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Developing the Virtual Motivational Interviewing (VMI) Application for Child Welfare Workers: Usability, Satisfaction, and Initial Efficacy

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ABSTRACT

This article presents two studies exploring the usability, satisfaction, and initial efficacy of the Virtual Motivational Interviewing (VMI) phone application's potential to enhance skill acquisition among child welfare workers. Motivational Interviewing (MI) has been recognized for its effectiveness in positive behavior change and reducing resistance in various contexts, including child welfare. The necessity for alternative training methods is underscored by resource intensity and the limited effectiveness of traditional training. VMI aims to provide a structured, evidence-based platform for practicing MI skills, leveraging the principles of Deliberate Practice, Multimedia Learning Theory, and Cognitive Load theory. Study 1 evaluated VMI's usability and satisfaction revealing positive feedback and potential effectiveness, alongside analyzed and implemented suggestions for improvement. Study 2, a randomized controlled trial, assessed VMI's preliminary efficacy compared to traditional role-play training, showing no significant differences in observational performance between the groups, while also seeing significant increases in self-reported competence. These findings suggest VMI's potential as a viable supplement to conventional training, offering benefits in terms of accessibility, efficiency, and reduced resource dependency. Future research directions include larger, multi-site studies to further assess VMI's efficacy and its real-world impact on skill application in child welfare settings.

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Introduction

Child welfare workers utilize a myriad of knowledge and skills to improve the permanency, safety, and well-being of children and families. One well-supported approach that has gained significant attention and recognition globally over the past decade, and across multiple fields of practice

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is Motivational Interviewing (MI) (Joseph & Basu, 2017; SAMHSA, 2019). MI is designed to increase a person's motivation to take actions that would promote their growth while reducing resistance to take such actions (Miller & Rollnick, 2013, 2023). It is further described as an approach to conversations that strengthens a client's motivation and commitment to make healthy life choices (Miller & Rollnick, 2023). MI has demonstrated effectiveness across a range of areas, including substance abuse (Steele et al., 2020; Schwenker et al., 2023), health behavior change (VanBuskirk & Wetherell, 2014), and mental health interventions (Dean et al., 2016; Hamrin & Iennaco, 2017; Lundahl et al., 2013, 2010).

More specifically, emerging findings indicate that MI has a viable place within child welfare (Chaffin et al., 2011; Hall et al., 2020). When used in a child welfare setting, MI research has shown an array of positive outcomes, including increased parental engagement (Forrester et al., 2008, 2019; Shah et al., 2019) and increased self-efficacy and self-reported engagement (Scourfield et al., 2012). As of the latest update on the Title IV-E Prevention Services Clearinghouse, MI maintains the highest rating of "well-supported" for use in child welfare service systems (U.S. Department of Health and Human Services, 2020, n.d.).

Aside from empirical evidence, MI logically fits within the realm of child welfare. For example, the first task in both MI and child welfare frameworks is to promote engagement. The Children's Bureau defines engagement as an interactive process that stems from the relationships and communications between child welfare staff and family members (Charest-Belzile et al., 2020). Engagement is critical to the success of families and can lead to improved outcomes such as a reduction of repeat maltreatment or family separation (Littell, 2001) and increased assessment or intervention validity (Robertson, 2006). The assumption is that if a parent is engaged in the process of change, they will be more open to the caseworker's influence.

In a systematic review of MI and child welfare, Hall et al. (2020) concluded that MI theory is applicable and relevant to the child welfare population because of the "benefits among individuals who use substances, are resistant to interventions or are nonvolitional" (p. 273). MI's success in helping individuals who misuse substances aligns with many caregivers' needs given that 39% placed in out-of-home care had parental alcohol or other drug abuse as a contributing factor of removal (National Center of Substance Abuse and Child Welfare, 2020). Providing MI to parents referred for substance treatment has shown an increase in treatment attendance (Carroll et al., 2001), lower drug use (Forrester et al., 2012; Schaeffer et al., 2021), and increases in retention and lower recurrence of child maltreatment reports in the two years following child welfare involvement (Chaffin et al., 2009).

