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HUMAN-ANIMAL INTERACTION IN A PRISON SETTING: IMPACT ON CRIMINAL BEHAVIOR, TREATMENT PROGRESS, AND SOCIAL SKILLS

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ABSTRACT: This quasi-experimental field study evaluated the effects of a forensic human-animal interaction (HAI) program on the criminal behavior of prison inmates. The study assessed the impact of the HAI program using between-subject methods and analyses. A total of 48 male inmates participated in the research by allowing researchers access to their institutional files and completing self-report measures. In general, it was hypothesized the HAI program would result in positive behavioral and psychosocial outcomes for inmates. Dependent measures included the frequency of institutional infractions, inmate treatment level within the prison's therapeutic community, and social skills. Analyses compared two groups of inmates in a pretest-posttest repeated-measures design, comparing a Treatment group with a Control group. Results indicated that inmates in the Treatment group evidenced statistically significant improvements in these dependent measures in comparison to the Control group.

KEYWORDS: Human-Animal Interaction, Criminal Rehabilitation, Social Sensitivity, Correctional Psychology

Incarceration rates are at an all-time high in the U.S. with 6.9 million people involved in the criminal justice system, either incarcerated in jails or prisons or in the community on probation or parole (Bureau of Justice Statistics, BJS, 2004). It is estimated that 95% of those incarcerated in state correctional facilities are eventually released back into the community (BJS, 2004). The change of the role of incarceration in the United States in the 1970's from providing rehabilitation for inmates to incapacitation

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and containment (Ogloff, 2002) has resulted in a drastic reduction in psychological treatment and rehabilitation programs for inmates (Haney, 1997).

The prevalence of mental illness among incarcerated inmates is estimated to be as high as 15%, compared to the prevalence rate of 2-3% in the normal population (Lamb & Weinberger, 1998). In contrast, relatively few offenders receive treatment while incarcerated—only 36% according to the BJS (1999). In addition to clinical disorders, inmates often exhibit psychosocial deficits, including poor social skills and emotion regulation.

These deficits may be a function of both poor functioning prior to incarceration and a loss of skills while incarcerated. The latter is consistent with literature on prisonization, a process in which inmates take on the customs and culture of a correctional facility (Clemmer, 1940; Peat & Winfree, 1992). The prison culture includes the rejection of societal norms, including social norms. Perhaps the most notable investigation of the psychosocial effects of incarceration is the Stanford Prison Experiment (Haney, Banks, & Zimbardo, 1973), in which psychologically healthy individuals in a prison-simulation study took on the role of an inmate, becoming blindly obedient and suffering acute psychological trauma (Haney & Zimbardo, 1998).

As a result of these deficits, rehabilitative interventions are often implemented to increase desired behaviors among inmates (e.g., Geller, Johnson, Hamlin, & Kennedy, 1977; Johnson & Geller, 1974) and to provide inmates with education and training in psychosocial skills (e.g., Pearson, Lipton, Cleland, & Yee, 2002). The therapeutic community, based on principles of applied behavior analysis (Skinner, 1953), is among the various treatments implemented. This is an institutional treatment aimed specifically at treating substance-related disorders, which has been demonstrated to be effective in reducing substance abuse relapse (e.g., Field, 1985; Inciardi, Martin, Butzin, Hooper, & Harrison, 1997), preventing future criminal behavior (e.g., Dietz, O'Connell, & Scarpitti, 2003), and reducing recidivism (Lipton et al., 2002).

In addition to programs specifically aimed toward rehabilitation and treatment, many inmates participate in alternative programs and institutional work. The latter may be in the form of contributing to the day-to-day operations of the correctional facility (e.g., cooking for inmates and staff or maintenance of prison property) or providing a service to the community (e.g., picking up litter on community roadways). Besides the actual services inmate work provides, such job responsibilities are also meant to serve a rehabilitative function, providing knowledge and experience and instilling the value of work (Flanagan, 1995). Recently, prisons have begun adopting programs in which inmates provide a service to the community by working with animals, referred to hereafter as human-animal interaction (HAI) programs. The present field study investigated the validity of anecdotal reports (e.g., Beard, 1984; Haight, 1986; Wade, 1986) that such programs provide rehabilitative benefits for inmates.

