European Journal of Psychotherapy & Counselling

ISSN: 1364-2537 (Print) 1469-5901 (Online) Journal homepage: http://www.tandfonline.com/loi/rejp20

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To cite this article: Elizabeth Kendall, Annick Maujean, Christopher A. Pepping, Martin Downes, Ali Lakhani, Jason Byrne & Kym Macfarlane (2015) A systematic review of the efficacy of equine-assisted interventions on psychological outcomes, European Journal of Psychotherapy & Counselling, 17:1, 57-79, DOI: 10.1080/13642537.2014.996169

To link to this article: https://doi.org/10.1080/13642537.2014.996169

Published online: 12 Mar 2015.

European Journal of Psychotherapy & Counselling, 2015
Vol. 17, No. 1, 57–79, http://dx.doi.org/10.1080/13642537.2014.996169

Routledge
Taylor & Francis Group

A systematic review of the efficacy of equine-assisted interventions on psychological outcomes

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(*Received 15 February 2013; accepted 16 October 2014*)

Much research attests to the beneficial effects of equine interventions on physical development and ability. However, less is known about the possible psychological benefits of horse activities, such as therapeutic riding or interactions with horses. Although there is public consensus that horses can have psychological benefits, it is an under-researched area and conclusions are largely based on anecdotal data. The little empirical evidence that is available about the efficacy of equine-assisted interventions on psychological outcomes tends to be mixed and is often difficult to interpret due to the lack of rigorous research designs. The purpose of this review was to examine the current state of the literature regarding the psychological effects of equine-assisted interventions, and to make recommendations for future research. Findings from this review suggest that equine-assisted interventions hold much promise, particularly in terms of child/adolescent social and behavioural issues, and perhaps adult affective disorders. However, the current state of the literature does not allow us to definitively conclude that equine-assisted interventions are efficacious. Well-designed randomised controlled trials are greatly needed in this area, as it is an appreciation of the need to standardise and document equine-assisted interventions and outcomes in future research.

Keywords: therapeutic riding; equine therapy; therapeutic intervention; psychological well-being; systematic review

Viele Studien bestätigen die positiven Effekte pferdgestützter Interventionen auf körperliche Entwicklung und Motorik. Bislang gibt es jedoch wenige Informationen darüber, wie sich die Beschäftigung mit Pferden, etwa über das therapeutische Reiten oder einfacheren Interaktionen, psychologisch auf die Klienten auswirkt. Trotz eines gewissen öffentlichen Konsenses zu den positiven Effekten von Pferden, ist dieses Feld bislang mehr oder weniger unerforscht und basiert in den meisten Fällen lediglich auf

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Einzelfallberichten. Das Wenige empirische Material, was bisher Auskunft über positive Ergebnisse pferdgestützter Interventionen gibt, erscheint tendenziell eher nicht valide und ist meist schwierig zu interpretieren - was auch teilweise dem nicht allzu präzisen Forschungsdesign geschuldet ist. Der Zweck dieses Reviews war es, relevante Forschungsergebnisse im Hinblick auf die psychologischen Effekte pferdgestützter Interventionen abzuklopfen und, darauf aufbauend, Empfehlungen für künftige Forschungen abzuleiten. Die Ergebnisse aus diesem Review weisen darauf hin, dass pferdgestützte Interventionen durchaus Potenzial besitzen, besonders in Bezug auf soziale und verhaltensbedingte Sachverhalte bei Kinder und Jugendlichen sowie möglicherweis auch affektiven Störungen bei Erwachsenen. Dennoch erlauben die derzeitigen Forschungsergebnisse nicht zwangsläufig den Schluss, dass pferdgestützte Interventionen per se wirksam sind. Gerade deshalb bedarf es auf diesem Gebiet randomisierter kontrollierter Studien, also der Notwendigkeit der Standardisierung und Dokumentation pferdgestützter Interventionen sowie der Ergebnisse bei zukünftigen Forschungen.

