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Effects of Psychotherapy Incorporating Horses (PIH) on Suicide Risk and Affect Among Participants in Psychiatric Inpatient Settings

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Abstract

Suicide remains a leading cause of death worldwide, and innovative therapeutic approaches are needed to complement existing treatments. This study aimed to examine the effects of Psychotherapy Incorporating Horses (PIH) on suicide risk and affect among psychiatric participants. Sixty participants (n = 60) hospitalized for suicidal ideation or behavior were assigned to either a PIH group (n = 30) or a control group (n = 30) participating in standard therapeutic workshops as part of a prospective, non-randomized controlled observational study. Over an eight-week period, suicide risk and affect were assessed at baseline, week 3, and week 8 using the Columbia–Suicide Severity Rating Scale (C-SSRS) and the Positive and Negative Affect Schedule (PANAS). Participants in the PIH group demonstrated significantly greater reductions in suicide risk categories ($p < 0.001$). Affect improved over time in both groups, while the PIH group showed greater improvements at the item level for several positive affect items, particularly feelings of pride, activity, inspiration, determination, and attentiveness. These results suggest that Psychotherapy Incorporating Horses may serve as a valuable addition to standard psychotherapeutic care and may contribute to a reduction in suicide risk among hospitalized individuals. However, further research with larger samples is needed to confirm these findings.

Introduction

Every year, approximately 703,000 individuals die by suicide, making it one of the leading causes of death worldwide [1]. Notably, 90% of individuals who die by suicide have been diagnosed with one or more psychiatric disorders [2]. Challenges in treating suicidal individuals include undertreatment, comorbid conditions, treatment non-compliance, poor adherence, and a high prevalence of individuals who do not respond to conventional therapies [3]. These challenges underscore the need for complementary and innovative therapeutic approaches beyond standard care [4].

Animal-Assisted Interventions (AAI), or more recently Animal-Assisted Services (AAS), represent a therapeutic approach that encourages positive interactions between humans and animals, with both preventive and therapeutic goals across various fields, age groups, and psychiatric diagnoses [5, 6]. Studies have shown that AAS can significantly reduce symptoms of depression, anxiety, and post-traumatic stress disorder (PTSD) [7, 8], conditions frequently associated with heightened suicide risk [9]. These interventions have been particularly effective in adolescents, veterans, and individuals with treatment-resistant psychiatric disorders, groups that often exhibit elevated vulnerability to suicide [10, 11].

Staniszewska et al. [12] reported that suicidal psychiatric participants expressed a profound need for respectful, trusting, and prejudice-free interactions with physicians, as supportive and collaborative approaches were essential to their sense of self-acceptance. Within AAS, the presence of an animal may naturally support these needs by offering a non-judgmental, compassionate presence with a unique sense of confirmation and emotional safety that allows individuals to feel accepted [13, 14].

Significant improvements in the management of mental disorders and enhancement of clients' psychological well-being have been documented with the integration of horses, often referred to as Equine-Facilitated Psychotherapy (EFP) [15, 16]. However, alternative terms such as Equine-Assisted Psychotherapy (EAP) and Equine-Assisted Therapy (EAT) are also frequently used [17, 18]. More recent terminology recommends adopting therapy-first language to enhance conceptual clarity and precision, with Psychotherapy Incorporating Horses (PIH) proposed as the preferred term [19]. Despite inconsistent terminology, interventions incorporating horses

have demonstrated multiple positive effects across diverse clinical populations. In particular, PIH has shown effectiveness in alleviating symptoms of various conditions commonly associated with suicidal tendencies [16, 17, 20–23].

In PIH, the horse's natural sensitivity to its surroundings and non-verbal cues is considered central to the therapeutic process. Horses respond rapidly to human emotional states and may mirror clients' emotions through their behavior [24]. For individuals with suicidal tendencies, this perceived responsiveness may serve as a powerful mechanism for change by helping clients recognize and process their emotions in a judgment-free space [25]. Given that negative emotions are linked to higher suicidality, whereas positive emotions may be protective, focusing on affect could provide therapeutic benefits [26]. Furthermore, PIH has been associated with trust-building, emotional connection, and relational safety [27], factors particularly relevant for suicidal individuals who often experience isolation and disconnection [27, 28]. Collectively, these factors may strengthen the therapeutic alliance, enhance engagement, and increase willingness to participate in treatment [29, 30]. This aligns with Fowler's [31] assertion that fundamental principles in treating suicidal individuals include establishing a strong therapeutic alliance and promoting the experience and expression of intense emotions as critical components of the therapeutic process.

Although PIH has been widely documented and applied across a variety of target populations, very limited research has examined the efficacy of PIH in individuals exhibiting suicidal tendencies. Existing studies on PIH typically focus on psychiatric disorders in which suicidality is present as a comorbid condition, rather than targeting suicidal individuals directly [32]. Consequently, suicidality is often assessed only secondarily. Research evaluating PIH commonly examines depression, anxiety, affectivity, stress, self-perception, and assertiveness using psychometric instruments designed to assess these constructs [33, 34]. In contrast, direct assessment of suicidality within PIH research remains limited and frequently relies on qualitative observational approaches or open interviews between participants and psychotherapists [35].

This study was designed to evaluate the impact of PIH on individuals with suicidal tendencies within a psychiatric hospital setting, employing the Columbia-Suicide Severity Rating Scale

(C-SSRS) and the Positive and Negative Affect Schedule (PANAS) to directly assess suicide risk and affectivity.

