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The Effect of Computer-Mediated Administration on Self-Disclosure of Problems on the Addiction Severity Index

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Abstract

Objectives—People tend to disclose more personal information when communication is mediated through the use of a computer. This study was conducted to examine the impact of this phenomenon on the way respondents answer questions during computer-mediated, self-administration of the Addiction Severity Index (ASI) called the Addiction Severity Index–Multimedia Version® (ASI-MV®).

Methods—A sample of 142 clients in substance abuse treatment was administered the ASI via an interviewer and the computerized ASI-MV®, three to five days apart in a counterbalanced order. Seven composite scores were compared between the two test administrations using paired t-tests. Post hoc analyses examined interviewer effects.

Results—Comparisons of composite scores for each of the domains between the face-to-face administered and computer-mediated, self-administered ASI revealed that significantly greater problem severity was reported by clients in five of the seven domains during administration of the computer-mediated, self-administered version compared to the trained interviewer version. Item analyses identified certain items as responsible for significant differences, especially those asking clients to rate need for treatment. All items that were significantly different between the two modes of administration revealed greater problem severity reported on the ASI-MV® as compared to the interview administered assessment. Post hoc analyses yielded significant interviewer effects on four of the five domains where differences were observed.

Conclusions—These data support a growing literature documenting a tendency for respondents to be more self-disclosing in a computer-mediated format over a face-to-face interview. Differences in interviewer skill in establishing rapport may account for these observations.

Keywords

ASI; ASI-MV; Self-disclosure; Substance abuse treatment

The wide spread use of computers and the Internet as a medium to communicate and exchange information has resulted in substantial changes in the way people socialize with each other and the nature of the kinds of information that they reveal about themselves. E-mail, Instant Messaging, and chat groups seem to encourage the expression of qualitatively different kinds of information than might otherwise be disclosed in a face-to-face encounter¹.

An interesting and significant area that has been impacted by the Internet and computer-mediated communication is the administration of clinical assessments. The growth and development of multimedia technology make it possible for individuals to self-administer

assessment instruments that were originally administered by human interviewers. The earliest efforts to evaluate and diagnose psychiatric conditions achieved good correspondence between computer administered and expert interviewers 2. In his review of computer-administered assessments, Garb (2007)³ notes that over the years, tests of concordance between computer- and interviewer-determined diagnoses have ranged from poor to fair, although such disagreement is often no worse than found among human diagnosticians (e.g., 4). Some authors and studies suggest that information obtained via a person's interaction with a computer is of better quality as respondents tend to give more accurate information about sensitive or socially undesirable life circumstances to a computer than to an interviewer. There is a growing body of evidence that computer-mediated administration of surveys increase responses to sensitive personal questions compared to face-to face interviews 5, 6. People tend to report more health-related problems 7, more HIV risk behaviors 8, 9, more drug use 10, and men report less sexual activity and women more 11. In general, computer-administered assessments have performed better than clinicians using information collected in normal clinical practice³.

Theories have been posited to explain why people tend to disclose not only more information about themselves when communicating on a computer, but respond with more candor as well. With respect to online communications, anonymity inherent in online communications may enhance respondent perceptions of privacy and the ability to choose to conceal or disclose information about themselves as they see fit 6. Theorists have also stated that a lack of social context cues (e.g., age, race, gender, socioeconomic status of the interviewer) or paralinguistic cues (body language, tone of voice, facial expression) contribute to greater self-disclosure 5, 6. This may be particularly important if respondents are asked sensitive questions by an unfamiliar interviewer whose judgments they might fear. In a similar vein, Sassenberg et al. (2005)¹² suggest that the possibility of stronger interpersonal influence in face-to-face communication than in computer-mediated communication may result from heightened private self-awareness. Joinson (2001)¹³ found that respondents, who remained visually anonymous while completing a survey, disclosed significantly more information about themselves than those who were not non-visually anonymous. These findings are consistent with the traditional analyst couch position in Freudian psychotherapy where the patient faces away from the therapist. Not having direct visual contact with the therapist was thought to facilitate honest disclosure and mitigate against the influence of visual cues such as facial gestures, which could be interpreted as disapproving or critical (or indeed, approving) and subsequently alter the nature of the information that the patient discloses.

In addition to providing more accurate and honest information, there are further benefits to computer-assisted self-interviews. According to Hohman and Finnegan (2006)¹⁴, computer-assisted self-administered interviews, in which the respondent answers questions posed by a computer, have been documented to be very effective. Advantages include a low cost, uniformity of administration, accurate recording of all responses, and increased reliability, as sensitive questions were perceived as less threatening 15, 16. Computer-mediated communication also appears to enhance self-disclosure of drug use in a population survey context 10. To our knowledge, systematic examination of the effects of computer-mediated assessment of individual with substance use disorders has not been undertaken.

The ASI and ASI-MV

The Addiction Severity Index (ASI) was created in 1980 by McLellan and his colleagues at the University of Pennsylvania¹⁷. It is a structured interview that assesses current and lifetime problem severity in seven areas: alcohol use, drug use, employment, medical disorders, psychiatric disturbances, family/social relations, and legal problems. The ASI has documented reliability and validity 18-21 and has become the most widely used measure of problem severity in substance abuse treatment settings in this country and, possibly, the world. The ASI interview

is frequently used in traditional research settings and as an outcome measure in clinical settings. Furthermore, its use for determining need-for-treatment is now mandated, or highly recommended, by many government agencies. Given the growing emphasis on standardized assessments and demonstrating the value of substance abuse treatments within the field, it is likely that the use of the ASI will increase. Indeed, it has become a standard interview method and a critical part of the assessment process for people in substance abuse treatment settings.