Through its four tasks (i.e., engagement, focus, evoking motivation, developing credible plans) MI advances many skills to promote success such as listening, reflecting, using open-ended questions, summarizing, emphasizing choice, accurately expressing empathy, and many others (Miller & Rollnick, 2023). These skills are often disseminated through online learning, in-person training, and live supervision within the child welfare workforce (Forrester et al., 2018; Greeno et al., 2017; Hodorowicz, 2018; Maxwell et al., 2012; Scourfield et al., 2012).

Similar to MI training, child welfare workers traditionally acquire knowledge and skills in three ways. The first is during an initial training experience lasting several weeks that exposes them to a vast set of information using lectures, quizzes, discussion, and limited roleplay/simulation as teaching approaches. The second, and probably largest, method child welfare workers acquire knowledge and skills, is through providing on-the-job services to children and families. In a high-functioning child welfare system, supervision is a third method for learning knowledge and skills.

Across many professional domains, the general effectiveness of the above training methods has proven to have limited effectiveness for adequately acquiring skills. (Ericsson et al., 2018). While supervision has been found to increase skill maintenance over time (Pecukonis et al., 2016), there are multiple barriers to effective implementation. Relying on supervisors, MI coaches, or trainers to be responsible for skill development and maintenance can be resource-intensive, unrealistic (Davis et al., 2021), and difficult to coordinate (Snyder et al., 2012). Motivational interviewing training generally increases empathy and self-efficacy in child welfare workers, but its impact on family outcomes like engagement in services is varied (Hall et al., 2020). Further, there is an ethical driver to continue to search for alternative approaches to be developed that do not require child welfare workers to practice and learn basic skills while working with the families who are impacted by their competence.

This article aims to evaluate the usability satisfaction, and preliminary efficacy of an alternative training approach to acquire skills in Child Welfare. We report on the progress of developing the Virtual Motivational Interviewing (VMI) phone-based application which was designed to provide a structured method for practicing skills in MI for child welfare workers. As such, this article will look at two studies. Study 1 explored the usability and satisfaction of VMI and Study 2 assessed the initial efficacy of VMI.

VMI

VMI is a phone application designed to teach motivational interviewing and engagement skills to students and child welfare workers. Drawing inspiration from language learning apps and cognitive load theory (Mayer,

2009), VMI employs diverse learning interactions and interfaces, including multiple-choice questions, dialogue coding, and free-response scenarios, to provide practice opportunities across 15 foundational skills based on principles and skills from Miller and Rollnick outlined in their 3rd edition of Motivational Interviewing (2013). Guided by the Theory of Deliberate Practice (Ericsson, 1996, 2006), learners are provided repeated practice opportunities, scaffolded exercises, and receive immediate feedback provided by a virtual coach, whose coaching is informed by motivational interviewing and child welfare experts.

By providing standardized role plays, immediate feedback from experts, and the ability to practice skills at convenience, even for minutes at a time, VMI hopes to tackle some of the barriers facing effective skill acquisition. Through usability, satisfaction, and initial efficacy testing, this paper outlines VMI as a potentially viable alternative or supplement to traditional training methods as it can alleviate the burdens of resource-exhaustive expert supervision, time constraints, cost, and provide practice opportunities in a risk-free environment.

Methods: study 1 – usability and satisfaction

Study design

Study One assessed the usability and satisfaction of the VMI application utilizing a mixed-methods approach. Data were collected from participants as they used the application through in-person observation, video and audio recording, and post-surveys.

Participant reactions and qualitative post-survey data were analyzed thematically using Atlas.ti 9 (ATLAS.ti Scientific Software Development GmbH, 2020). Qualitative and quantitative post-survey data were collected using Qualtrics. In addition, a review of the application's content and literature was conducted via the Zoom remote conferencing platform to align development changes derived from thematic feedback with theory. The experts providing feedback were content experts in MI, learning psychology, and child welfare.

Participants

Sixteen ($N = 16$) second-year MSW students from the researchers' university enrolled in an MI course in Fall 2019 were recruited on a voluntary basis to participate in the study. Targeted graduate social work students were expected to have some child welfare experience and some knowledge of MI. The inclusion criteria required participants to be actively attending their MI course and have completed at least a year-long practicum in the social work field. An MI course was specifically chosen as the application is designed with the assumption that the user has a foundational knowledge

of MI and social work practice. This sample of students was also chosen partially due to the convenience of it being the only MI graduate course offered at the university and being taught by one of the researchers.