Methods

Participants

The study involved 60 adult participants (28 ± 9.90 years old) hospitalized in a psychiatric department, including 23 men, 35 women, 1 non-binary person, and 1 person undergoing female-to-male gender transition. All participants presented varying levels of suicide risk at admission, assessed by the lead clinician using the C-SSRS, ranging from a wish to die and passive or active suicidal ideation to a specific suicide plan. None of the study participants attempted suicide or were in an acute suicidal state during their hospitalization. All participants were also concurrently diagnosed with one or more psychiatric disorders according to the International Classification of Diseases, 10th Revision (ICD-10), most commonly specific personality disorders (F60), anxiety disorders (F41), and depressive episodes (F32). Exclusion criteria included psychosis, acute risk of suicide attempt, allergies, phobias, or aggressive behavior toward animals.

Study design and procedure

This study employed a prospective, non-randomized controlled observational design and was not conducted as a clinical trial. Participants were enrolled from the Acute Care Unit of the Psychiatric Hospital, an open psychotherapy ward providing comprehensive and specialized psychiatric care with an emphasis on group and individual psychotherapy. Data collection took place between 5 April 2022 and 27 January 2023.

The horses involved in the Psychotherapy Incorporating Horses intervention were not subjected to any experimental procedures or experimental manipulation as part of this study. The use of horses in Psychotherapy Incorporating Horses is not classified as an animal experiment under Act No. 246/1992 Coll., on the Protection of Animals Against Cruelty; therefore, specific permission for an animal experiment was not required. The horses were under regular veterinary and welfare supervision, and all employed protocols and methods complied with the applicable legislation and Directive 2010/63/EU. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. The study protocol was approved by the Ethics Committee of the Psychiatric Hospital Bohnice (PNBek4/2022). Prior to data collection, all study participants signed “Participant’s Instruction and Informed Consent Form”. Personal data were processed confidentially and anonymously under identification numbers, participation was voluntary, and no financial compensation was provided.

Participants admitted to the ward were routinely assessed upon admission by the lead clinician using the Columbia-Suicide Severity Rating Scale (C-SSRS). Individuals in whom suicide risk was identified were informed about the study and invited to participate. Those who agreed completed the Positive and Negative Affect Schedule (PANAS). A non-randomized pragmatic allocation procedure was employed, with participants allocated to study groups by the research team based on intervention availability at the time of admission. Ward staff were informed of group allocation only after the participant had been admitted, met inclusion criteria, and completed baseline assessments (C-SSRS and PANAS). The clinician conducting the C-SSRS assessments remained blinded to group allocation throughout the study. Both the control (n = 30) and experimental groups (n = 30) followed identical treatment programs during hospitalization, differing only in the targeted therapeutic sessions. While the experimental group attended PIH sessions, the control group participated in therapeutic workshops (paper, ceramic, textile etc.). Targeted therapies were conducted once a week over an 8-week observation period, comprising eight sessions in total.

Data were collected at three predefined intervals across both study groups: before the first targeted therapy session (week 1), after the third session (week 3), and after the final session (week 8). PANAS and C-SSRS scores were analyzed to evaluate the effectiveness of PIH in participants at suicide risk compared with the control group.

Questionnaires

The *Columbia–Suicide Severity Rating Scale (C-SSRS)* was assessed via in-depth interview and a semi-structured interview with the lead clinician, who was blinded to the participants' group assignments. The scale is often used as an initial screening tool that can assist clinicians in assessing suicide risk and categorizing individuals as low, medium, or high risk for fatal suicide attempt, yet specific cut-off scores are not provided [36]. Results obtained from the C-SSRS were classified into ten ordinal risk categories in accordance with Scoring and Data Analysis Guide for C-SSRS by Nilsson et al. [37] to facilitate clear presentation of suicide risk. Each participant was

assigned to a single category (1–10, from lowest to highest risk) based on the highest level of suicidal ideation and/or presence of suicidal behavior identified during the C-SSRS interview. Categorization followed standardized C-SSRS criteria and was conducted by the lead clinician.

Positive and Negative Affect Schedule (PANAS) is a self-administered psychological tool consisting of two subscales assessing positive and negative affect, completed by the study participants using the PAPI technique (paper and pencil interviewing). Positive affect (PA) can be defined as the extent to which a person feels comfortable and forms broad social relationships. Negative affect (NA) is understood as a measure of subjective distress, including states such as anger, guilt, fear, and difficulty overcoming difficult situations. A high level of PA indicates a state of positive integration, whereas a low level of PA is associated with sadness and numbness. High NA reflects significant stress, while low NA indicates a state of calm [38]. Respondents rate each item on a five-point scale ranging from 1 (very slightly or not at all) to 5 (extremely) according to how relevant the emotion is to them or how they felt during the past week [39]. In the general population, the average PA score is reported as 33.3 (SD ± 7.2) and the NA score as 17.4 (SD ± 6.2) [40].

Intervention

Psychotherapy Incorporating Horses. The PIH sessions for the **experimental group** took place at the Sociotherapy Farm within the psychiatric hospital grounds, approximately a 10-minute walk from the ward where the participants were hospitalized. Participants were escorted to and from sessions by appointed personnel. Sessions were mostly conducted as group therapy (2–4 participants), although each participant worked individually with one horse during the session. Each PIH session lasted approximately 60 minutes.

The PIH sessions consisted of three segments. The first included an introduction to the horse, explanation of important information and rules, initial contact, and mainly grooming activities. This segment aimed to increase participants' awareness of the horse's presence, facilitate attunement, establish an initial relationship with the horse, and prepare participants for the continuation of the therapy. The second segment involved a range of activities presented in Table 1, selected by the therapist based on the participant's individual therapeutic goals. The activities primarily aimed to support the participant's self-confidence, self-awareness, self-control, and assertiveness. The final part of the PIH included rewarding the horse, cleaning the equipment, and summarizing the session, during which participants shared their opinions and evaluated their work.