Currently several states within the U.S. and several countries abroad have correctional facilities with organized HAI programs (Correctional Services of Canada, 2003). For these programs, animals live in the prison and participating inmates serve as animal caretakers. The programs involve inmates keeping animals as pets, training them

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for human service, or training them in preparation for pet adoption, as was the case for the program evaluated by the present research. The latter is one suggested solution to the societal problem of companion-animal overpopulation (Fournier & Geller, 2004).

To date, program efficacy is based primarily on the *animals'* success in the prison and placement in the community, with little research investigating inmate outcomes. Empirical research of HAI, including studies of pet ownership and animal-assisted therapy, suggests potential human outcomes may include improvements in psychiatric symptomatology, psychological states, and social behavior (e.g., Garrity, Stallones, Marx, & Johnson, 1987; Hecht, McMillan, & Silverman, 2001). Studies researching these *psychosocial* effects of HAI are particularly common in institutional settings such as inpatient psychiatric hospitals and nursing homes (Johnson, Odendaal, & Meadows, 2002).

The present research extends existing literature by examining human psychosocial outcomes of HAI in a prison setting. Hypotheses were based in part on findings from HAI program benefits experienced thus far by nursing-home and hospital residents, as residents and inmates likely experience similar difficulties, namely loneliness, boredom, dependence, and aberrant social behavior (Ivanoff et al., 1992; Phillips, 2001). To date, only a small number of studies have explored HAI in correctional settings, and the findings have been mixed.

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Katcher, Beck, and Daniel (1989) studied the physiological and behavioral impact of pet ownership on inmates by measuring blood pressure with and without the pet present. They also measured criminal infractions before and after the prison's pet program was implemented. No significant differences were found between the participating inmates and a control group. Conversely, Moneymaker and Strimple (1991) found a reduced recidivism rate among inmates who participated in an HAI program in which they were trained in laboratory-animal technician skills and served as caretakers for institutional animals. However, these results were not tested with statistical analyses.

Unlike pet programs, inmates participating in service-dog programs prepare dogs for human service (e.g., seeing-eye dog). Walsh and Mertin (1995) studied such a program with minimum-security inmates at a women's prison in Australia. The program was evaluated with a pretest-posttest design, assessing participating inmates' levels of self-esteem and depression. Results indicated the participants reported a significant increase in self-esteem and a significant decrease in depression from pretest to posttest. However, there was no control group and the posttest measures were completed when inmates were about to be released from prison. Thus, the change in self-esteem and depression may have been because of participants' impending release rather than the HAI program.

Finally, based on the research reviewed here, a pilot study was conducted to prepare for the present research. Suthers-McCabe, Fortney, and Fournier (2004) investigated the impact of a service-dog training program on 16 inmates in a pretest-posttest study of clinical symptomatology and psychological functioning. A finding of no significant

differences from pretest to posttest was explained by a “ceiling effect,” in that mean pretest scores on all measures were in the normal/healthy range, precluding further movement in the direction of improved psychological functioning.

These results suggest that, despite HAI resulting in a reduction of clinical symptoms (e.g., Barker & Dawson, 1998) and the increased prevalence of mental illness in correctional settings (Lamb & Weinberger, 1998), clinical symptoms and diagnostic status are probably not appropriate dependent measures for studies of this type. Inmates in such programs are carefully selected and thus are among the most psychologically healthy inmates. However, such model inmates are still subject to effects of prisonization and still demonstrate criminal behavior in the correctional setting, variables which put them at risk for future recidivism. Therefore, the present research assessed criminal behavior and social variables rather than clinical symptoms and distress.

THE HAI PROGRAM IN THE PRESENT RESEARCH

The HAI program studied in this research is the PenPals program, a dog-training program in which dogs are selected from local shelters and trained by volunteer inmates in prison for 8 to 10 weeks. During that time, dogs live with selected inmates who are educated in dog-training skills. The volunteer inmates provide for the dogs' basic needs (i.e., food, shelter, grooming), and train them in basic obedience. After the training period, the dog is adopted by individuals in the community and the inmates begin the process again with a new shelter dog. Inmates who apply for the position are selected by correctional staff. Inclusion criteria for the HAI program, as predetermined by the facility, include (a) being in the therapeutic community for at least 30 days, (b) having at least three months of prison sentence remaining, and (c) having no history of animal abuse or domestic violence. In addition, the coordinator chose inmates based on answers to subjective questions on the program's application form, indicating a positive attitude toward the therapeutic community and the HAI program.