There are drawbacks to the ASI, however. The interview is complicated to administer and score and, as such, requires extensive and expensive training. Counselors find it tedious and as a diversion from “real” counseling²². To address these concerns, Butler and colleagues (2001)²³ developed a computerized client self-administered version of the ASI, the Addiction Severity Index–Multimedia Version® (ASI-MV®). The ASI-MV® simulates an interview using audio and video presentations. Respondents are met by virtual interviewers for each of the various domains. For instance, a virtual physician greets the respondent and asks the medical questions, a substance abuse counselor asks questions about alcohol and drug abuse, a lawyer asks legal questions, etc. Furthermore, the computer program simulates an interview in that it uses skip-logic to ensure that only appropriate questions are asked. That is, if the respondent has already indicated that he or she has never used heroin, then questions about route of administration or length of time using heroin are skipped. In addition to the fact that no staff time is required to administer the ASI-MV® interview, the scoring and report generation are automated²².

The ASI-MV® was found to be reliable and valid, and to have high user acceptance²³. The ASI traditionally generates two summary scores²⁴, composite scores for each ASI domain, which are objectively calculated from clients’ responses, and severity ratings for each ASI domain, that are subjectively assigned by interviewers. The composite scores are primarily used for research and outcome monitoring. These scores are derived from questions sensitive to client behavior within the 30 days prior to taking the interview. Severity ratings are used mostly for treatment planning, since they factor in client lifetime behavior and experiences. Butler and colleagues (1998)²⁵ developed algorithms that mathematically predicted reliable severity ratings that compare well with those assigned by highly trained, expert raters. This has enabled the ASI-MV® to generate reliable, objective severity ratings in place of the subjectively assigned interviewer severity ratings.

The ASI-MV® has been well received by agencies using it to assist with treatment planning, client placement, program evaluation, and research²². Many public agencies have approved or adopted the use of the ASI-MV®, including the Veteran’s Administration, Louisiana’s Office of Addictive Disorders, Oklahoma’s Department of Mental Health and Substance Abuse, and New Mexico’s Department of Health. At this writing, the ASI-MV® is being used in more than 400 facilities in 48 states, as well as in Canada, Australia and New Zealand.

The development of the ASI-MV® emphasized criterion validity, with the “gold standard” operationally defined as agreement with the ASI face-to-face interview version on ASI composite scores. We expected and obtained substantial intra-class correlations between the ASI-MV® and the ASI face-to-face interview²³. However, based on the literature reviewed here, including evidence of superior discriminant validity of the ASI-MV® with comparison measures²³, and anecdotal evidence from users of the ASI-MV®, we began to wonder whether respondents may be more self-disclosing in their interactions with the computer-mediated, self-assessment than with an ASI face-to-face interview.

Thus, in the present study, we hypothesize that, where significant differences exist in respondents’ answers, responses to the ASI-MV® are more likely to endorse greater problem levels than responses to the ASI face-to-face interview. In order to focus the analyses, we elected to examine the ASI composite scores. The composite scores provide a general measure

of patient status in each problem area and are suitable for calculating change. These composite measures are derived mathematically for each of the ASI domains from the patient responses to certain ASI questions and they have demonstrated reliability and validity^{18, 19, 24, 26}. If significant differences in mean composite scores are observed, this would suggest that one version (ASI-MV[®] or ASI face-to-face interview) is producing higher composite scores (indicating greater problem levels). For those domains with significant differences, the direction of those differences will be examined along with the individual items used in the composite score algorithms²⁷ to determine which items account for any observed difference.

Methods

This study utilized data collected as part of the original validation of the ASI-MV[®]²³. In that study, criterion validity was established by administering both the ASI-MV and the face-to-face interview version to clients. These data were re-examined for the present study.

Participants

One-hundred forty-two participants were recruited and administered both versions of the ASI. Participants were all between the ages of 18 and 73 years. Inclusion criteria included: primary diagnosis of substance abuse or dependence, in treatment for at least three days, deemed stable enough to complete study procedures, and willingness to sign informed consent. Stabilization of the client was a subjective decision made by the treatment staff to ensure that the client's clinical status was appropriate for an assessment (e.g., not currently intoxicated or experiencing withdrawal symptoms or actively psychotic). Subjects were compensated with a \$40 gift certificate for participation in both assessment sessions.

Field Trial Facilities

The field trial was conducted at four substance abuse treatment organizations in New England (five different locations). One organization was located in New Hampshire, which consisted of two facilities, an outpatient, prison diversion facility and a residential treatment facility. A facility located in New York was both a day treatment and residential facility. The treatment organizations located in Massachusetts and Rhode Island were both residential facilities.

ASI Interviewers and Training Procedures

Each site was asked to refer one or two staff members to undergo ASI training and administer the face-to-face ASI for the research project. Seven staff members were recommended: one had an RN with a BA degree, two had BA degrees, one had a master's degree, and three had high school degrees. Three of these people reported previous experience with the ASI, and one reported having formal ASI training before this project began.