Table 1
Range of implemented activities during PIH intervention

Type of the intervention	Activity description	Aim of the intervention
Ground work • Liberty work *-techniques where the bond with the horse is established not by a lead rope but through gestures, body language, and eye contact*	◊ Embracing the horse, caressing it from its neck to its back, using the leash to gently stroke it, and placing hands on its neck to feel the rhythm of its breath.	to calm and relax the patient
	◊ Guiding the horse backward with a firm and deliberate application of imagined energy aimed at its chest, without any physical contact from the participant.	on concentration, working with emotions, assertiveness
	◊ Beckoning the horse back using only the participant's body language.	
	◊ Rotating the horse on its axis, with and without using a leash.	
	◊ Guiding the horse through the arena, intermittently pausing with a distinct stop that the horse mirrors, followed by a deliberate forward surge, which the horse also emulates.	to train self-confidence
	◊ Strolls through the hospital premises	help with spatial awareness.
	◊ Guiding the horse along the walls of the riding arena, while moving quickly alongside the long walls and slowly beside the short walls.	to decrease and increase energy flow
	◊ Directing the horse using one's energy and imaginary pressure, the participant stands at the arena's center while the horse circles the walls. The horse speeds up with imaginary pressure on its back, slows down when the participant's energy focuses ahead of it, and maintains a normal pace when the energy targets its midsection.	to train self-confidence, assertiveness, energy flow
	◊ Practicing commands to modify the horse's pace (walk, trot, canter), navigating obstacle courses, slalom, and halting the horse at an obstacle.	to train self-confidence, self-awareness, assertiveness, vocal modulation and concentration
	◊ The participant trails behind the horse, aiming to align their footsteps with the horse's.	
• *Long-reining*	◊ The participant, positioned behind the horse, guides it around the arena using long reins, engaging in activities similar to those previously outlined.	
Mounted work	◊ Exercises focused on counting the horse's steps and monitoring its breaths.	on concentration, self-awareness, to keep patients in reality, improving the horse-rider communication
	◊ Stopping the horse at marked spots with letters (like A and C) on the walls.	
	◊ Participants learned to initiate horse movement with a deep inhale and to stop them with a strong	

Type of the intervention	Activity description	Aim of the intervention
	exhale among many other exercises akin to those used in groundwork training.	

The horse was continuously monitored by an assistant (handler), who observed any behavioral changes to ensure its safety and welfare. This allowed the therapist to fully focus on the participants. The therapist was a licensed psychotherapist certified to provide PIH. Horses ranged from 18–27 years of age, with the Silesian Norik being the most common breed, followed by the Welsh Pony, English Thoroughbred, and Haflinger. All horses were experienced and certified to perform PIH. Fresh water, appropriate food and balanced nutrition, and all other essential welfare measures were ensured for all horses involved.

Therapeutic Workshops. Activities for the **control group** consisted of independent but therapeutically guided work focused on creating products over several weeks as part of paper, glass, ceramic, textile, or candle-making workshops in an enclosed indoor environment for approximately 60 minutes. The therapy aimed to promote self-sufficiency, decision-making, patience, responsibility, and behavioral self-control, while helping participants feel useful through acknowledgment of their work outcomes. The therapy within the workshops provided long-term and regular support for creating, restoring, maintaining, and improving work habits and skills through social-occupational therapy, while respecting the abilities, wishes, and long-term goals of participants. The workshops were located on the premises of the psychiatric hospital, and participants were accompanied to and from the sessions by appointed personnel.

Data analysis

Data processing and statistical analysis were performed using IBM SPSS Statistics 25.0. Descriptive statistics were used to analyze frequencies, means, and standard deviations of the study variables. Friedman's test and Wilcoxon signed-rank test (for post-hoc tests) were used to evaluate within-group changes. Differences between groups were analyzed with the nonparametric Mann-Whitney U test because the data were not standardly distributed according to the Shapiro-Wilk test. P-values of 0.05 were corrected for multiple comparisons using the Bonferroni-Holm correction (values adjusted to $p < 0.017$). All statistical tests were two-tailed.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process.

Generative AI tools (ChatGPT, OpenAI, version GPT-5) and DeepL were used exclusively for language editing and improvement of grammar and clarity. The authors take full responsibility for the content of the manuscript.

Results

C-SSRS

Suicide risk, as assessed by the Columbia–Suicide Severity Rating Scale (C-SSRS) categorical scoring [37], changed significantly over time in both study groups (see Table 2).

In the experimental group, Friedman's test indicated a significant reduction in suicide risk across the three measurement points (baseline, week 3, and week 8; $\chi^2 = 55.51$, $p < 0.001$). Post hoc pairwise comparisons with Bonferroni–Holm correction revealed significant decreases in C-SSRS category scores between all measurement

points (all $p < 0.001$), indicating a progressive shift toward lower risk categories over the course of the intervention. Descriptive inspection of mean category scores in the experimental group further indicated that the largest decrease occurred between baseline (M = 4.80 ± 1.42) and mid-treatment (M = 1.70 ± 0.79), whereas the subsequent decrease between mid- and post-treatment (M = 0.36 ± 0.62) was less pronounced.

The control group also showed a significant change over time ($\chi^2 = 41.66$, $p < 0.001$). A similar, though numerically less pronounced, pattern was observed in mean category scores (baseline M = 4.53 ± 1.59; mid-treatment M = 2.57 ± 1.68; post-treatment M = 1.65 ± 1.07).

Mann–Whitney U test revealed no significant between-group difference in C-SSRS category scores at baseline ($U = 398.5$, $p = 0.434$). Significant differences emerged between groups at mid-treatment ($U = 276.5$, $p = 0.008$) and post-treatment (U = 113.0, p < 0.001), with lower suicide risk categories observed in the experimental group.