Schlüsselwörter: Therapeutisches Reiten; Pferdetherapie; therapeutische Interventionen; Psychologisches Wohlbefinden; Systematischer Review

Los aspectos beneficiosos de lo que podríamos llamar intervenciones equinas han sido investigados en muchas ocasiones; sin embargo, se conoce muy poco acerca de los beneficios psicológicos de las actividades que se realizan con caballos, tales como cabalgatas terapéuticas o interacciones con ellos. Aunque hay un consenso público de que estas actividades pueden traer beneficios psicológicos, ésta es un área poco investigada y las conclusiones están en su mayoría basadas en datos anecdóticos. La escasa evidencia empírica disponible tiende a ser mixta y con frecuencia difícil de interpretar debido a la falta de diseños experimentales rigurosos para la investigación. El propósito de esta revisión fue examinar el estado actual de la literatura en relación con los efectos psicológicos de las intervenciones equinas y hacer recomendaciones para futuras investigaciones. Los resultados de la investigación sugieren que las intervenciones en las cuales se utilizan caballos prometen mucho particularmente en términos de problemas de conducta y de la sociabilidad de niños y adolescentes y quizás con adultos que presentan trastornos de la afectividad. Sin embargo, el estado actual de la literatura en este aspecto no nos permite hacer una conclusión definitiva acerca de la eficacia de estas intervenciones. Se necesitarían experimentos bien diseñados y controlados en esta área así como una apreciación de la necesidad de estandarizar y documentar las intervenciones equinas y sus resultados en investigaciones futuras.

Palabras clave: terapia equina; intervención terapéutica; bienestar psicológico; revisión sistemática

Numerose ricerche attestano gli effetti benefici degli interventi equestri sullo sviluppo e sulle capacità fisiche. Tuttavia, meno conosciuti sono i possibili benefici psicologici di attività quali l'equitazione terapeutica o le interazioni con i cavalli. Sebbene vi sia un generale consenso circa i benefici psicologici dell'ippoterapia, questo è un tema scarsamente indagato e le conclusioni sono in gran parte basate su dati aneddotici. Le circoscritte evidenze empiriche disponibili sull'efficacia dell' equitazione a scopo terapeutico sulle risultanze psicologiche tendono ad essere confusi e di difficile interpretazione a causa della mancanza di disegni di ricerca

rigorosi. Obiettivo di questa review è esaminare lo stato dell'arte della letteratura sugli effetti psicologici degli interventi di ippoterapia, oltre che offrire indicazioni per la ricerca futura. I risultati della presente review suggeriscono che gli interventi equestri siano molto incoraggianti, soprattutto rispetto a problematiche sociali e comportamentali durante l'adolescenza e l'infanzia, e probabilmente anche nei disturbi affettivi adulti. Tuttavia, questo riassunto dello stato dell'arte in questo ambito non permette di giungere a conclusioni definitive circa l'efficacia dell'ippoterapia. Studi controllati randomizzati ben progettati sono necessari nelle futuro ricerche in quest'ambito, in quanto è opportuno standardizzare gli interventi e documentarne gli esiti.

Parole chiave: equitazione terapeutica; ippoterapia; intervento terapeutico; benessere psicologico; revisione sistematica

Un nombre considérable de recherches atteste des effets bénéfiques des interventions équines sur le développement physique et les compétences. Pourtant on connaît beaucoup moins les bénéfices psychologiques éventuels des activités hippiques telles que l'équitation thérapeutique ou les interactions avec les chevaux. Bien qu'il y ait un consensus que les chevaux peuvent avoir des bénéfices psychologiques, ce domaine reste sous-recherché et les conclusions sont essentiellement basées sur des données anecdotiques. Le peu de preuves empiriques disponibles concernant les effets psychologiques de l'efficacité des interventions équines assistées ont tendance à être mitigées et sont souvent difficiles à interpréter au regard du manque de recherche rigoureuse. L'objectif de cette revue de la littérature est d'examiner l'état actuel des recherches disponibles concernant les effets psychologiques des interventions équines assistées et de faire des recommandations pour la recherche future. Les résultats de cette revue de la littérature suggèrent que ces interventions sont prometteuses en particulier en termes de problèmes sociaux et comportementaux des enfants/adolescents, et peut-être en ce qui concerne les désordres affectifs des adultes. Cependant, l'état actuel de la littérature ne nous permet pas de conclure de manière définitive que les interventions équines assistées sont efficaces. Des essais contrôlés randomisés bien construits sont grandement nécessaires dans ce domaine comme l'est l'appréciation du besoin de standardiser et de documenter les interventions équines assistées ainsi que les résultats des futures recherches.