The standard, two-day ASI training was conducted by DeltaMetrics, Inc. The training covered the goals and objectives of the ASI, coding and rating, a coding quiz, scoring of video vignettes, and skill building exercises including role-plays. Two months following the initial training, a quiz on ASI knowledge was administered and scored by DeltaMetrics, Inc., and feedback was given to the interviewers. Five months after the initial training, a one-day booster session was conducted by DeltaMetrics, Inc. Finally, a scored ASI for each rater was sent to DeltaMetrics, Inc. for review, comments and feedback. These procedures reflect state-of-the-art ASI training. Interviewers were blind to the hypothesis of this study.

Design of the Field Trial and Procedures

The ASI-MV[®] and ASI face-to-face interview versions were administered to the same individual three to five days apart in counterbalanced order. McLellan et al. (1985)¹⁸ used this

timeframe when conducting test-retest evaluations of the interviews, reasoning that this timeframe was a long enough interval to reduce the likelihood of simply repeating answers from memory, but short enough to reduce the possibility of real changes in clients' situation. Based on this rationale, the three- to five-day timeframe between the face-to-face and ASI-MV[®] administrations was used.

After informed consent was given, participants were assigned to receive either the ASI-MV[®] or the ASI face-to-face interview version first in counterbalanced order to minimize any order effect. Three to five days later (depending on participants' schedules), a return visit was scheduled for the participant to complete the other version of the ASI.

Results

Client participants' characteristics

One-hundred-forty-two (142) clients in substance abuse treatment served as participants in the study. Participants' average age was 33.5 years (S.D. = 9.5; range 18-73 years). The sample was comprised mostly of men (59.2%) and mostly white (63.4%), with 26.1% African American, 8.4% Hispanic, 1.4% Native American, and .7% other ethnicity. A national survey of substance abuse treatment in the US²⁸ reported that about 32% of people in substance abuse treatment centers through the United States were female and about 59% white, 22% African-American, 14% Hispanic, and 3% other ethnicity. Thus, the present sample generally reflects the ethnic and gender distributions found nationally for substance abusers in treatment, although our sample has somewhat more female participants and fewer Hispanic persons in treatment than presented in the national figures. Most respondents were single, never married (59.9%), with 14.8% married or living as married, 22.5% divorced or separated, and 2.8% widowed. Most participants (44%) reported alcohol and drug use as their primary problem, followed by alcohol only (18%), cocaine (15%) and poly-drug use (11%), with 9% claiming heroin and 3% marijuana abuse as the primary problem. The mean education level was 11.7 years, with a third of the sample having less than a high school education. More than a third (37%) were in court-ordered treatment, and more than half (52%) were currently on parole or probation. Finally, 94% of clients who completed the initial assessment returned for the second the assessment.

Composite score comparisons of ASI-MV and ASI face-to-face interview administrations

The seven composite scores were compared using paired t-tests (SPSS version 15.0.1). The Type I error was Bonferroni adjusted for multiple tests (although it has been argued that this is overly stringent and increases the Type II error rate—that is, the error of failing to reject a null hypothesis when the alternative hypothesis is the true—cf Perneger, 1998)²⁹. Descriptives and results of the t-tests are presented in Table 1. It is clear from these analyses, that five of the seven composite scores (medical, drug, legal, family, and psychiatric domains) yielded highly significant differences between the ASI-MV[®] and the ASI face-to-face interview composite scores. In each case, the mean composite scores for the ASI-MV[®] were greater than the means for the ASI face-to-face interviews, suggesting greater problem severity reported on the computer-mediated, client-administered ASI-MV[®]. Two composite scores, for employment and alcohol, did not yield significant differences between the two forms of the ASI assessment.

Post hoc examinations of the significant domains were conducted to determine the effects of possible mediating variables (e.g., gender, age (median split), race (white versus non-white), and drug of choice (alcohol only, drug only, or drug and alcohol) on composite scores generated from either ASI version. Analyses did not yield any statistically significant effect of these variables. Different interviewers conducted the interviews at the four different participating

organizations (two each at the New Hampshire, Massachusetts, and New York organizations, and one at the Rhode Island facility). To examine effects of the interviewers, analyses were conducted to determine the possible effects of varying interviewers. These analyses yielded significant interaction effects of interviewer for the medical ($F_{1,6} = 3.1$, $p = .008$), drug ($F_{1,6} = 5.9$, $p < .001$), family/social ($F_{1,6} = 6.6$, $p < .001$), and psychiatric domains ($F_{1,6} = 3.7$, $p = .002$). While there was an overall tendency for interviewers to elicit fewer problems than computer, in each case there were one or more interviewers that elicited markedly fewer problems than the other interviewers. The one interviewer from Rhode Island was consistently low for all of the domains where significant differences were found.