Table 2
Changes in C-SSRS scores over the course of treatment.

C-SSRS	Pre-treatment (mean ± SD)	Mid-treatment (mean ± SD)	Post-treatment (mean ± SD)	Friedman Test	Differences within group	Differences between groups (Mann-Whitney U Test)
Experiment	4.80 ± 1.42	1.70 ± 0.79	0.36 ± 0.62	X2 = 55.51; p < 0.001	1–2***, 2–3***, 1–3***	Pre: U = 398.5; p = 0.434 Mid: U = 276.5; p = 0.008 Post: U = 113.0; p < 0.001
Control	4.53 ± 1.59	2.57 ± 1.68	1.65 ± 1.07	X^2 = 41.66; p < 0.001	1–2***, 2–3***, 1–3***	
Note: Significance level * p < 0.05, ** p < 0.01, *** p < 0.001.						

PANAS

As assessed by the Positive and Negative Affect Schedule (PANAS), baseline comparisons revealed significant differences between groups in both positive affect (U = 303.0, $p = 0.029$) and negative affect (U = 307.5, $p = 0.035$) prior to the targeted interventions (see Table 3). At baseline, the experimental group showed higher positive affect (M = 18.0 ± 5.81) than the control group (M = 14.97 ± 3.90), and lower levels of negative affect (M = 28.30 ± 9.34) compared with the control group (M = 33.53 ± 7.63).

Table 3
Changes in positive and negative affect across treatment

PANAS	Group	Pre-treatment (mean ± SD)	Mid-treatment (mean ± SD)	Post-treatment (mean ± SD)	Friedman Test	Differences within group	Differences between groups (Mann-Whitney U Test)
Positive	Experiment	18.0 ± 5.81	24.30 ± 7.25	29.67 ± 7.33	χ^2 = 48.05, p < 0.001	1–2***, 2–3***, 1–3***	Pre: U = 303.0, **p = 0.029** Mid: U = 240.5, **p = 0.002** Post: U = 243.0, **p = 0.002**
	Control	14.97 ± 3.90	18.50 ± 6.08	23.80 ± 6.21	χ^2 = 49.34, p < 0.001	1–2***, 2–3***, 1–3***	
Negative	Experiment	28.30 ± 9.34	22.57 ± 7.82	16.63 ± 6.39	χ^2 = 42.97, p < 0.001	1–2***, 2–3***, 1–3***	Pre: U = 307.5, p = 0.035 Mid: U = 299.0, p = 0.025# Post: U = 306.0, p = 0.033#
	Control	33.53 ± 7.63	27.43 ± 8.22	21.33 ± 9.16	χ^2 = 38.14, p < 0.001	1–2***, 2–3***, 1–3***	

Note: Significance level * p < 0.05, ** p < 0.01, *** p < 0.001. # after Bonferroni-Holm correction

(p < 0.017) data not significant

Friedman's test indicated significant changes over time in both groups. In the experimental group, positive affect increased (χ^2 = 48.05, p < 0.001) and negative affect decreased (χ^2 = 62.97, p < 0.001). Similar changes were observed in the control group (positive affect: χ^2 = 49.34, p < 0.001; negative affect: χ^2 = 38.14, p < 0.001).

Mann–Whitney U tests showed significant differences in positive affect at mid-treatment (U = 240.5, p = 0.002) and post-treatment (U = 243.0, p = 0.002). For negative affect, significant between-group differences were observed at mid-treatment (U = 299.0, p = 0.025) and post-treatment (U = 306.0, p = 0.033).

Item-level analyses of the positive affect subscale revealed significant group differences for item 10 ("proud"), item 14 ("inspired"), item 16 ("determined"), item 17 ("attentive"), and item 19 ("active"). On the negative affect subscale, a significant between-group difference was observed for item 13 ("ashamed") at post-treatment (U = 248.5, p = 0.002) (see Table 4).

Table 4
Changes in individual positive affect items across treatment

PANAS	Group	Pre-treatment (mean ± SD)	Mid-treatment (mean ± SD)	Post-treatment (mean ± SD)	Friedman Test	Differences within group	Differences between groups (Mann-Whitney U Test)
Proud	Experiment	1.37 ± 0.77	2.10 ± 1.13	2.70 ± 1.34	X^2 = 29.12, p < 0.001	1–2**, 2–3***, 1–3***	Pre: U = 415.5, *p* = 0.464 Mid: U = 280.0, **p = 0.005** Post: U = 275.0, **p = 0.007**
	Control	1.20 ± 0.48	1.33 ± 0.61	1.80 ± 0.85	X^2 = 20.51, p < 0.001	2–3**, 1–3**	
Inspired	Experiment	1.73 ± 1.08	2.43 ± 0.97	3.27 ± 1.02	X^2 = 39.00, p < 0.001	1–2*, 2–3***, 1–3***	Pre: U = 352.0, *p* = 0.073 Mid: U = 317.5, *p* = 0.041# Post: U = 289.5, **p = 0.013**
	Control	1.30 ± 0.70	1.93 ± 0.98	2.63 ± 0.93	X^2 = 36.54, p < 0.001	1–2***, 2–3***, 1–3***	
Determined	Experiment	1.77 ± 1.07	2.57 ± 0.94	3.30 ± 0.88	X^2 = 39.23, p < 0.001	1–2***, 2–3***, 1–3***	Pre: U = 447.0, *p* = 0.961 Mid: U = 358.0, *p* = 0.158 Post: U = 280.5, **p = 0.009**
	Control	1.77 ± 1.04	2.20 ± 1.16	2.63 ± 0.99	X^2 = 26.99, p < 0.001	1–2**, 2–3*, 1–3***	
Attentive	Experiment	1.77 ± 0.97	2.40 ± 0.81	3.20 ± 0.96	X^2 = 35.50, p < 0.001	1–2**, 2–3***, 1–3***	Pre: U = 429.0, *p* = 0.731 Mid: U = 302.0, *p* = 0.022# Post: U = 248.5, **p = 0.002**
	Control	1.67 ± 0.88	1.90 ± 0.99	2.33 ± 1.09	X^2 = 16.10, p < 0.001	2–3**, 1–3**	