THE EVALUATION DESIGN

The study followed a mixed between- and within-subject, pretest-posttest repeated-measures design. Comparisons were made between phases, comparing pretest and posttest scores, and between groups, comparing a Treatment group with a Control group. The Treatment group was comprised of inmates in the HAI program and the Control group consisted of inmates on the waiting list for the HAI program. Participants were not randomly assigned to Treatment and Control groups, as the prison administration had a selection process in place prior to this research. Thus, the two groups were predetermined samples of convenience.

Treatment group (n=24). Participants in the Treatment group were inmates who began working in the HAI program during the research period. Participants in the Treatment group completed pretest measures prior to being in the HAI program and completed posttest measures after two weeks of involvement in the program.

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Control group (n=24). Participants in this group were inmates who applied and met criteria to work in the HAI program, but remained on the waiting list during the research period. Each time a participant from the Treatment group completed posttest measures, a participant from the waiting list was randomly chosen to complete posttest measures, thus becoming a part of the Control group.

HYPOTHESES

In general, it was hypothesized the HAI program would result in beneficial inmate outcomes. Dependent measures included inmate treatment level within the therapeutic community, frequency of institutional infractions documented in the inmates' institutional files, and social skills assessed with a self-report measure. Based on the information cited, it was predicted that (a) the Treatment group would demonstrate greater increases in treatment level in the therapeutic community and self-reported social skills than the Control group, and (b) the Treatment group would demonstrate a decrease in institutional infractions from pretest to posttest in comparison to the Control group.

METHOD

Participants and Setting

The study was conducted at a minimum-security male prison in southwest Virginia. The prison confines a total of 352 adult inmates, housed in dormitory-style buildings. Exclusion criteria for this facility include charges for kidnapping/abduction, violent sex offenses and those inmates determined to be escape risks. In addition, the prison is a substance abuse treatment-oriented facility, and thus it is limited to inmates with a history of substance abuse or legal charges related to drugs or alcohol. In conjunction with the facility's treatment orientation, two-thirds of the inmates participate in the prison's therapeutic community.

A total of 48 adult male inmates from the prison's therapeutic community participated in the research. This included 24 inmates who participated in the HAI program, serving as the Treatment group, and 24 inmates who applied to the HAI program but remained on the waiting list, serving as the Control group. The participants' mean age was 29 with a range of 21 to 46 years old. Participants had completed a mean of 11.6 years of education with a range of 9 to 15 years. All participants were able to read at least at an 8th grade reading level. With regard to race, 63.0% of the participants were Caucasian, 25.9% were African American, 5.6% were Hispanic, 1.9% were Native American, and 3.7% did not report their ethnicity.

Because participants were not randomly assigned to groups, demographic variables were compared between the Treatment and Control groups at Pretest to assess for potential sampling bias. Participant age, education, treatment level, length of stay in the therapeutic community, and time left of prison sentence were compared using one-way analyses of variance (ANOVA). There was a significant difference in age between the two groups; the mean age in the Treatment group ($M = 26.1$) was significantly lower than

in the Control group ($M = 32.8$), $F(1, 43) = 17.8$, $p < .001$. No other demographic variables differed between the two groups, $p's > .05$

Dependent Measures

Institutional infractions were obtained from inmate records as a measure of criminal behavior. Therapeutic community treatment level was obtained via participant self-report. In addition, a scale measuring HAI and a demographic questionnaire to obtain information on variables such as age, ethnicity, and level of education were developed for the purposes of the study.

Human-Animal Interaction Scale. The present research required a measure of HAI. While there are some measures of human attachment to pets (e.g., Garrity et al., 1989; Holcomb, Williams, & Richards, 1985), there are no validated instruments designed to quantify HAI. Thus the Human-Animal Interaction Scale, in which respondents are asked to endorse the amount and type of interaction they experience with animals, was created for the purpose of measuring HAI in this study. The HAI Scale is an 11-item, 5-point Likert scale on which participants were asked to report their interactions with program dogs over the past week².

