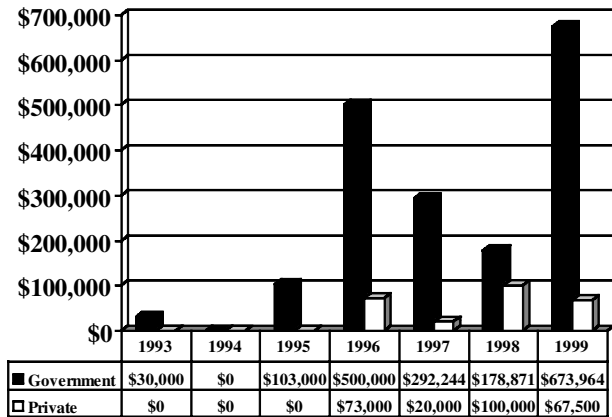

	1993	1994	1995	1996	1997	1998	1999
■ Government	$30,000	$0	$103,000	$500,000	$292,244	$178,871	$673,964
□ Private	$0	$0	$0	$73,000	$20,000	$100,000	$67,500

FIG. 1.   Amount of VR funding, 1993–1999.

	1993	1994	1995	1996	1997	1998	1999
# of Presentations	2	6	9	17	18	42	77

FIG. 3.   Number of professional presentations on VR, 1993–1999.

form research in the mental health area (Fig. 1). Funding efforts by the National Science Foundation, the Defense Advanced Research Projects Agency, the European Union Funding agencies, and the National Institute of Mental Health have sought to determine ways to make software more versatile and easier to use, as well as supporting expanded clinical trials to discover the efficacy of VR treatment for specific disorders (Fig. 2).

PRESENTATIONS

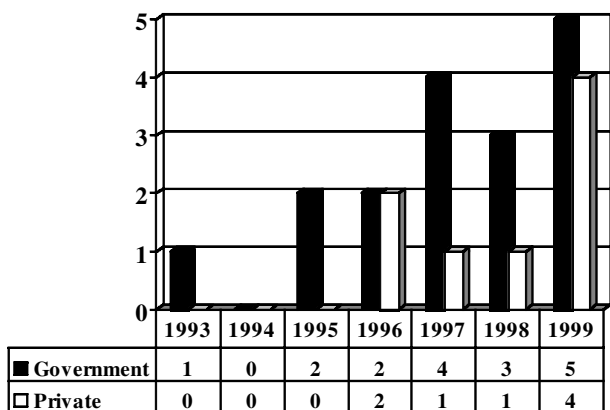As wider acceptance has grown in the psychiatric and psychological domain, more presentations considering virtual reality as an adjunct to traditional treatments have been seen at professional meetings, with 77 professional presentations in 1999; up from a mere two presentations in 1993 (Fig. 3). Peer-reviewed professional journals have also realized the importance of the dissemination of these results, with publications ranging from 0 in 1993 to 53 in 1999; with a peak in 1998 of 61 (Fig. 4).

Medicine Meets Virtual Reality (MMVR), a conference that started 8 years ago to review the use of advanced technologies in the field of healthcare, realized several years ago that advanced technologies also held great promise in the mental health area. MMVR's VR and mental health symposium has expanded from half a day in 1995 to 1.5 days in 2000; with next
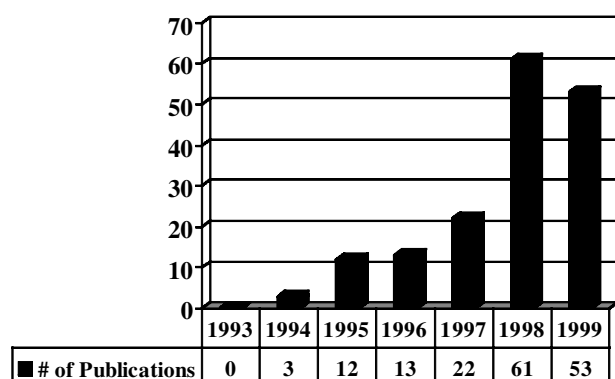

	1993	1994	1995	1996	1997	1998	1999
■ Government	1	0	2	2	4	3	5
□ Private	0	0	0	2	1	1	4

FIG. 2.   Number of VR grants funded, 1993–1999.