Data collection

Participants were paired with a researcher who briefly explained the purpose of the VMI application. Participants were asked to navigate and engage in the lessons of VMI without any researcher guidance for 20 min. Guided by the think-aloud method (Eccles & Arsal, 2017), participants were encouraged to express thoughts, confusion, and feedback throughout. During these observation sessions, participants' behaviors and verbal feedback with VMI were recorded by the in-person researcher using screen-tracking and audio recording devices. Post-surveys were also administered to collect quantitative and additional qualitative data.

Data analysis

Following participants' use of the application, video/audio recordings, participant feedback, and researcher notes were thematically analyzed and coded using Atlas.ti software. Thematic coding involved a systematic approach to identify recurring patterns and derive emergent themes in the participants' verbal feedback and recorded behaviors while engaging with the VMI application as well as qualitative feedback provided on post-surveys. Quantitative data was pulled from post-surveys to assess VMI's ease of use and net effectiveness (Thalheimer, 2018).

Ethical considerations

Ethical approval for the study was obtained from the institutional review board (IRB) of the researchers' university. The university's IRB classified the study as exempt as it was deemed administrative data and no more than minimal risk. Participants were informed about the study's purpose, procedures, and potential benefits/risks before providing their consent to participate. All participants engaged in the study voluntarily and were explained that they were able to opt-out at any point throughout the study. Confidentiality and anonymity of participants were ensured throughout the data collection and analysis process.

Results – Study 1, usability and satisfaction

Demographics

Of the participants ($N = 16$), 56.2% (9) were female and 43.8% (7) were male. Participants largely were non-Hispanic Caucasian (Caucasian $N = 13$,

Black or African American $N = 1$, Asian $N = 1$, Prefer not to disclose $N = 1$). All participants who were present on the day of the study met the inclusion criteria. Participants ranged from 23 to 59 years old, with the average age being 30.8 years old. 87.5% (14) of participants' highest level of education was a bachelor's degree, with 12.5% (2) participants holding a master's degree. A quarter (4) of the participants had direct child welfare experience, with 75% (3) of them currently working for the state's child welfare agency. The 4 participants with child welfare experience ranged in experience from 1 year to 8 years. Regarding MI experience, 81.2% reported having engaged with MI material beyond the present MI course, either through readings, training, other courses, or roleplays. Of the participants, only 1 described their MI competence as Beginner (defined as "very little MI knowledge and would not be comfortable using it"), while the majority (93.7%) described their MI competence as either Novice (some MI knowledge and could use it) or Intermediate.

Usability and satisfaction

Based on the post-surveys, the majority of participants found VMI to be *easy* to use. 12.5% (2) found VMI to be *extremely easy* to use, while 25% (4) found it to be *moderately easy* to use, and 43.7% reported VMI as *slightly easy* to use. The remaining 18.7% found VMI to be *slightly difficult* to use.

The single-item scaling question from Thalheimer's (2018) Net Effectiveness Score (NES) was used in the post-surveys to assess perceptions of VMI's effectiveness. The NES has participants report the degree of effectiveness and likelihood that they would recommend the learning based on a 5-point scale. 50% (8) of participants stated that they would "recommend VMI as is, even if no changes were made." Another 25% (4) reported VMI "not fully effective but would recommend the learning experience if improvements were made." The remaining 18.7% (3) reported VMI as "ineffective enough that they would be hesitant to recommend" and 6.2% (1) reported it as "too ineffective to recommend."

Qualitative feedback

Qualitative data from surveys, audio recordings, and screen recordings were thematically analyzed. Qualitative survey data asked participants to describe the best and worst parts of using VMI. The best parts typically featured the feedback or explanation provided, having practice opportunities, the accessibility/convenience, and the appeal of the design. For example: "It was helpful when I received specific feedback about why a response I selected was MI-consistent/effective, or not." While feedback

was generally positive and satisfied, participants provided vital qualitative feedback on areas the application could be improved. Areas of improvement were thematically analyzed using Atlas.ti and vetted by the authors and developers.