Social Skills Inventory. The Social Skills Inventory (SSI) is a 90-item, 5-point measure designed to assess basic social and emotional communication skills (Riggio, 1986). It is based on the premise that socially intelligent people are skilled in correctly receiving and appropriately conveying social and emotional information in a given situation (Guildford, 1967; Mayer & Salovey, 1997; Riggio, 1986; Salovey & Mayer, 1990). The SSI consists of six scales that measure communication skills on emotional/nonverbal and social/verbal dimensions, and evaluate expressivity, sensitivity, and control for each of these dimensions. Test-retest reliability is favorable with correlations ranging from .81 to .96, and internal consistency is acceptable, with Cronbach's alpha coefficients for the scales ranging from .65 to .88 (Riggio, 1986).

Procedures³

Participant recruitment. The research was initially announced to all inmates in the therapeutic community through flyers placed in the dormitories and announcements made during a nightly inmate meeting. As an incentive to participate, inmates were informed they would earn Certificates of Participation to put in their institutional file should they choose to participate. Inmates interested in participating attended a single mass-testing session in which the principal investigator administered the self-report measures to all volunteer participants. After the initial mass-testing session, all inmates who applied to

² A copy of the Human-Animal Interaction (HAI) Scale is available from the first author, upon request.

³ All procedures were approved by the Virginia Tech Institutional Review Board for Research with Human Subjects and the Human Subjects Review Board for the Virginia Department of Corrections.

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work in the HAI program were informed of the nature of the research and asked for their voluntary participation. A total of 109 inmates applied for the HAI program during the research period, all of whom volunteered to participate in the research. Of those who volunteered, 55 did not meet criteria for the HAI program and thus were excluded from the research. Another six inmates participated in a second study, not discussed here, and thus are not included in the present research. Therefore, a total of 48 inmates participated in the present study.

Data collection. Criminal behavior was operationally defined as the frequency of institutional infractions occurring during the research period, as reported in individual institutional records maintained by the prison. Treatment progress was operationalized as the difference in therapeutic community treatment level between Pretest and Posttest. Treatment level was measured via participants' self-report, because documentation of the inmates' treatment level in the institutional file was optional and thus inconsistently recorded. However, the treatment levels reported by inmates were verified and corroborated by correctional staff, with no inconsistencies noted. Inmates' reported treatment levels (e.g., Pulsar East I) were ranked from 1 to 5, according to the prison's treatment manual, with 1 representing the lowest (i.e., beginner, lowest functioning) level and 5 representing the highest level. Higher levels represent better psychosocial functioning. The SSI and the HAI Scale were administered to participants at two assessment phases – before Treatment group participants were involved in the HAI program, or “Pretest,” and after Treatment group participants were involved for two weeks, or “Posttest.”

RESULTS

Human-Animal Interaction

Mean scores on the HAI Scale are presented in Table 1. Means were compared with a 2 Group x 2 Phase repeated-measures analysis of variance (ANOVA). The ANOVA resulted in a main effect for Group, $F(1, 46) = 24.1, p < .001$, in which HAI Scale scores were significantly higher in the Treatment group ($M = 31.5$) than in the Control group ($M = 19.8$). There was also a main effect for Phase, $F(1, 46) = 7.9, p < .01$, reflecting an increase in HAI Scale scores from Pretest ($M = 23.3$) to Posttest ($M = 27.9$). The Group x Phase interaction was not significant, $p > .05$.

TABLE 1. MEANS AND STANDARD DEVIATIONS OF HAI SCALE SCORES, CLASSIFIED BY GROUP AND PHASE.