	1993	1994	1995	1996	1997	1998	1999
■ # of Publications	0	3	12	13	22	61	53

FIG. 4.   Number of professional publications on VR, 1993–1999.

year's symposium scheduled for two days of oral presentations and an evening poster session (http://www.amainc.com).

The news media has shown significant interest, and has also been very helpful in disseminating information on virtual reality successes to the general public, with over 86 news stories concerning virtual reality and mental health reported in 1998 and 67 in 1999 (Fig. 5).

PUBLICATIONS

The area of VR and mental health has given rise to a peer-reviewed academic journal, *CyberPsychology & Behavior* (http://www.liebertpub.com), that is dedicated to exploring the impact of the Internet, multimedia, and VR on behavior and society as well as how these technologies are used in the diagnosis, assessment, and treatment of mental health disorders. Four professionally published books are also currently available on this topic: *Virtual Environments in Clinical Psychology and Neuroscience*,[1] *Virtual Reality in Neuro-Psycho-Physiology*,[2] *Virtual Reality Therapy*,[3] and *Virtual Therapy*.[4] In addition, a public list serve managed by Albert "Skip" Rizzo at the University of Southern California allows for discussion of virtual reality topics (vrpsych_l@usc.edu) by both professional researchers and clinicians as well as interested laypersons.

WEBSITE

A website is now under development to post clinical research results from mental health studies. The website, hosted by the California School of Professional Psychology's Research and Service Foundation, will allow for quicker dissemination of research results, posting of adverse effects seen in virtual environments internationally, and a stronger collaborative approach to this field. The website will include such content as current and past research studies, publications related to VR and mental health, ethical considerations in using virtual worlds, medical contraindications, and grants funded. The website, *http://www.vrmentalhealth.com*, is scheduled to be open for web traffic on or before September 1, 2000.

VR COMPANIES

Many researchers and clinicians in this area have joined together to form start-up VR companies as a vehicle to disseminate software to other clinicians and researchers. This trend appears to be continuing with a number of other investigators planning new start-ups in the coming year.

CONCLUSION

As a wider variety of VR software is made available for PC use and as hardware prices for head-mounted displays, trackers, and computers decline, a wider dissemination of VR into clinicians' offices should be seen. It is important that continued emphasis be placed on controlled clinical trials so that the efficacy and effectiveness of VR therapy continues to be demonstrated. We look forward to many more interesting and exciting applications for VR therapy for treating a wide variety of mental health disorders as researchers from different theoretical backgrounds become interested in these technological developments and realize their value in optimizing patient care.
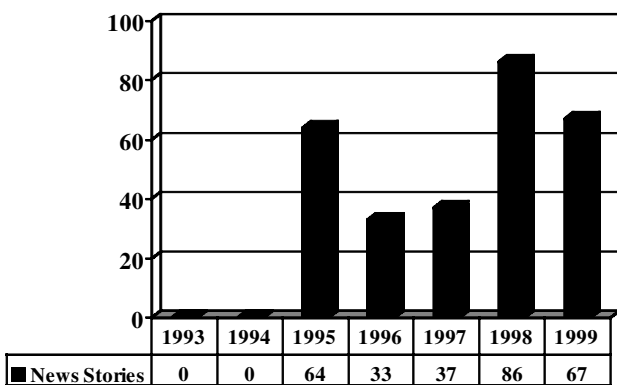

	1993	1994	1995	1996	1997	1998	1999
■ News Stories	0	0	64	33	37	86	67

FIG. 5. Number of news stories/popular press publications on VR, 1993–1999.

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