Note: Significance level * p < 0.05, ** p < 0.01, *** p < 0.001. # after Bonferroni-Holm correction

(p < 0.017) data not significant

PANAS	Group	Pre-treatment (mean ± SD)	Mid-treatment (mean ± SD)	Post-treatment (mean ± SD)	Friedman Test	Differences within group	Differences between groups (Mann-Whitney U Test)
Active	Experiment	1.57 ± 1.01	2.27 ± 1.08	2.97 ± 1.13	X^2 = 32.89, p < 0.001	1–2**, 2–3***, 1–3***	Pre: U = 372.0, *p* = 0.109 Mid: U = 281.0, **p = 0.008** Post: U = 296.5, *p* = 0.018#
	Control	1.23 ± 0.77	1.57 ± 0.82	2.27 ± 1.05	X^2 = 28.30, p < 0.001	1–2*, 2–3**, 1–3***	
Note: Significance level * p < 0.05, ** p < 0.01, *** p < 0.001. # after Bonferroni-Holm correction							
(p < 0.017) data not significant							

Discussion

Suicide risk

The present study demonstrated significant reductions in suicide risk during hospitalization in both study groups, as reflected by changes in C-SSRS risk categories over time. However, participants receiving PIH showed significantly greater reductions in suicide risk at both mid-treatment and post-treatment compared to the control group. These findings suggest a more pronounced improvement in suicide risk trajectories among individuals participating in PIH within an inpatient psychiatric setting. At the same time, the overall reduction in suicide risk observed across both groups is consistent with evidence indicating that comprehensive inpatient care integrating environmental safety, systematic suicide risk assessment, and psychotherapeutic interventions is associated with decreases in suicide risk during hospitalization.

The most pronounced reduction in C-SSRS risk categories occurred between baseline and the mid-treatment assessment, which followed the fourth PIH session. Changes observed between mid- and post-treatment were less marked, indicating a non-linear pattern of suicide risk reduction over the course of hospitalization. Within the C-SSRS methodological framework, shifts toward lower risk categories are considered clinically meaningful, as they reflect lower levels of suicide risk [37]. This temporal pattern suggests that the largest shifts in suicide risk trajectories may occur during the initial phase of intervention exposure. However, given the study design, this pattern cannot be interpreted as definitive evidence of an intervention-specific timing effect.

Research in the field of PIH frequently excludes individuals with acute suicidal ideation or behavior as contraindications for participation [41–44], which likely contributes to the limited empirical evidence regarding PIH in populations with suicidal tendencies. Existing studies that have examined suicidality within the context of equine- or animal-assisted services are rare and have predominantly relied on qualitative or observational approaches. Romaniuk et al. [18] reported reductions in suicide risk among war veterans with PTSD following an equine-assisted program, based on structured clinical interviews. Similarly, Marchand et al. [45] observed

improvements in negative affect and psychological distress among veterans with high rates of suicidal ideation participating in an equine-assisted intervention, although suicidality was not assessed as a primary outcome. Evidence from AAS involving other species has also suggested potential benefits, including reductions in suicidal thoughts or self-harm behaviors in specific contexts, such as dog-assisted interventions in clinical and correctional settings [35, 46–48]. However, direct comparisons remain limited, as previous studies have primarily focused on symptom domains associated with suicidality rather than suicidality itself, and did not systematically apply standardized psychometric instruments to assess suicidal ideation or behavior within AAS frameworks.

Potential mechanisms underlying the observed reductions in suicide risk may be interpreted in relation to the experiential and relational characteristics of PIH. Engagement with horses typically involves attentive engagement [49], emotional regulation [50], and reflective behavior, processes previously associated with improvements in self-regulation, self-esteem, and self-awareness [51]. Several of these processes are considered protective factors in suicide prevention frameworks [52, 53], particularly in inpatient settings where individuals often experience reduced autonomy and heightened loneliness [54, 55]. Within this broader concept, the findings suggest that PIH may represent a supportive addition to standard inpatient care for individuals with suicidal tendencies.

Given that affective dysregulation represents a proximal risk factor for suicidality [56], changes in affect provide important context for interpreting the observed shifts in suicide risk.

Positive and Negative Affect

Across the hospitalization period, both groups demonstrated increases in positive affect and decreases in negative affect. Such changes are clinically relevant, as affective states are closely linked to suicide risk, with elevated negative affect associated with increased suicidality and positive affect potentially serving a protective role [26]. At baseline, participants demonstrated substantially lower positive affect and markedly elevated negative affect than typically reported in general population samples [40], reflecting a high level of emotional distress at admission. Although baseline differences in affect were present between groups, both groups exhibited comparable overall trajectories of change at the scale level across subsequent assessments. Comparable improvements in emotional well-being during hospitalization have been previously reported, suggesting that structured therapeutic activities may contribute to affective stabilization in inpatient settings [57].

While no significant between-group differences were observed in overall affect scores, item-level analyses revealed several affective domains in which participants receiving PIH showed greater improvements compared to the control group. Specifically, PIH participation was associated with greater improvements in feelings of pride, inspiration, determination, attentiveness, and activity, alongside reduced shame. These findings suggest a selective rather than uniform pattern of affective change.