Item-level analyses for significant composite scores

For each of the domains where significant differences were obtained for composite scores, we examined the individual items included in the algorithms used to calculate the scores²⁷. For continuous variables, paired t-tests were used. In the case of the family composite score, nine separate items ask about whether respondent has had serious problems in the past 30 days with mother, father, siblings, spouse, children, other family members, close friends, neighbors, and co-workers. Rather than examining each of these variables separately, we calculated a ratio of “yes” responses to the number of relationships that exist for the individual (that is, if one has no spouse, for instance, then that relationship is not counted). This calculation is part of the computation of the family composite score. This ratio was then analyzed as a continuous variable. Similarly, a series of yes/no responses are asked with respect to the experience of various psychiatric symptoms or problems in the past 30 days, including serious depression, anxiety, hallucinations, trouble concentrating or understanding, violent behavior, thoughts of suicide, suicide attempts, or taken prescription medication. A variable was created that summed respondents’ answers to these variables, so that greater values represent more endorsement of psychiatric symptoms or problems. Finally, two remaining categorical variables include one in the legal domain regarding whether the respondent was awaiting charges, trial or sentencing and one in the family domain that asks whether the respondent is satisfied with their marital status. These variables were examined using the Wilcoxon Signed Ranks test, a non-parametric test for paired comparisons.

Item results for the significant domains are presented in Table 2 whereas item results for the domains that were not statistically different can be found in the Appendix. As can be seen, in each of the significantly different domains, only a few of the variables appear to account for the observed significance. For the medical domain, the only item that was significant was one that asked the respondent how important it was for him/her to get treatment for their medical problems ($p = .003$). For the individual drug items, sedative use in the past 30 days was significant ($p = .006$), although no other drug was significant. In addition, the importance of treatment for drug problems was significant ($p < .001$) and how troubled or bothered the respondent is about their drug problems approached significance ($p = .052$). With respect to the legal domain, again the variable that gauged the respondents’ need for legal assistance was significant ($p = .001$) along with whether they are awaiting charges, trial or sentencing ($p < .001$). The significant variables for the family domain were the number of days in the past 30 he/she experienced family conflicts ($p = .001$), need for treatment for family problems ($p < .001$) and the family problem ratio reflecting the degree to which the respondents’ experienced problems in relationships ($p < .001$). Finally, for the psychiatric domain, the sum of psychiatric symptoms or problems was statistically different ($p < .001$) as was the respondents’ ratings of how important their need is for psychiatric treatment ($p = .045$). In all cases, the significant differences reflect greater endorsement of problems for the ASI-MV[®] than in the ASI face-to-face interview. It is interesting to note that in each of the domains, respondent ratings of how important treatment is for their problems were significant.

Discussion

Results from this study indicate that clients tend to report a higher degree of problem severity or concerns about their problems when answering questions on the ASI-MV[®] than during the face-to-face interview ASI format. On five out of the seven ASI domains, composite scores, reflecting participants' problem level, were more severe on the computerized version of the assessment. Domains in which significant differences were found were the medical, drugs, legal, family and psychological domains. The two domains in which the two different test administrations were not significantly different were the alcohol and employment domains. Within each domain where significant differences were found, we identified the individual items that were responsible for the differences. In the medical domain, only one item was significantly different between the computer-mediated and face-to-face assessments, while the other four domains had multiple items that were significantly different.

In post hoc examinations, significant differences were found for interviewer. While in general there was a tendency for interviewers to elicit fewer problems or ratings of less severity, some interviewers were more likely to record significantly less severity. Thus, although there is a tendency documented in the literature for interviewers to elicit fewer problems or make fewer diagnoses than computer-administered assessments³, there may be wide variability in interviewer skill or training. The present findings suggest an overall agreement between computer- and interviewer-administered assessment, but this agreement may be affected by the skill or training of the interviewer. Further, disagreement tends to take the form of interviewers eliciting responses reflecting less severity than reported by the computer.

The original intention of developing a computer-mediated ASI interview was to achieve agreement with the "gold standard" of the face-to-face interview version. Correlations obtained in the original validation study of the ASI-MV[®] were all reasonably high (between .54 and .95) and significant²³. Indeed, observations of "denial" in those with substance use disorders³⁰ raised the question as to whether completely self-report formatted assessments, like the ASI-MV[®], might permit clients to minimize their problems. However, the data presented here suggest that such concerns were unwarranted. For the most part, the ASI-MV[®] and the face-to-face ASI interview produce quite similar results. When the ASI-MV[®] and the face-to-face ASI interview results were divergent, a consistent pattern was found where more problems were endorsed in the computer-mediated format. Thus, the hypothesis that people would be more forthcoming through a computer was supported by a consistent and significant pattern of increased problem reporting on five of the seven ASI domains. It is important to point out that not all of the composite domain items were significantly different. In particular, clients' ratings of their need for treatment was consistently significantly different for each of the domains (medical, legal, drug, family/social, and psychological domains) between the interviewer-administered and computer-administered versions of the ASI. Why this item consistently emerged as different is unclear. It is possible that willingness to admit need for help is greater when one does not have to admit such a need to an actual person. On all five significantly different domains, patients reported a higher need for treatment when answering the item on the ASI-MV[®]. Interestingly, in the alcohol domain, which did not yield a significant finding at the composite score level, the need-for-treatment item was significantly different between the interviewer-administered and computer-administered versions of the ASI ($t = 3.4$, $df = 112$, $p = .001$, Appendix). Thus, for all six domains (the need for treatment item is not part of the employment domain composite score), clients' expressed desire to receive treatment was significantly greater on the ASI-MV[®] compared to the interviewer-administered ASI. Of course, the clients' opinion that he/she needs treatment is subjective, as opposed to, for instance, the number of days in the past 30 that one experienced a particular problem. This alone, however, is unsatisfactory as an explanation, since other opinions (e.g., how troubled or bothered one is by problems) seem equally subjective, but were inconsistently different among