Based on the analysis, five themes were derived as areas to improve within the VMI application to enhance its usability and satisfaction. The themes were: 1. Navigating the user interface. 2. Objective confusion 3. Task-relevant reinforcement. 4. Question structure and interface. 5. Answer clarification and feedback.

Improvements to VMI

Throughout Spring 2020, each theme was evaluated by the authors and developers to justify the changes and align them with evidence-based theories, and avoid losing learning effectiveness for the sake of ease. The authors and developers featured expertise in learning theory (MD), decades of child welfare experience (CB, MD, BL, & CM), a leading motivational interviewing expert (BL), and MI practicing clinicians (CB, BL, MB). The five themes and their rationales were derived from the Theory of Deliberate Practice, Multimedia Learning Theory, and Cognitive Load Theory. Through the expert lens and additional literature review, the authors and developers were able to incorporate changes to VMI in a manner that addressed the themes of improvement provided by participants, while maintaining fidelity to learning theories, realism, and MI.

Discussion – Study 1

Based on participant feedback, the overall feeling of useability and satisfaction of the application was positive. However, a key takeaway was that the main barrier to use and effectiveness was rooted in the user interactive experience as opposed to content, practicality, or need for training opportunities. Aligning with the expressed improvement areas, thematic analysis, and expert review were combined to inform revisions to the VMI application.

Authors and developers systematically reviewed the literature again to identify evidence-based practices and guidelines to modify VMI and address the usability and satisfaction themes highlighted by participants, while also aligning with the learning theories necessary for skill development. The application's design and content were then updated based on these insights and recommendations. Specific revisions made and each revision's rationale are highlighted in Table 1. Given the initial promising usability and satisfaction findings, paired with the data and theory-driven improvements, the authors and developers felt VMI was viable to be tested for initial efficacy.

Table 1. Changes made to VMI and why they were adopted.

Changes made to VMI	Why the changes were adopted
• **Navigating User Interface** • More narration by the virtual expert to guide the user experience and establish the context of conversation. Incorporation of informal dialogue by the virtual expert.	• Users reported losing track of or forgetting their specific task. • Multi-media Learning (MML) theory suggests limiting the cognitive load on the interface. "Personalization Principle" of MML suggests an informal and narrative approach to instruction. Theory of Deliberate Practice (DP) suggests immediate feedback given by a coach or expert.
• **Prompts of Task Objective** Virtual expert prompt the user regarding the task, skill and context that is to be explicitly focused on. • Banner text that outlined learning objective, skill focus, or target behavior change was eliminated.	• Analysis indicates difficulty remaining focused on the skill task as opposed to focusing on the immediate question. • DP suggests a scaffolded approach to learning, with a focus on discrete skills. • MML suggests eliminating unnecessary cognitive load, such as the banner text.
Task Relevant Reinforcement • Incentive and feedback in VMI was adapted away from external motivation and gamification, to more intrinsic and task relevant motivations.	• Learning and development literature (Clark, 2014) suggests that intrinsic motivators are more influential and sustainable.
Question Structure/Interface • Interface kept simple and unnecessary text and graphics that would contribute to cognitive load was eliminated.	• Users reported liking the simplicity of the interface. • MML suggest eliminating unnecessary cognitive load.
Answer Clarification & Feedback • Answer clarification and feedback was expanded upon so that every learner response received specific feedback related to the response and task.	• Users reported confusion as to why answers were scored right/wrong, and wanted more feedback. • DP suggests giving immediate and direct feedback from an expert or coach.

Methods – Study 2, efficacy pilot

Study design

Study 2 employed a randomized controlled trial (RCT) design to assess the preliminary efficacy of the VMI application. The study involved both quantitative and qualitative data collection methods, including pre- and post-test measures of participants' perceived competence in the specific MI skills of permission questions, simple reflections, and complex reflections, as well as an observational performance activity related to the same skills.

Participants

Forty ($N = 40$) participants were recruited from Summer 2023 graduate social work courses to participate in the study. The specific courses were identified as skill practice courses with students that would have some MI experience, as no MI-specific course was currently offered. All students who voluntarily opted into the study and completed all surveys and assessments were included. Participants were randomly assigned to either the control group or the intervention group. The inclusion criteria required participants to be enrolled and actively participating in a graduate social work program and have regular access to a smartphone.