Measure	Treatment Group (n=24)		Control Group (n=24)	
	Pretest	Posttest	Pretest	Posttest
HAI Scale	28.8 (10.9)	34.2 (9.1)	17.8 (8.9)	21.6 (10.9)

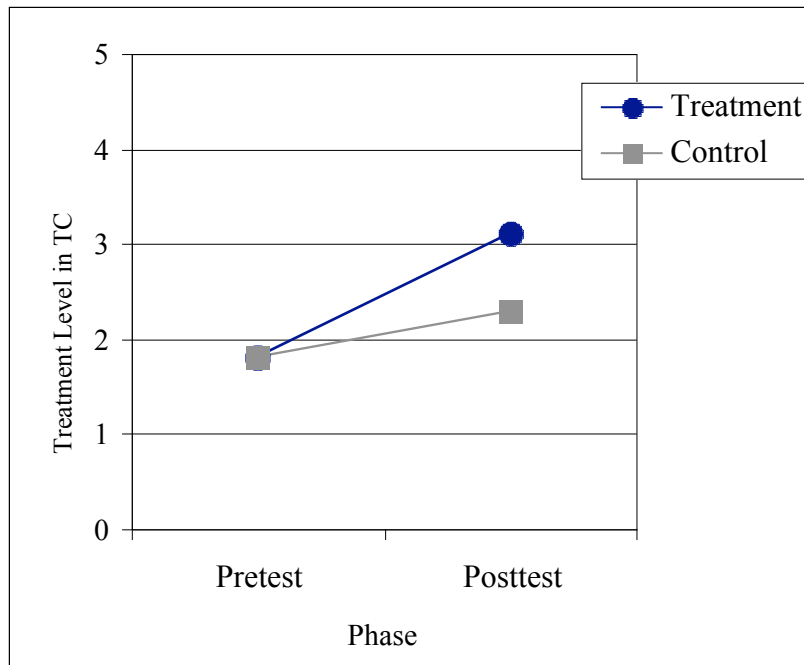


Figure 1. Treatment level in the therapeutic community (TC) as a function of experimental group and phase.

Treatment Progress

Self-reported treatment level within the therapeutic community was ranked from 1 to 5, with higher scores indicating better psychosocial functioning. Treatment level was compared across Group and Phase by calculating a 2 Group x 2 Phase repeated-measures ANOVA. The analysis resulted in a significant main effect for Phase, $F(1, 44) = 33.4, p < .001$, indicating treatment level increased significantly from Pretest ($M = 1.8$) to Posttest ($M = 2.7$). The ANOVA also resulted in a significant Group x Phase interaction, $F(1, 44) = 6.5, p < .05$, indicating treatment level improved more in the Treatment group from Pretest ($M = 1.8$) to Posttest ($M = 3.1$) than it did for the Control group from Pretest ($M = 1.8$) to Posttest ($M = 2.3$). Figure 1 illustrates this Group x Phase interaction.

Criminal Behavior

Criminal behavior was measured via frequency of institutional infractions recorded in individual institutional files. Pretest frequencies included infractions incurred within one month before Pretest surveys were completed. Posttest frequencies included infractions incurred during the one month after beginning the HAI program, for the Treatment group, and during a one-month period following completion of the Pretest sur-

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TABLE 2. TOTAL NUMBER OF INSTITUTIONAL INFRACTIONS, CLASSIFIED BY GROUP AND PHASE

Group	Total Infractions	
	Pretest	Posttest
Treatment (n=24)	7	5
Control (n=24)	3	10

veys, for the Control group. The total number of criminal infractions, classified by Group and Phase, are depicted in Table 2.

As indicated in Table 2, infractions were relatively infrequent, with participants incurring zero to two infractions during the research period. Therefore, the ANOVA statistic could not be calculated. Instead, each infraction was categorized according to the Phase in which it occurred and the Group of the inmate who incurred the infraction. The infractions were analyzed with a 2 x 2 Chi Square analysis. The two variables were Phase with two levels (Pretest and Posttest) and Group with two levels (Treatment and Control). The Chi Square statistic indicated the variables Phase and Group were significantly related, $X^2(1, n = 25) = 3.2, p < .10$. The more liberal p -value of .10 was accepted as statistically significant by these authors due to the small number of infractions being analyzed.