This pattern may be interpreted in relation to the experiential and embodied nature of PIH. Sustained attention, active participation, and immediate behavioral feedback inherent to PIH [51], may foster a sense of competence, responsibility, and personal accomplishment [58, 59]. Such experiences may help contextualize the observed increases in pride and determination, which may be associated with engagement in structured activities involving a large, responsive animal. Similarly, heightened attentiveness and activity may reflect the present-moment awareness and physical engagement characteristic of this therapeutic modality. Bryan et al. [60] demonstrated that pride buffers the effects of hopelessness on current suicidal ideation and moderates the relationship

between shame and severe suicidal ideation. In this context, the reduction in shame observed in the PIH group may reflect the interrelated nature of shame and pride. This reduction in shame may be related to the non-verbal and non-judgmental context of human–horse interaction. Compared with traditional verbal psychotherapy, PIH may reduce reliance on verbal interpretation while minimizing exposure to socially mediated appraisal [51], potentially lowering vulnerability to shame-related affect and facilitating emotional engagement without fear of criticism. Such processes may be particularly relevant in populations at elevated risk of suicide [31].

Only a limited number of studies using PANAS have examined affective changes following equine-assisted interventions [61–64]. However, these studies were limited by factors such as small samples, absence of control groups, single-session interventions, or high attrition. Furthermore, they primarily focused on overall scale-level changes rather than specific item-level affective patterns. Although direct comparisons remain limited due to methodological differences, the present findings extend existing evidence by demonstrating selective item-level affective changes associated with PIH within a controlled inpatient psychiatric setting.

Nevertheless, these findings should be interpreted with caution, as baseline differences in affective states were observed between groups. This consideration highlights the exploratory nature of the item-level analyses and the need for replication in larger, randomized samples.

Limitations and future directions

Several limitations of the present study should be acknowledged. The study employed a prospective non-randomized design, with group allocation based on intervention availability rather than random assignment. Although baseline suicide risk assessed by the C-SSRS did not differ significantly between groups, baseline differences in PANAS scores should be considered when interpreting affect-related outcomes.

In addition, PIH allowed flexibility in therapist approach and activity selection, reflecting routine clinical practice. While this individualized approach increases ecological validity, it may have contributed to variability in intervention exposure and limits conclusions regarding specific therapeutic components.

Future research should replicate these findings using randomized controlled designs with larger samples. Follow-up assessments after discharge would be valuable in determining whether reductions in suicide risk and affective changes associated with PIH are sustained over time. Further studies could also examine the mechanisms underlying PIH-related changes in suicide risk and affect.

Conclusion

This study examined the effects of Psychotherapy Incorporating Horses (PIH) as an adjunct to standard inpatient psychiatric care among individuals hospitalized for suicidal ideation or behavior. Using repeated assessments of suicide risk (C-SSRS) and affect (PANAS), the findings indicate that although both groups improved during hospitalization, participants receiving PIH showed a more pronounced reduction in suicide risk categories and specific enhancements in positive affect, including increased pride, activity, inspiration, determination, and attentiveness, alongside reduced shame.

These findings suggest that PIH may represent a beneficial complementary intervention within high-risk inpatient psychiatric settings. However, further research is needed to confirm these findings.

Declarations

Competing interests

The author(s) declare no competing interests.

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Author Contribution

L.Š.: Conceptualization, Project administration, Investigation, Writing – original draft; K.M.: Conceptualization, Methodology, Supervision, Writing – review & editing; V.J.: Formal analysis; MV: Investigation. All authors reviewed the manuscript.

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Data Availability

The data that support the findings of this study are openly available in Mendeley Data at DOI: https://doi.org/10.17632/m97zgzhmyr.1

References

1. World Health Organization. *Suicide worldwide in 2019: Global health estimates* (World Health Organization, 2021).
2. Brådvik, L. Suicide risk and mental disorders. *Int. J. Environ. Res. Public. Health*. **15**, 2028 (2018).
3. Lönnqvist, J. Mood and anxiety disorders in suicide and suicide attempters. in Oxford Textbook of Suicidology and Suicide Prevention (eds (eds Wasserman, D., Wasserman, C. & Wasserman, D.) 261–268 (Oxford University Press, doi:10.1093/med/9780198834441.003.0031. (2021).
4. Sher, L. Suicide research and prevention: we need new, innovative approaches. *Acta Psychiatr Scand.* **140**, 3–4 (2019).