the various domains for the computer-mediated and interviewer-administered versions. Finally, it is unclear why the employment and alcohol domains did not show significant differences. It is possible that the employment domain would have been significantly different had the “troubled or bothered” and “need for treatment” questions been included in the composite score calculations, as they were for the other domains. Nonetheless, why alcohol and employment would be different from the other domains has not been completely elucidated. Interestingly, on the alcohol domain scale, one out of two items that were significantly different (how bothered by alcohol problems in the past 30 days) had a greater mean ($p = .012$) for the interviewer-administered version compared to the computer-mediated version. This was the only item that was examined that turned out to be significantly different between the two versions of the assessment that reversed the tendency for the computer-mediated version to have the higher score. Finally, it is likely that examination of differences at the domain level may be more meaningful than item-level analyses. Future research is warranted in this area.

Enhanced candor and self-disclosure in computer-mediated assessments

The present results support a growing consensus that responses to computer-mediated interviews and surveys tend to yield greater levels of self-disclosure. Anonymity is typical in online computer-mediated interviews and may account for an increased willingness to disclose information⁶. With the ASI-MV[®], however, respondents know that their answers will be conveyed to the treatment staff and, thus, are not anonymous. It may be, however, that the ASI-MV[®] benefits from participants having a sense of anonymity in the immediate situation, since they generally complete the ASI-MV[®] alone. In a similar sense, the ASI-MV[®] experience is certainly marked by a lack of social context cues (e.g., age, race, gender, socioeconomic status of the interviewer) and paralinguistic cues (body language, tone of voice, facial expression) which are thought to contribute to feeling less observed and judged^{5, 6}. This is consistent with findings in the literature of computer-mediated reporting being associated with higher levels of self-disclosure^{13, 31} and reduced levels of socially desirable responding³² when compared with face-to-face interviews. Clearly, such findings endorse maximizing use of interview and assessment methods known to encourage self-disclosure in substance abusing populations.

Trust and Self-disclosure

While the present study and a growing body of literature support the hypothesis of greater self-disclosure in computer-mediated communications, this is not generalizable to all settings and interview circumstances. Olivero (2001)³³ found that willingness to disclose personal information to commercial organizations on the Internet depended upon the level of perceived trustworthiness of the organization. Similarly, Joinson and colleagues (2007)³⁴ found that trust in the organization or sponsor conducting Web-based surveys was the key factor affecting self-disclosure on those surveys. The present results suggest that, in the substance abuse treatment setting, there may have been sufficient level of trust to encourage computer-mediated self-disclosure. The use of self-report tools in criminal justice or other settings where respondents may fear their answers could have a detrimental impact on them may produce different results. It is important to note, however, that such concerns would also apply to answers given via a face-to-face interview.

In our experience using the ASI-MV[®] in a broad range of settings, including criminal justice and welfare agencies, the way in which organizations introduce the ASI-MV[®] has an impact on client self-disclosure and honesty. Organizations assure clients that the information they disclose via the computer interview is as confidential as any other information they may reveal in this setting and that all of the information will be used to identify problem areas and to aid in the study of client self-disclosure during computer-mediated assessments. As with any effective interview, rapport and trust building improve the quality of the information gathered. This raises an additional point highlighted by the present comparison of computer- and

interviewer-administered assessment study, namely the skill of interviewers. All interviewers are not alike in their ability to create a safe, trustworthy rapport with respondents. It is interesting that, if one assumes that eliciting more problem severity reflects good interviewing skill and ability to establish rapport, the computer-administered version appears to set the standard, since interviewers did not record more problem severity than the computer. It is clear that more research is warranted in this area.

Limitations

Limitations of the present study include the fact that we did not report on all ASI items, and the related issue of conducting multiple tests. It is possible that examining all ASI items could yield some items that are significantly different in the opposite direction from that hypothesized, that is, showing that clients report greater problems during the face-to-face interview compared to the computer-mediated version. Naturally, any time a large number of statistical tests are run, one can expect a certain number of spurious significant findings. To mitigate this, we limited our exploration to the ASI composite scores and the items used to calculate these scores. We also made specific predictions of direction, namely that when composite scores or items were significantly different, they would be in the direction of more self-disclosure in the ASI-MV[®] than during the face-to-face interview. We believe the consistency with which the differences observed here favor the hypothesis that greater self-disclosure is associated with the ASI-MV[®] compared to the interviewer-administered version of the ASI. However, it is important to emphasize that additional research is needed to replicate these results. Finally, it is useful to highlight that this study makes the assumption that greater problem levels endorsed by respondents are more “honest” or “true.” It is acknowledged that this assumption requires empirical support before firm conclusions regarding honesty or truth can be drawn.