Mots-clés: équitation thérapeutique; équitherapie; intervention thérapeutique; bien-être psychologique; revue systématique

Περίληψη: Αρκετές έρευνες βεβαιώνουν τα ωφέλιμα αποτελέσματα των παρεμβάσεων με τη χρήση αλόγου στη σωματική ανάπτυξη και ικανότητα. Ωστόσο, ελάχιστα γνωρίζουμε για τα ενδεχόμενα ψυχολογικά οφέλη που μπορούν να αποφέρουν οι δραστηριότητες με τη χρήση αλόγου, όπως είναι η θεραπευτική ιππασία ή η αλληλεπίδραση με άλογα. Παρόλο που υπάρχει κοινή παραδοχή ότι τα άλογα μπορεί να προσφέρουν ψυχολογικά οφέλη, λίγες έρευνες έχουν δημοσιευτεί σε αυτό το πεδίο. Τα ελάχιστα διαθέσιμα εμπειρικά στοιχεία σχετικά με την αποτελεσματικότητα των παρεμβάσεων με τη βοήθεια του αλόγου στην ψυχική υγεία είναι ανάμεικτα και είναι συχνά δύσκολο να ερμηνευθούν λόγω της έλλειψης αυστηρού ερευνητικού σχεδιασμού. Στόχος της παρούσας ανασκόπησης ήταν να ερευνηθεί η υπάρχουσα βιβλιογραφία που αφορά τις ψυχολογικές συνέπειες των παρεμβάσεων με τη βοήθεια του αλόγου και να διατυπώσει προτάσεις για

μελλοντική έρευνα. Με βάση τα ευρήματα της παρούσας ανασκόπησης προτείνεται ότι οι παρεμβάσεις με τη βοήθεια αλόγου υπόσχονται πολλά, ιδιαίτερα σε ό, τι αφορά ζητήματα κοινωνικότητας και συμπεριφοράς παιδιών/ εφήβων και ενδεχομένως συναισθηματικές διαταραχές των ενηλίκων. Ωστόσο, η υπάρχουσα βιβλιογραφία δε μας επιτρέπει να συμπεράνουμε τη δραστικότητα των παρεμβάσεων με τη χρήση αλόγου. Η εν λόγω περιοχή χρειάζεται καλά σχεδιασμένες τυχαιοποιημένες μελέτες με ομάδα ελέγχου. Επίσης είναι σημαντικό να αναγνωριστεί η σημασία που έχει για τη μελλοντική έρευνα το να σταθμιστούν και να καταγραφούν συστηματικά οι παρεμβάσεις με τη χρήση αλόγου και τα αποτελέσματά τους.

Λέξεις κλειδιά: θεραπευτική ιππασία; θεραπεία με τη χρήση αλόγου; θεραπευτική παρέμβαση; ψυχολογική ευημερία; συστηματική ανασκόπηση

During the past few decades, therapeutic horse riding has become increasingly recognised as a progressive form of therapy for individuals with physical disabilities, and other forms of disadvantage (Masini, 2010; Nahra, 2000). In contrast to recreational riding, therapeutic riding refers to the use of a horse, and equine-related activities, to bring about a variety of positive outcomes across a range of domains, including physical, emotional, social, behavioural, cognitive and educational (Lessick, Shinaver, Post, Rivera, & Lemon, 2004).