Measures

Pre- and post-test measures consisted of participants from the control and intervention groups completing survey assessments of their perceived competence in specific skills. The skills of interest were *permission questions*, *simple reflections*, and *complex reflections*. Participants rated their perceived competence on multiple Likert scales, indicating their level of confidence in understanding and performing these skills. For each of the three skills, participants completed four Likert scales to assess their knowledge, confidence, ability, and feelings of being overwhelmed, as seen in Table 2.

Participants first completed an observational performance activity during which they watched a short video clip portraying MI being demonstrated with a mock client. While the participants watched the video, they marked how many times each skill was demonstrated by the MI clinician. The intervention group practiced these skills using VMI only, and the control group was taught these skills as they normally do through a brief lecture and role-playing to practice the skills. Both groups completed a post-observation assessment of another video clip during which they marked how many times they observed any of the three skills being demonstrated by the clinician. Each participant's performance was rated by trained evaluators using a standardized rating scale to assess their ability to accurately recognize the use of each skill.

Data analysis

An analysis of covariance (ANCOVA) was conducted to control for covariates measured in the pretest and examine differences in post-test perceived competence in each skill between groups. The covariates included participants' demographic characteristics and baseline scores on the pretest measures. The ANCOVA analysis aimed to determine if there were significant differences in post-test perceived competence between the two groups.

Individual *t*-tests were performed to compare the pre to post-test differences in perceived competence for each skill within each group. These *t*-tests assessed whether there were significant changes in perceived

Table 2. Example of initial efficacy Likert scales.

	Strongly agree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
I understand what open-ended questions are.	○	○	○	○	○
I have the skills needed to use open-ended questions with clients.	○	○	○	○	○
I am confident I could use open-ended questions with clients	○	○	○	○	○
I often think "I cannot do this" when thinking of using open-ended questions with clients.	○	○	○	○	○

competence from pre- to post-intervention within the control and intervention groups separately.

Results – Study 2, efficacy Pilot

Participants ($N = 40$) were randomly assigned to the control group (role-play, $N = 19$) or the intervention group (VMI, $N = 21$). Two participants were excluded in the final analysis due to incomplete data. There were 72.5% female (29) and 27.5% male participants (11). The ethnicity of the participants was mostly non-Hispanic Caucasian (Caucasian $N = 36$, Hispanic, Latino $N = 1$, Asian $N = 1$, Other $N = 2$). Participants had a mean age of 28.5 years (SD = 5.109). The highest degree completed for all participants was a bachelor's degree. Most participants had practicum experience with clients (82.5%) and had at least one semester of clinical experience (80%). Participants were almost evenly split regarding clinical experience before their MSW program, with 52.5% of participants indicating they did have clinical experience before their MSW program. When considering exposure to MI, all participants were recruited from a graduate-level MI course. All participants reported exposure to MI through this course, with 62.5% (25) reporting at least one additional exposure to MI, 35% (14) reporting at least two additional types of exposures to MI, and one participant reporting at least three additional exposures to MI outside of their enrolled graduate course.

Preliminary efficacy

Aside from two participants who had incomplete data, all other participants in both groups completed the study. No statistical differences were found when measuring observational performance between VMI and role-play. VMI appears to be equivalent to roleplay as a method of skill practice (Table 3). When evaluating perceived competence, participants' self-reported confidence significantly increased from pre to post-test ($p < .001$) for both the VMI and roleplaying groups. After engaging in role-play, participants did have significantly higher perceptions of competence compared to the VMI group ($p = .021$). However, there was no significant correlation between perceived competence and actual performance (Table 4 and 5). This suggests that although the role-play participants had a

Table 3. Observation performance means for both groups.

Group	Mean	Std. Deviation	N
VMI	8.57	2.357	21
Roleplay	8.37	3.041	19
Total	8.47	2.670	40

Table 4. Correlation of pre-observation performance and perceptions.

		Observation performance	Perceptions
Observation Performance	Pearson Correlation	1	−0.078
	Sig. (2-tailed)		0.632
	N	40	40
Perceptions	Pearson Correlation	−0.078	1
	Sig. (2-tailed)	0.632	
	N	40	40

Table 5. Correlation of post observation performance and perceptions.