Conclusions

The results of the present study indicate that the use of the computer-mediated, self-administered ASI (ASI-MV[®]) provides a similar picture of clients in treatment to what is observed through the clinician-administered assessment. Where there are differences, this study suggests that the computer-administered version may encourage more disclosure from clients. Further, the present results strongly counter the argument that self-report via computer encourages or allows for “denial” in client responses, especially in clients that are being admitted to treatment for a substance use disorder. The findings presented here complement the growing body of research that suggests agreement between computer- and interviewer-mediated assessments³. Further, when disagreement does occur, computer-administered assessment appears to be associated with enhanced self-disclosure. This raises the provocative hypothesis that the carefully designed computer interface of the ASI-MV[®] establishes a level of rapport with the respondent that is on a par with expert, well-trained interviewers. Taken together, such findings advocate for using interview and assessment methods known to encourage self-disclosure in substance abusing populations. Further research is recommended to replicate these findings in other settings and other interview circumstances. Future research should also explore the role of rapport building in computer-administered assessment and how this might impact respondent self-disclosure.

Appendix

Individual ASI items' descriptives and significance values for ASI domains that were not significantly different

Domain	Item	N	Mean	SD	t value	DF	p
Employment	Days paid for working in the past 30 days.						
	ASI-MV	129	4.56	9.00	1.522	128	.131
	Interview		3.95	8.41			
	Money from employment past 30 days.	132	154.69	363.88	1.147	131	.253
	ASI-MV		193.64	489.61			
	Interview						
	Do you have a driver's license?						
	ASI-MV	141	–	–	Z= 1.00	–	.317
	Interview						
	Do you have a car?						
	ASI-MV	134	–	–	Z= 1.134	–	.257
	Interview						
Alcohol	Days used any alcohol past 30.						
	ASI-MV	132	1.34	4.74	.299	131	.765
	Interview		1.42	4.01			
	Days used alcohol to intoxication past 30.						
	ASI-MV	132	1.23	4.51	.285	131	.776
	Interview		1.17	3.78			
	Money spent on alcohol past 30 days.						
	ASI-MV	130	163.87	1753.79	.924	129	.357
	Interview		21.51	86.19			
	Days experienced alcohol						

Domain	Item	N	Mean	SD	t value	DF	p
	problems past 30.						
	ASI-MV	131	3.38	8.17	1.890	130	.061
	Interview		5.17	9.22			
	How bothered by alcohol problems?	129					
	ASI-MV		.99	1.40	-2.560	128	.012 ^e
	Interview		1.26	1.54			
	How important is treatment for alcohol problems?						
	ASI-MV	131	2.81	1.56	4.292	130	<.001
	Interview		2.08	1.89			

^e Shaded items are significant.

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References

1. Tidwell LC, Walther JB. Computer-mediated communication effects on disclosure, impressions, and interpersonal evaluations: Getting to know one another a bit at a time. *Human Communication Research* 2002;28:317–348.
2. Spitzer RL, Endicott J. 2: further developments in a computer program for psychiatric diagnosis. *Am J Psychiatry* Jan;1969 125(7Suppl):12–21. [PubMed: 5766230]
3. Garb HN. Computer-administered interviews and rating scales. *Psychol Assess* Mar;2007 19(1):4–13. [PubMed: 17371119]
4. Spitzer RL, Endicott J, Cohen J, Fleiss JL. Constraints on the validity of computer diagnosis. *Arch Gen Psychiatry* Aug;1974 31(2):197–203. [PubMed: 4604268]
5. Joinson, AN.; Paine, CB. Self-disclosure, privacy and the Internet. In: Joinson, A.; McKenna, K.; Postmes, T.; Reips, U-D., editors. *The Oxford handbook of Internet psychology*. Oxford University Press; 2007. p. 237-252.
6. Hewson, C. Gathering data on the Internet. In: Joinson, A.; McKenna, K.; Postmes, T.; Reips, U-D., editors. *The Oxford handbook of Internet psychology*. Oxford University Press; 2007. p. 406-428.
7. Epstein JF, Barker PR, Kroutil LA. Mode effects in self-reported mental health data. *Public Opinion Quarterly* 2001;65:529–550.
8. Des Jarlais DC, Paone D, Milliken J, et al. Audio-computer interviewing to measure risk behaviour for HIV among injecting drug users: a quasi-randomised trial. *Lancet* May 15;1999 353(9165):1657–1661. [PubMed: 10335785]
9. Navaline HA, Snider EC, Petro CJ, et al. An automated version of the risk assessment battery (RAB): Enhancing the assessment of risk behaviors. *AIDS Research and Human Retroviruses* 1994;10:S281–S283. [PubMed: 7865319]