5. Hediger, K. et al. Effectiveness of animal-assisted interventions for children and adults with post-traumatic stress disorder symptoms: a systematic review and meta-analysis. *Eur. J. Psychotraumatol*. **12**, 1879713 (2021).
6. Johnson, A. et al. Recommendations for uniform terminology in animal-assisted services (AAS). *Hum. Anim. Interact.* **12**, 1 (2024).
7. O'Haire, M. E., Guérin, N. A. & Kirkham, A. C. Animal-Assisted Intervention for trauma: a systematic literature review. *Front. Psychol.* **6**, 1121 (2015).
8. Ambrosi, C., Zaiontz, C., Peragine, G., Sarchi, S. & Bona, F. Randomized controlled study on the effectiveness of animal-assisted therapy on depression, anxiety, and illness perception in institutionalized elderly. *Psychogeriatrics* **19**, 55–64 (2019).
9. Angelakis, I. & Gooding, P. Associations of anxiety and depression with suicide experiences in individuals with and without childhood trauma: The role of social support. *Psychiatry Res.* **309**, 114424 (2022).
10. Kelly, M. A. & Cozzolino, C. A. Helping at-risk youth overcome trauma and substance abuse through animal-assisted therapy. *Contemp. Justice Rev.* **18**, 421–434 (2015).
11. Marchand, W. R., Andersen, S. J., Smith, J. E., Hoopes, K. H. & Carlson, J. K. Equine-assisted activities and therapies for veterans with posttraumatic stress disorder: current state, challenges and future directions. *Chron. Stress (Thousand Oaks)*. **5**, 2470547021991556 (2021).
12. Staniszewska, S. et al. Experiences of in-patient mental health services: systematic review. *Br. J. Psychiatry*. **214**, 329–338 (2019).
13. Amerine, J. L. & Hubbard, G. B. Using animal-assisted therapy to enrich psychotherapy. *Adv. Mind Body Med.* **30**, 11–11 (2016).
14. Jones, M. G., Rice, S. M. & Cotton, S. M. Incorporating animal-assisted therapy in mental health treatments for adolescents: A systematic review of canine assisted psychotherapy. *PLoS ONE*. **14**, e0210761 (2019).
15. Bennett, B. & Woodman, E. The potential of equine-assisted psychotherapy for treating trauma in Australian aboriginal peoples. *Br. J. Soc. Work*. **49**, 1041–1058 (2019).
16. Mueller, M. K. & McCullough, L. Effects of equine-facilitated psychotherapy on post-traumatic stress symptoms in youth. *J. Child. Fam Stud.* **26**, 1164–1172 (2017).
17. Burton, L. E., Qeadan, F. & Burge, M. R. Efficacy of equine-assisted psychotherapy in veterans with posttraumatic stress disorder. *J. Integr. Med.* **17**, 14–19 (2019).
18. Romaniuk, M., Evans, J. & Kidd, C. Evaluation of an equine-assisted therapy program for veterans who identify as 'wounded, injured or ill' and their partners. *PLoS ONE*. **13**, e0203943 (2018).
19. Wood, W. et al. Optimal terminology for services in the United States that incorporate horses to benefit people: A consensus document. *J. Altern. Complement. Med.* **27**, 88–95 (2021).
20. Bachi, K. Application of attachment theory to equine-facilitated psychotherapy. *J. Contemp. Psychother.* **43**, 187–196 (2013).
21. Earles, J. L., Vernon, L. L. & Yetz, J. P. Equine-assisted therapy for anxiety and posttraumatic stress symptoms. *J. Trauma. Stress*. **28**, 149–152 (2015).
22. García-Gómez, A., Guerrero-Barona, E., García-Peña, I., Rodríguez-Jiménez, M. & Moreno-Manso, J. M. Equine-assisted therapeutic activities and their influence on the heart rate variability: A systematic review. *Complement. Ther. Clin. Pract.* **39**, 101167 (2020).

23. Wilson, K., Buultjens, M., Monfries, M. & Karimi, L. Equine-assisted psychotherapy for adolescents experiencing depression and/or anxiety: A therapist's perspective. *Clin. Child. Psychol. Psychiatry*. **22**, 16–33 (2017).
24. Scopa, C. et al. Emotional transfer in human–horse interaction: New perspectives on equine assisted interventions. *Animals* **9**, 1030 (2019).
25. Sels, L. et al. Perceived responsiveness in suicidal ideation: An experience sampling study in psychiatric patients. *Suicide Life-Threat Behav.* **54**, 925–933 (2024).
26. Gee, B. L., Han, J., Benassi, H. & Batterham, P. J. Suicidal thoughts, suicidal behaviours and self-harm in daily life: A systematic review of ecological momentary assessment studies. *Digit. Health*. **6**, 2055207620963958 (2020).
27. Kovács, G., van Dijke, A. & Enders-Slegers, M. J. Psychodynamic based equine—assisted psychotherapy in adults with intertwined personality problems and traumatization: A systematic review. *Int. J. Environ. Res. Public. Health*. **17**, 5661 (2020).
28. Grace, B., Richardson, N., Carroll, P. &. If you're not part of the institution you fall by the wayside: Service providers' perspectives on moving young men from disconnection and isolation to connection and belonging. *Am. J. Mens Health*. **12**, 252–264 (2018).
29. Sudmann, T. T. Communitas and Friluftsliv: equine-facilitated activities for drug users. *Community Dev. J.* **53**, 556–573 (2018).
30. Acri, M. et al. An equine-assisted therapy for youth with mild to moderate anxiety: Manual development and fidelity. *J. Child. Fam Stud.* **30**, 2461–2467 (2021).
31. Fowler, J. C. Core principles in treating suicidal patients. *Psychotherapy* **50**, 268–272 (2013).
32. Robinson-Edwards, S., Kewley, S., Riley, L. & Fisher, D. Examining prisoner experience of an equine assisted psychotherapy. *Therapeutic Communities: Int. J. Ther. Communities*. **40**, 111–124 (2019).
33. Kendall, E. et al. A systematic review of the efficacy of equine-assisted interventions on psychological outcomes. *Eur. J. Psychother. Couns.* **17**, 57–79 (2015).
34. de Zamo, R., Trentini, C. M. & S. & Revisão sistemática sobre avaliação psicológica nas pesquisas em equoterapia: a systematic review. *Psicologia: teoria e prática*. **18**, 81–97 (2016).
35. Dell, C., Chalmers, D., Stobbe, M., Rohr, B. & Husband, A. Animal-assisted therapy in a Canadian psychiatric prison. *Int. J. Prison Health*. **15**, 209–231 (2019).
36. Salvi, J. Columbia-suicide severity rating scale (C-SSRS). *Emerg. Med. Pract.* **21**, CD3–CD4 (2019).
37. Nilsson, M. E. et al. *Columbia–suicide severity rating scale scoring and data analysis guide* (The Columbia Lighthouse Project, 2013).
38. Serafini, K., Malin-Mayor, B., Nich, C., Hunkele, K. & Carroll, K. M. Psychometric properties of the Positive and Negative Affect Schedule (PANAS) in a heterogeneous sample of substance users. *Am. J. Drug Alcohol Abuse*. **42**, 203–212 (2016).
39. Buonincontri, V. & Viggiano, D. Modification of mood states in CKD patients: uniform manifold approximation and projection (UMAP) analysis of PANAS data. *BAC:JB* **1**, 126–135 (2022).
40. Zureigat, A., Fattah, O. A. & Elayyan, A. Effects of bodypump exercise on the emotions and life satisfaction among women during the coronavirus pandemic. *Sport Mont.* **19**, 89–94 (2021).