		Observation performance	Perceptions
Observation Performance	Pearson Correlation	1	0.057
	Sig. (2-tailed)		0.727
	N	40	40
Perceptions	Pearson Correlation	0.057	1
	Sig. (2-tailed)	0.727	
	N	40	40

Table 6. Pre to post Observation performance and perceptions.

Source	Type III sum of squares	df	Mean square	*F*	Sig.	Partial eta squared
Corrected Model	53.671	3	17.890	2.871	0.050	0.193
Intercept	0.948	1	0.948	0.152	0.699	0.004
Pre-perception	19.691	1	19.691	3.160	0.084	0.081
Pre- Ob Performance	37.318	1	37.318	5.989	0.019	0.143
Group	0.286	1	0.286	0.046	0.832	0.001
Error	224.304	36	6.231			
Total	3151.000	40				
Corrected Total	277.975	39				

higher perception of competence in MI skills when compared to the VMI group, both groups performed similarly (Table 6).

Discussion

Usability and satisfaction testing of VMI led to enhanced and data-driven changes across five aspects of the application to improve the user experience and adhere to learning theories. Based on the framework of technology development for skills training (Davis et al., 2021), the implementation of learning theories into VMI (McDonald et al., 2021), and the present usability and satisfaction study, the VMI application is in a stage of development that is prepared for reliable efficacy testing as a skill acquisition method.

The present efficacy pilot study provides valuable insights into the potential effectiveness of VMI as a novel approach to skill acquisition within the arena of child welfare. Our findings indicate that VMI holds promise as a viable alternative or addition to traditional methods such as roleplaying and didactic learning.

Our studies suggest that VMI may be a valuable training supplement for several reasons. First, VMI initially appears to offer a level of skills

practice that may be equivalent to traditional roleplaying while potentially requiring less time and reducing the resource load to conduct similar training. This is especially significant in child welfare, where the availability of funding, supervision, and repeated roleplaying opportunities can be limited. The time efficiency of VMI, with users spending an average of 29.96 minutes out of the 50 minutes allotted for roleplaying, highlights its potential to maximize the utilization of valuable training time. The advantages of accessibility, reduced reliance on supervision/coaching for skill development, and incorporation of evidence-based learning methods make VMI an appealing option for further advancement and consideration in child welfare workforce development.

Although the roleplaying group had significantly higher perceptions of confidence compared to the VMI, the actual utilization of skill in the observational activity saw no differences between groups. This could suggest that VMI may provide a more realistic experience of the difficulty of using the targeted skills.

Limitations and future directions

Despite the promising findings of the present study, some limitations are necessary to address in future directions to confidently acclaim VMI as an application that effectively increases learners' skills at a level comparable or superior to training as is. This is reflected in the low sample size, where additional studies with more participants across multiple settings are needed. There are also limitations in the design of measurement; including a possible ceiling effect when assessing perceptions of confidence, an unknown difficulty level of the observational assessment, and the lack of applied skill utilization as a measure. Another limitation of this study is that participants' digital literacy was not assessed. A participant's self-reported digital literacy level could have impacted participants' rating on VMI's effectiveness and likelihood to recommend it. A final limitation that is noted is self-selection bias, as the MI course in Study 1 was an elective course. Lastly, the use of a one-item scale to assess usability could pose limitations and not fully encompass the umbrella of usability.

Future studies plan to address limitations and continue to explore the efficacy and effectiveness of VMI as a skills training application. This study fits within a schedule of research in an effort to develop an effective application. Previous frameworks for learning technology (Benson et al., 2021; Davis et al., 2021; Ericsson, 1996, 2006; Mayer, 2009) have guided the development of VMI. The present study then explored the usability, satisfaction, and initial efficacy of VMI. Continuing studies plan to assess the broader efficacy, effectiveness in multi-site designs, explore the possible drivers for autonomous use of VMI, and ultimately look at real-world

transfer of learning to the field. VMI will also be updated to align with Miller and Rollnicks 4th edition of Motivational Interviewing which was not yet available at the time of the studies (Miller & Rollnick, 2023).

Disclosure statement

No potential conflict of interest was reported by the author(s).

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