10. Lessler JT, Caspar RA, Penne MA, Barker PR. Developing computer-assisted interviewing (CAI) for the National Household Survey on Drug Abuse. *Journal of Drug Issues* 2000;30:19–34.
11. Tourangeau R, Smith T. Asking sensitive questions: The impact of data collection mode, question format, and question context. *The Public Opinion Quarterly* 1996;60(2):275–304.
12. Sassenberg K, Boos M, Rabung S. Attitude change in face-to-face and computer-mediated communication: Private self-awareness as mediator and moderator. *European Journal of Social Psychology* 2005;35:361–374.
13. Joinson AN. Self-disclosure in computer-mediated communication: The role of self-awareness and visual anonymity. *European Journal of Social Psychology* 2001;31:177–192.
14. Hohman M, Finnegan D. A Computer-Assisted Self-Interview (CASI) Assignment in the MSW Classroom. *Journal of Technology in Human Services* 2006;24(23)
15. Butcher, JN. How to use computer-based reports. In: Butcher, JN., editor. *Clinical personality assessment: Practical approaches*. New York: Oxford University Press; 2002.
16. Miller, MJ.; Tharpe, M. How to create your own computerized questionnaires. In: Miller, M.; Hammond, KW.; Hile, MG., editors. *Mental health computing*. New York: Springer; 1996. p. 115-124.
17. McLellan AT, Luborsky L, Woody GE, O'Brien CP. An improved diagnostic evaluation instrument for substance abuse patients. *Journal of Nervous and Mental Disease* 1980;168:26–33. [PubMed: 7351540]
18. McLellan AT, Luborsky L, Cacciola J, et al. New data from the Addiction Severity Index: Reliability and validity in three centers. *Journal of Nervous and Mental Disease* 1985;173:412–423. [PubMed: 4009158]
19. Hendricks VM, Kaplan CD, VanLimbeek J, Geerlings P. The Addiction Severity Index: Reliability and validity in a Dutch addict population. *Journal of Substance Abuse Treatment* 1989;6:133–141. [PubMed: 2746712]
20. Alterman AI, Brown LS, Zaballero A, McKay JR. Interviewer severity ratings and composite scores of the ASI: a further look. *Drug and alcohol dependence* Feb;1994 34(3):201–209. [PubMed: 8033757]
21. Makela K. Studies of the reliability and validity of the Addiction Severity Index. *Addiction* (Abingdon, England) Apr;2004 99(4):398–410. discussion 411-398.
22. Budman, SH.; Butler, SF.; Villapiano, AJ. The Addiction Severity Index Multimedia Version (ASI-MV): An innovative computerized assessment tool for substance abuse treatment. In: O'Donohue, WT.; Cummings, NA., editors. *Evidence Based Adjunctive Treatments*. Burlington, MA: Academic Press/Elsevier; 2008. p. 141-158.
23. Butler SF, Budman SH, Goldman RJ, et al. Initial validation of a computer-administered Addiction Severity Index: the ASI-MV. *Psychol Addict Behav* Mar;2001 15(1):4–12. [PubMed: 11255937]
24. McLellan AT, Luborsky L, Cacciola J, Griffith JE, McGahan P, O'Brien CP. Guide to the Addiction Severity Index: Background administration and field testing results. 1985
25. Butler SF, Newman FL, Cacciola JS, et al. Predicting Addiction Severity Index (ASI) interviewer severity ratings for a computer-administered ASI. *Psychological Assessment* 1998;10(4):399–407.
26. Hodgins DC, el-Guebaly N. More data on the Addiction Severity Index. Reliability and validity with the mentally ill substance abuser. *The Journal of nervous and mental disease* Mar;1992 180(3):197–201. [PubMed: 1588339]
27. McGahan, PL.; Griffith, JA.; Parente, R.; McLellan, AT. Composite Scores from the Addiction Severity Index. Philadelphia, PA: Department of Veterans Affairs Medical Center; 1986.
28. Treatment Episode Data Set (TEDS). Highlights - 2005. Rockville, MD: Department of Health and Human Services; 2006.
29. Perneger TV. Clinical research ed. What's wrong with Bonferroni adjustments. *BMJ* Apr 18;1998 316(7139):1236–1238. [PubMed: 9553006]
30. Moras, K. Substance abuse research: Outcome measurement conundrums. National Institutes of Health; 1993.
31. Bargh JA, McKenna KYA, Fitzsimmons GM. Can you see the real me? Activation and expression of the "True Self" on the Internet. *Journal of Social Issues* 2002;58:33–48.

32. Joinson A. Social desirability, anonymity, and Internet-based questionnaires. *Behav Res Methods Instrum Comput* Aug;1999 31(3):433–438. [PubMed: 10502866]
33. Olivero, N. Self-disclosure in e-commerce exchanges: Relationships among trust, reward and awareness. Paper presented at: Psychology and the Internet: A European Perspective conference; 2001; Farnborough, UK.
34. Joinson, AN.; Paine, CB.; Buchanan, T.; Reips, U-R. Privacy, Trust and Self-Disclosure to Web-based Surveys. Paper presented at: Proceedings of the Association of Survey Computing International Conference; September 11-12, 2007; Southampton.

Table 1

ASI domain categories, descriptives, and significance level

Domain	Group	N	Mean	SD	t value	Df	p *
Medical	ASI-MV	125	.26	.27	2.82	124	.006
	ASI-Interview	125	.21	.28			
Employment	ASI-MV	120	.78	.26	-1.38	119	NS
	ASI-Interview	120	.79	.26			
Alcohol	ASI-MV	125	.15	.27	.638	125	NS
	ASI-Interview	125	.17	.28			
Drug	ASI-MV	125	.13	.08	5.60	124	< .001
	ASI-Interview	125	.09	.08			
Legal	ASI-MV	125	.24	.20	6.32	124	< .001
	ASI-Interview	125	.14	.17			
Family	ASI-MV	124	.31	.20	3.87	123	< .001
	ASI-Interview	124	.23	.20			
Psychiatric	ASI-MV	121	.35	.24	2.84	120	.005
	ASI-Interview	121	.30	.25			

* Bonferroni correction for multiple tests requires the p values < .007 be considered significant

Table 2
Individual ASI items' descriptives and significance values for ASI domains that are significantly different