Social Skills

Social skills were assessed by calculating mean total scores on the six SSI subscales. A 2 Group x 2 Phase repeated-measures multivariate analysis of variance (MANOVA) was calculated on the SSI scale scores. The MANOVA resulted in a significant main effect for Phase, $F(6, 40) = 2.5, p < .05$, and a significant Group x Phase interaction, $F(6, 40) = 3.0, p < .05$. ANOVAs on each subscale were calculated as a follow-up to the MANOVA main effect and interaction. The ANOVAs indicated the main effect for Phase was significant for the Emotional Control scale, $F(1, 45) = 5.2, p < .05$, with Emotional Control scores increasing significantly from Pretest ($M = 41.1$) to Posttest ($M = 43.7$).

With regard to the Group x Phase interaction, the ANOVAs indicated the interaction was significant for the Social Sensitivity scale, $F(1, 45) = 4.0, p < .05$, with Social Sensitivity scores increasing from Pretest ($M = 35.9$) to Posttest ($M = 39.4$) for the Treatment group and scores decreasing from Pretest ($M = 38.0$) to Posttest ($M = 35.5$) for the Control group. Figure 2 illustrates this interaction.

DISCUSSION

This quasi-experimental field study tested the psychosocial effects of an HAI program on a correctional population. The general prediction that participation in the HAI program would result in psychosocial changes for inmates was supported. Participa-

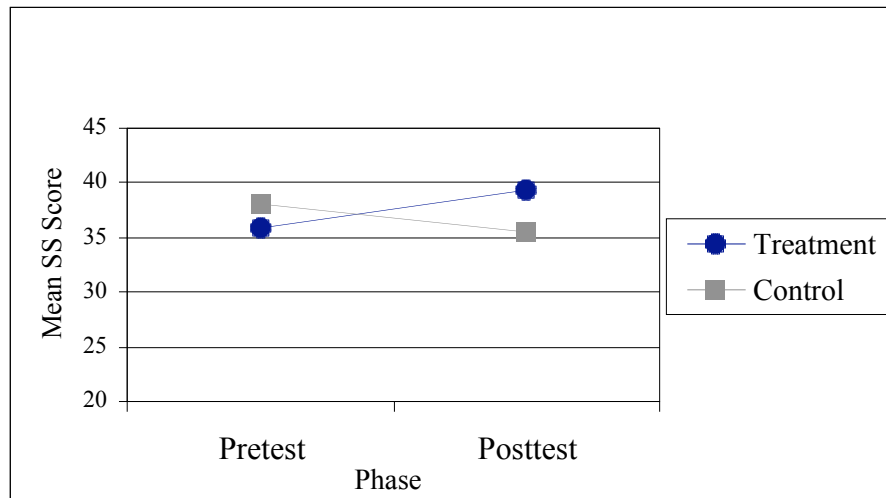


Figure 2. Mean score on the Social Sensitivity (SS) scale of the Social Skills Inventory (SSI) as a function of experimental group and phase.

tion in the HAI program was associated with increased treatment progress in the therapeutic community, decreased institutional infractions, and improvement of social sensitivity.

Treatment Level

The comparison of treatment level within the therapeutic community across Group and Phase revealed that while both groups reported an increase in treatment level from Pretest to Posttest, the increase was significantly greater for the Treatment group. This is a substantial finding, as it suggests participation in the HAI program beneficially impacts the treatment already in place at the prison. This is consistent with research on animal-assisted therapy in which the presence of an animal has been found to facilitate traditional physical, occupational or psychological therapies (e.g., Fick, 1993). The present research took place within a therapeutic community. Participation in therapeutic communities results in beneficial outcomes, including lower rates of institutional infractions (e.g., Dietz, et al., 2003), fewer rule violations and failed drug screens (e.g., Prendergast, et al., 2001), and lower recidivism (e.g., Lipton et al., 2002).

Because the dependent measure was purely a number to signify treatment level reported by inmates and staff, it remains unclear what this change in treatment level represents. Inmates advance to the next level of the therapeutic community when treatment staff at the facility judge them to have met the necessary requirements, a somewhat subjective procedure. Thus, advancement through treatment levels could have been increased in the Treatment group because they met the criteria *or* because treatment staff *perceived* them to have met the criteria sooner. It is possible being in the HAI

program changes *others'* perceptions of the inmates, an important hypothesis for future research. It is also important to consider sampling bias as a potential confound. That is, this finding could be due to systematic differences between the Treatment and Control groups independent of the HAI program. Nonetheless it is a promising finding to be studied further with experimental conditions.