41. Nelson, C., Dossett, K. & Walker, D. L. Equine-assisted therapy for posttraumatic stress disorder among first responders. *Psychol. Rep.* **127**, 2203–2219. 10.1177/00332941221146707 (2022).
42. Schmidt, J., Wartenberg-Demand, A. & Forstmeier, S. Equine-assisted biographical work (EABW) with individuals in the second half of life: study protocol of a multicentre randomised controlled trial. *Trials* **21**, 857 (2020).
43. Willmund, G. et al. Equine-assisted psychotherapy with traumatized couples—Improvement of relationship quality and psychological symptoms. *J. Marital Fam Ther.* **47**, 925–944 (2021).
44. Zhu, X. et al. Neural changes following equine-assisted therapy for posttraumatic stress disorder: A longitudinal multimodal imaging study. *Hum. Brain Mapp.* **42**, 1930–1939 (2021).
45. Marchand, W. R. et al. A pilot observational study of implementing an equine-assisted services program within a VA medical center residential substance use disorder treatment program. *Mil Med.* **188**, usac028. 10.1093/milmed/usac028 (2022).
46. Mercer, J., Gibson, K. & Clayton, D. The therapeutic potential of a prison-based animal programme in the UK. *J. Forensic Pract.* **17**, 43–54 (2015).
47. Muela, A. et al. A social-emotional learning program for suicide prevention through animal-assisted intervention. *Animals* **11**, 3375 (2021).
48. Scotland-Coogan, D., Whitworth, J. & Wharton, T. Outcomes of participation in a service dog training program for veterans with PTSD. *Soc. Anim.* **30**, 1–22 (2020).
49. Waite, C. & Bourke, L. It's different with a horse': Horses as a tool for engagement in a horse therapy program for marginalised young people. *Youth Stud. Aust*. **32**, 4 (2013).
50. Zaker, A., Dudley, L., Slouka, M. & Stallones, L. Integration of equine assisted services and social-emotional learning: A preliminary evaluation of a life skills training program for at-risk youth. *Hum. Anim. Interact.* **12**, 1 (2024).
51. Hemingway, A., Carter, S., Callaway, A., Kavanagh, E. & Ellis, S. An exploration of the mechanism of action of an equine-assisted intervention. *Anim. (Basel)*. **9**, 303 (2019).
52. Gallagher, M. L. & Miller, A. B. Suicidal thoughts and behavior in children and adolescents: An ecological model of resilience. *Adolesc. Res. Rev.* **3**, 123–154 (2018).
53. Holman, M. S. & Williams, M. N. Suicide risk and protective factors: A network approach. *Arch. Suicide Res.* **26**, 137–154 (2022).
54. Shafer, M. S. & Staples, V. & St. George, L. Self-advocacy and empowerment. in *Handbook of Recovery in Inpatient Psychiatry* 339–357 (Springer International Publishing/Springer Nature, Cham, Switzerland, (2016). 10.1007/978-3-319-40537-7_14
55. Talebjeddi, M., Nohesara, S., Keshavarz-Akhlaghi, A. A., Asl, M. & Mohammadsadeghi, H. Psychiatric hospitalization: Patients' negative experiences and attitudes. *J. Iran. Med. Counc.* **5**, 462–470. 10.18502/jimc.v5i3.10942 (2022).
56. Rogante, E. et al. The role of emotion dysregulation in understanding suicide risk: A systematic review of the literature. *Healthcare* **12**, 169 (2024).
57. Csipke, E. et al. Inpatient care 50 years after the process of deinstitutionalisation. *Soc. Psychiatry Psychiatr Epidemiol.* **49**, 665–671 (2014).

58. Bachi, K., Terkel, J. & Teichman, M. Equine-facilitated psychotherapy for at-risk adolescents: The influence on self-image, self-control and trust. *Clin. Child. Psychol. Psychiatry*. **17**, 298–312 (2012).
59. Kovács, G., van Dijke, A., Noback, I. & Enders-Slegers, M. J. Integrated equine-assisted short term psychodynamic psychotherapy (EASTPP) equals regular STPP and outperforms in overcoming core problems of patients with personality problems: interpersonal sensitivity and self esteem. *ANAMH* 1, 2–20 (2021).
60. Bryan, C. J., Ray-Sannerud, B., Morrow, C. E. & Etienne, N. Shame, pride, and suicidal ideation in a military clinical sample. *J. Affect. Disord*. **147**, 212–216 (2013).
61. Cappelen, H., Ivarsson, A. & Jormfeldt, H. The effects of an equine-assisted therapeutic intervention on well-being in persons diagnosed with schizophrenia. A Pilot Study. *Issues Men Health Nurs.* **44**, 104–111 (2023).
62. Gehrke, E. et al. Multi-site psychophysiological analysis of equine assisted healing in combat veterans and first responders. *J. Health Sci.* **7**, 1–8 (2019).
63. Marchand, W. R., Sullivan-Sakaeda, L., Lackner, R., Taplin, D. & Nazarenko, E. A replication study of a psychotherapy incorporating horses resiliency intervention for healthcare workers. *Complement. Ther. Med.* **76**, 102965 (2023).
64. Schütz, K. & Schmitz, J. Positive and negative affects in horse-assisted coachings. *Coaching Theor. Prax*. **7**, 25–33 (2021).

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