Domain	Item	N	Mean	SD	t value	Df	p value
Medical	Physical or medical problems past 30 days.						
	ASI-MV	128	6.16	9.63			
	Interview		5.51	9.12	1.01	127	.313
	Troubled or bothered by medical problems past 30 days?						
	ASI-MV	131	1.09	1.09			
	Interview		1.02	1.36	.84	130	.400
	How important is treatment for medical problems?						
	ASI-MV	129	1.29	1.46			
	Interview		.88	1.43	3.00	128	.003 ^a
Drug	Days in past 30 used Heroin.						
	ASI-MV	129	.58	3.03			
	Interview		.61	3.21	.45	128	.656
	Days in past 30 used Methadone.						
	ASI-MV	129	.05	.45			
	Interview		.05	.47	.13	128	.893
	Days in past 30 used other opiates.						
	ASI-MV	129	.75	4.33			
	Interview		.22	1.83	1.58	128	.116
	Days in past 30 used barbiturates.						
	ASI-MV	129	.00	.00			
					–	–	–

Domain	Item	N	Mean	SD	t value	Df	p value
	Interview		.00	.00			
	Days in past 30 used other sedatives, ASI-MV Interview	130	1.60 .04	6.40 .23	2.79	129	.006
	Days in past 30 used cocaine, ASI-MV Interview	129	.79 .66	3.33 2.42	.54	130	.590
	Days in past 30 used amphetamines, ASI-MV Interview	129	.00 .00	.00 .00	–	–	–
	Days in past 30 used cannabis, ASI-MV Interview	130	.53 .34	2.81 1.37	.88	130	.379
	Days in past 30 hallucinogens, ASI-MV Interview	131	.15 .00	1.17 .000	1.42	130	.159
	Days in past 30 used more than one substance, ASI-MV Interview	132	1.08 .86	4.00 3.30	1.39	131	.168
	Days in past 30 experienced problems with drugs?, ASI-MV Interview	131	5.94 6.58	10.10 10.43	.74	130	.464

Domain	Item	N	Mean	SD	t value	Df	p value
	How troubled or bothered by drug problems?						
	ASI-MV Interview	131	1.75 1.49	1.58 1.66	1.96	130	.052
	How important is it to you to receive treatment?						
	ASI-MV Interview	130	3.22 2.01	1.37 1.88	7.07	129	<.001
Legal	Money received from illegal sources.						
	ASI-MV Interview	131	153.97 43.74	1318.95 227.89	.96	130	.341
	Days you did anything illegal for profit?						
	ASI-MV Interview	131	.36 .75	1.62 3.12	1.59	130	.115
	How serious are your present legal problems?						
	ASI-MV Interview	128	1.46 1.31	1.52 1.44	1.54	127	.125
	How important is counseling?						
	ASI-MV Interview	129	1.27 .78	1.57 1.42	3.42	128	.001
	Presently awaiting trial? (Categorical Item)	132	–	–	Z=6.27 ^b	–	<.001
Family/Social	Are you satisfied with your current living situation? (Categorical Item)	125	–	–	Z= .28	–	.783

Domain	Item	N	Mean	SD	t value	Df	p value
	Days in past 30 conflict with family.						
	ASI-MV	131	1.66	5.77	.05	130	.963
	Interview		1.69	5.60			
	How troubled or bothered are you by family problems?						
	ASI-MV	132	1.62	1.53	3.32	131	.001
	Interview		1.20	1.51			
	How important is it to you to receive counseling?						
	ASI-MV	132	2.20	1.60	5.07	131	<.001
	Interview		1.41	1.71			
	Family Problem Ratio ^c						
	Problems with Mother past 30 days						
	Problems with Father past 30 days						
	Problems with Siblings past 30 days						
	Problems with Spouse past 30 days						
	Problems with Children past 30 days						
	Problems with Other Family Members past 30 days						
	Problems with Close Friends past 30 days						
	Problems with Neighbors past 30 days						
	Problems with Co-Workers past 30 days						
	ASI-MV	144	.03	.04	3.84	143	<.001
	Interview		.02	.03			
Psych	Psychological problems past 30 days?	132	9.31	11.99	.98	131	.330
	ASI-MV		10.30	11.94			
	Interview						

Domain	Item	N	Mean	SD	t value	Df	p value
	How bothered by psychological problems?	131	1.59	1.36	.24	130	.808
	ASI-MV		1.62	1.59			
	Interview						
	How important is treatment for psychiatric problems?						
	ASI-MV	129	1.97	1.67	2.03	128	.045
	Interview		1.67	1.83			
	Sum of Psychiatric Problems past 30 days ^d						
	Experienced serious depression						
	Anxiety						
	Hallucinations						
	Trouble concentrating						
	Violent behavior						
	Thoughts of suicide						
	Attempted suicide	132	2.49	1.91	3.66	131	<.001
	Taken prescription medication		2.05	1.88			
	ASI-MV						
	Interview						

^a Shaded items are significant.

^b Wilcoxon Signed Ranks test. Significance implies that the ASI-MV > Interview.

^c A Family Problem Ratio was created to count the number of relationships with which one has a problem adjusted for the presence of such a relationship in one's life.

^d Respondents indicate (yes/no) whether they have experienced any of these psychiatric problems. These variables are summed to indicate the total endorsement of each respondent to psychiatric problems.