The use of the equine in a therapeutic context has been referred to by many different names, including equine-facilitated psychotherapy (EFP), equine-assisted learning (EAL), hippotherapy and therapeutic riding. Each of these approaches has different methods and goals. For instance, EAL often has an educational focus, using horses as a way of advancing learning whereas hippotherapy programmes are usually conducted by physiotherapists, with a focus on movement and strength. Therapeutic riding programmes are usually focused on the task of riding (e.g. riding for disabled) or caring for a horse with emphasis on skills, fun and social interaction. Equine-facilitated psychotherapy, on the other hand, involves a registered mental health therapist and engages the horse as a way of facilitating psychological and social insights. According to Bachi, Terkel, and Teichman (2012), EFP facilitates the development of meaningful therapeutic alliance between the client, therapist and the horse. The therapeutic alliance is perceived as being critical for establishing trust and interpersonal adaptation skills, which in turn may foster the development of positive attachment and resiliency in the client.

It is evident that these different interventions (i.e. EAL, EFP, hippotherapy, therapeutic riding) each adopt different underlying principles, methods and proposed outcomes. Further, there is great variation in the way programmes are delivered (i.e. in group sessions, one-on-one with a therapist, in a range of different settings), even within similar clusters of programmes.

In general, much research attests to the beneficial effects of equine-assisted interventions on physical ability (e.g. Benda, McGibborn, & Grant, 2003; Biery & Kauffman, 1989; Cherng, Liao, Leung, & Hwang, 2004; Lechner, Kakebeeke, Hegemann, & Baumberger, 2007; Snider, Kornen-Bietnsky, Kamman, Warner, & Saleh, 2007; Sterba, 2007). However, less is known regarding the possible psychological benefits of equine-assisted interventions.

Table 1. Summary of included studies (for a review of equine interventions on psychological outcomes).

Author (year)	Sample	Intervention Type (design)	Intervention Duration	Outcome Measure/s	Findings
Bachi, Terkel and Teichman (2012)	$N = 29$; At-risk adolescents in residential treatment; age 14–18 years	Equine-facilitated psychotherapy (intervention ($n = 14$) vs. control group ($n = 15$ – not randomly assigned)	1 h weekly session for a period of 7 months	Offer Self-image questionnaire (OSIQ) Self-control Children's Interpersonal Trust Scale (CITS) Student's Life Satisfaction Scale (SLS)	A trend in positive changes for the intervention group for OSIQ, self-control, CITS, and SLS
Bass, Duchowny, and Llabre (2009)	$N = 34$; Children with Autism; age 5–10 years	Therapeutic Horseback Riding; (RCT)	1 h weekly session for 12 weeks	Social Responsiveness Scale (SRS) Sensory Profile Questionnaire (SPQ)	Improved SRS relative to control group; Improvement on the SPQ
Borioni et al. (2012)	$N = 23$; Adults with intellectual disability; M age = 42.9 (equine), 38.6 (donkey)	Equestrian Therapy & Onotherapy; (intervention, no control group)	12 months (time interval between session not specified)	Tool developed by the researchers based on ICF and ICF-CY classification systems to measure functions relevant to therapeutic riding (e.g. autonomy and relational skills)	Improved autonomy, and affective-relational skills for both groups
Burgon (2011)	$N = 7$; At risk adolescents; age = 11–16 years	Therapeutic Horsemanship (non-standardised intervention)	3 h session across a 2-year period; participants attendance varied based on individual circumstances	Qualitative Interviews	Improved confidence, self-esteem & empathy (important themes)
Cerino, Cirulli, Chiarotti, and Seripa (2011)	$N = 24$; Adults with schizophrenia; age 18–40	Therapeutic riding; (intervention, no control group)	40 sessions (1 h weekly session)	Brief Psychiatric Rating Scale (BPRS) Positive and Negative Syndrome Scale (PNSS)	Improvement on both BPRS and PNSS

(*Continued*)

Table 1. (*Continued*).