Criminal Behavior

The results for criminal infractions suggest some beneficial impact of the HAI program. Although the small number of infractions prevented the calculation of parametric statistics, both visual inspection of the data in Table 2 and the nonparametric analysis of the infractions suggest the HAI program is associated with reduced criminal behavior. This is particularly important in light of verbal reports from the prison administrators that some correctional staff are actually *more* controlling with inmates in the HAI program, citing them with infractions for less serious offenses than inmates not in the program. Within this context, the small but significant difference found here is especially notable. Furthermore, applying even a small reduction to the 6.9 million people involved in the criminal justice system (BJS, 2004) gives these findings potential for being clinically significant. Unfortunately these results could reflect a regression toward the mean rather than a beneficial effect of the treatment, as frequencies decreased within the Treatment group and increased within the Control group, resulting in similar totals across pretest and posttest. Future replication with a larger sample could clarify the nature of this finding.

Social Skills

It was predicted that participants in the Treatment group would report greater improvement in social skills from Pretest to Posttest than those in the Control group. Such a finding would provide support for the HAI program's efficacy in facilitating inmate social skills and would be an extension of the HAI literature, which suggests improved social behavior is an outcome of animal-assisted therapy (e.g., Corson et al., 1977; Salmon et al., 1982). Results supported this hypothesis, indicating that scores in one specific area of social skills, social sensitivity, did improve for the Treatment group from Pretest to Posttest, while the Control group scores decreased on this variable.

Social sensitivity, as measured by the SSI, is defined as the ability to interpret verbal communication from others and sensitivity to norms governing appropriate social behavior (Riggio, 1986). This finding suggests participants may have improved at this skill as a result of working in the HAI program. The broader implication is that such programs may have socially rehabilitative effects for prison inmates. Such an impact would likely be welcomed in the criminal justice system, as social-skill development is an integral part of many correctional rehabilitation programs (Pearson et al., 2002). On the other hand, the existing literature on prisonization suggests the effect found here may represent prevention of inmates from *declining* in social sensitivity, rather than *improving* in this quality. Either way, the HAI program was apparently beneficial.

Experts in the study of prisonization suggest adjustment to incarceration includes achieving “total emotional control, heightened levels of suspicion and guardedness, and mastery over the intricacies of interpersonal deceptions” (Haney, 1997, p. 533). This adjustment does not lend itself to social sensitivity as defined by the SSI. Thus, it is possible this construct naturally lessens with incarceration and that participating in the HAI program acted as a buffer to prevent the process from occurring within the Treatment group participants.

Unfortunately, the lack of a significant Group x Phase interaction on HAI, discussed below, makes it difficult to attribute the present findings to the HAI program. However, participation in the present HAI program resulted in other changes that could impact social sensitivity. In addition to studying HAI, it may also be important to study human-human interaction to determine if the amount and type of social contact an inmate experiences changes as a result of the HAI program. For example, the act of working on a team may affect social skills, such as that demonstrated in research on cooperative learning (Rutherford, Mathur, & Quinn, 1998). More specific to HAI, research has shown that the mere presence of an animal increases friendly social interaction between strangers (Wells, 2004). Consistent with this finding, inmates in the present research anecdotally reported increased social interaction with both inmates and staff interested in interacting with the dogs.

Human-Animal Interaction

Although it was not specifically predicted, there was an underlying assumption that there would be a significant Group x Phase interaction on scores on the HAI Scale, representing inmates’ interactions with the program dogs. That is, it was assumed that scores on the HAI scale would increase significantly from Pretest to Posttest in the Treatment group but not in the Control group, or at least not to as great an extent. Based on the analyses, this underlying assumption was not met. Specifically, there was only a main effect of group. This suggests the Treatment group participants interacted with the dogs prior to officially working in the HAI program. Thus, unfortunately, the present research does not represent a true Pre-Post comparison with regard to HAI, an important limitation to the study. However, it is encouraging that the Treatment group scored significantly higher on the HAI checklist than the Control group.

Limitations

The findings and implications of the present research must be considered in light of several limitations, the most important being the quasi-experimental nature of the study. Participants were not randomly assigned to groups and thus selection bias may have confounded the results. Analyses indicated the two groups did differ on one demographic variable at Pretest—age—in that participants in the Treatment group were significantly younger than those in the Control group. However, it is doubtful the differences in age can discount the present results, as there is no empirical evidence connecting younger inmates with improvements in these measures. In fact, studies specific to criminal

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infractions have found that younger inmates incur *more* infractions than older inmates (Faily, Roundtree, & Miller, 1980; Flanagan, 1983). Nonetheless, selection bias is a potential confound, which should be addressed in future research.

As was mentioned earlier, the lack of a true Pretest-Posttest comparison of HAI is a second limitation. Inmates reported the same amount of HAI before beginning the program as they did after. Thus, the Pretest-Posttest comparisons in the analyses may have assessed the impact of *working in the HAI program*, but not the impact of interacting with the animals. Thus, the reported effects on the dependent measures may have been the result of other variables related to working in the program (e.g., incentive to follow the rules, increased social interaction), not HAI per se. It must also be noted that the instrument used to measure this dependent variable, the HAI Checklist, was created for the current research, as no such measure existed. In that regard, the above finding could be related to weaknesses with the measure itself. Future research should involve the further development and evaluation of a psychometrically sound measure of HAI.

With further regard to dependent measures, the measure of institutional infractions may have been a limitation. Frequencies were recorded from institutional files without verification of the reliability with which infractions were given or documented by correctional staff. Furthermore, the present research did not include an analysis of type or severity of infractions. Although this limitation was constant for both groups and conditions, and thus did not likely confound the findings, more specific investigation of this variable in future studies would amplify the meaningfulness of data collected.

External validity may be a third limitation, in that the results may be not be generalizable beyond this particular population and setting. The participants differed from the general prison population; each had at least an eighth-grade reading ability and 72% had completed high school, obtained a GED, or higher degree. This is contrasted with the BJS's report that only 59% of inmates in state prisons have a high school diploma or GED (1999). However, the nature of the research required that inmates be able to read, and it is unlikely reading ability or level of education would significantly alter the overall effect of an HAI program or the findings of the present research. Nevertheless, external validity is critical to applied research and future research should control for this limitation.

SUMMARY AND FUTURE DIRECTIONS

Given the promising findings and yet the limitations noted, future research is warranted in this area. While a true experimental design is recommended, it is unlikely prison administrators would allow inmates to be randomly assigned to HAI programs. Therefore, a design in which correctional institutions are randomly assigned to have an HAI program is indicated. The group-randomized-trial (Murray, 1998), in which whole groups are randomly assigned to treatment or control conditions, is such a research design. Findings from such a design involving several different correctional populations and settings would be more generalizable; the timing of HAI program implementation

could be controlled by researchers, providing a true pretest-posttest comparison; and HAI programs would be randomly assigned, eliminating selection bias. Alternatively, a crossover design; in which an HAI program is assessed within one institution by making comparisons at baseline, intervention, and withdrawal phases; may address some of the same methodological concerns and be more easily implemented.

Given the need for effective rehabilitation programs and the current promising results, more behavioral research in this area is warranted. It is recommended that future research first focus on replication of the current findings, followed by analysis of the processes that occur within an HAI program, to include a dismantling and evaluation of the numerous *non*-HAI variables (e.g., increased social interaction) related to working in such a program. Furthermore, investigations should include follow-up assessments of inmates, to determine long-term impact of HAI programs. Such studies are necessary to clarify what could be a clinically significant intervention for incarcerated offenders. More generally, this line of research has important implications for the contentious social justice issue of whether inmates can or should benefit from rehabilitation programs.

Given that our current sociocultural climate favors “tough on crime” legislation (Haney, 1997), public officials and community members may reject large-scale implementation of prison HAI programs. Providing *companion* animals to inmates, even if requiring the inmates to care for them, is inconsistent with what many suggest is a primary goal of American prisons—to strip offenders of their identity and facilitate a sense of isolation (Coyle, 2003; Rodriguez, 2003). Thus, the present research has important implications for rehabilitation of inmates in specific HAI programs, but also has the potential to fuel discussions on broader issues in criminal justice, such as retributive versus rehabilitative prison management practices.

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