Author (year)	Sample	Intervention Type (design)	Intervention Duration	Outcome Measure/s	Findings
Cuypers, De Ridder, and Strandheim (2011)	*N* = 5; Children with ADHD; age 10–11 years	Therapeutic Horseback Riding; (time series quasi-experimental)	1 h session twice a week for 8 weeks	Strengths & Difficulties Questionnaire (SDQ); Kindl^{R}-HQoL (Quality of life); Modified Function-Neurological Assessment; Movement Assessment Battery for Children	Improved behaviour (SDQ); Improved quality of life; Improved motor performance
Davis et al. (2009)	*N* = 99; Children with Cerebral Palsy; age 4–12 years	Therapeutic horse riding; (RCT)	30 to 40 min weekly session for 10 weeks	Cerebral Palsy Quality of Life Questionnaire for children (CP QoL-Child); KIDSCREEN; Child Health Questionnaire (CHQ); Gross Motor Function Measure; Life Events Questionnaire	After controlling for time 1 data, improvement in family cohesion No positive effects for main outcomes
Frank, McCloskey, and Dole (2011)	*N* = 1; Child with Cerebral Palsy; age 6 years old	Hippotherapy (single case design)	2 weekly sessions for 8 weeks (each session was 45 min duration)	Pictorial Scale of Perceived Competence and Social Acceptance for young children (PSPCSAYC); Gross Motor Function Measure-66	Improved PSPCSAYC; Improved Gross Motor Function
Gabriels et al. (2012)	*N* = 58; Children with an autism spectrum disorder; age 6–16 years	Therapeutic horseback riding (intervention (*n* = 14) vs. control (*n* = 15) group – not randomly assigned)	1 h weekly session for 10 weeks	Aberrant Behaviour Checklist-community; Vineland Adaptive Behavioral Scales – Interview Edition, Survey Form; Bruininks-Oseretsky Test of Motor Proficiency; Sensory Intergration and Praxis Test	Intervention group: Improved self-regulation behaviours; Improved expressive language skills; Improved motor skills; Improved verbal praxis/motor planning skills;
Hakanson, Moller, Lindstrom, and Mattsson (2009)	*N* = 24; Individuals with back and neck pain; age 13–53	Equine-assisted therapy (intervention, no control group)	1 to 2 sessions a week; number of sessions ranged from 2 to 32 and 5–45 min duration depending on patient's needs and endurance and the number of horses available	Visual Analogue Scale (VAS; anxiety, self-confidence, pain, sleep, and body control) Session notes & phone call records	Increased positive emotion and well-being (qualitative, i.e. session notes and phone call records) No improvements in levels of intensity and duration for anxiety and pain

Holmes, Goodwin, Redhead, and Goymour (2012)	$N = 11$; Adolescents with emotional, behavioural or learning difficulties; age 12–14	Equine-assisted activities (intervention, no control group)	4 sessions (each session was 3 h duration)	Spence Children's Anxiety Scale (SCAS); Rosenberg Self-esteem Scale (RSES); Interaction, measured by experimenter behavioural observation	Improvement (statistical but not clinical) in SCAS, but not in RSES Improvements in behaviour (approach and avoidance)
Kern et al. (2011)	$N = 24$; Children with Autism; age 3–12 years	Equine-assisted activities; (intervention, served as own wait-list control)	1 h weekly session for 6 months	Timberlawn Parent-child interaction Scale; Childhood Autism Rating Scale (CARS); Timberlawn Parent-Child Interaction Scale; Quality of Life Enjoyment and Satisfaction Questionnaire: General Activities Subscale Revised for this study; Treatment Satisfaction Survey	No clear improvement in parent-child interaction; Improved CARS scores; Increased in parent-rated quality of life
Memishevikj and Hodzhikj (2010)	$N = 4$; Children with Autism; age 8–10 years	Equine-assisted therapy; (single case design)	30 min weekly session for 10 weeks	Autism Treatment Evaluation Checklist (ATEC; sociability subscale);	2/4 children exhibited improvements in ATEC outcomes
Taylor et al. (2009)	$N = 3$; Children with Autism; age 4–6 years	Hippotherapy; (single case design)	45 min weekly session for 16 weeks	Paediatric Volitional Questionnaire	Improved volition; Improved motivation
Trotter, Chandler, Goodwin-Bond, and Casey (2008)	$N = 164$; At risk children & adolescents; age	Group Equine Assisted Counselling; (intervention ($n = 126$) vs. Control ($n = 38$) group – not randomly assigned)	2 h weekly session for 12 weeks	Behavioral Assessment System for Children (BASC) Psychosocial Session Form (PSF)	Improved social stress, self-esteem, conduct problems, hyperactivity, aggression, behavioural symptoms; externalising, compared to control group (however, control group also improved, but on fewer indices)

Although there is generally enthusiasm that equine-assisted interventions have psychological benefits (e.g. Quiroz Rothe, Jimenez Vega, Mazo Torres, Campos Soler, & Molina Pazos, 2005), this remains an under-researched area with a heavy reliance on anecdotal data. Most research pertaining to the psychological benefits of equine-assisted interventions has been descriptive, rather than experimental (Ewing, MacDonald, Taylor, & Bowers, 2007; Kaiser, Spence, Lavergne, & Vanden Bosch, 2004), which makes it difficult to draw conclusions about the effectiveness of these interventions.

Several researchers have reviewed the literature on psychological benefits of equine-assisted interventions, but results have been inconclusive. For example, Ratliffe and Sanekane (2009) reviewed the literature on the psychotherapeutic benefits and concluded that the evidence was insufficient to support its use. However, the authors noted that subjective data tended to suggest that equine-assisted interventions do indeed have beneficial psychological effects. They concluded that well-designed outcome studies are greatly needed. Similarly, Lentini and Knox (2009) concluded that although some individual studies supported the positive psychological impact of equine-assisted interventions, more rigorous research was necessary. In a recent review of the literature, Smith-Osborne and Selby (2010) concluded that the evidence was mixed and difficult to interpret due to the lack of rigorous research designs. Specifically, the studies in this area contained small sample sizes and lacked appropriate control groups, and the interventions themselves were often not described or standardised.

In summary, there is much anecdotal and subjective evidence that equine-assisted interventions have positive psychological outcomes. However, based on anecdotal and subjective evidence, it would seem that equine-assisted interventions hold much promise and may be particularly beneficial for individuals who do not engage in traditional forms of psychotherapy. In order to demonstrate the efficacy of equine-assisted interventions for psychological issues, well-designed, randomised controlled studies are necessary but in the absence of this type of rigour, quasi-experimental designs and statistical methods can be used to address challenges such as the inability to randomise participants, small sample sizes, attrition and measurement difficulties. The purpose of this paper was to systematically examine the conclusions that can be drawn from the empirical literature that has emerged in the last few years regarding the psychological effects of equine-assisted interventions (e.g. Lentini & Knox, 2009; Ratliffe & Sanekane, 2009; Smith-Osborne & Selby, 2010). Where possible, we will identify different types of programmes, using both qualitative and quantitative studies, to build a coherent understanding of whether or not a range of interventions involving the horse can be harnessed in the future to improve psychological outcomes and augment more traditional therapy.

Methods

Selection of studies

We conducted a systematic review of the literature on equine-assisted interventions published between 2008 and 2012 to include studies published since the previous reviews. Keyword searches were conducted using six databases (PsycINFO, MEDLINE, PROQUEST, Scopus, Web of Science and CINAHL). Key words used for the search were equine-facilitated learning, equine-facilitated psychotherapy (EFP), horse riding, hippotherapy, therapeutic horse riding, horsemanship and equine therapy paired with key terms (therapy, well-being, psychological benefits, physical benefits, social benefits, health, recovery, rehabilitation, healing, treatment, intervention, psychotherapy, illness, disability and life skills). The reference lists in the retrieved articles were also examined for any additional articles that warranted inclusion. Finally, the equine-assisted interventions repository site was searched to identify any relevant articles that may have been missed in the database search.

The abstracts of these articles were then reviewed by two independent raters, and articles that met the following inclusion criteria were retained for the systematic review:

(1) Only original published journal articles that investigated the psychological or social outcomes of equine-assisted interventions were included.
(2) A therapeutic intervention involving horses was provided as part of the study and was described sufficiently in the article.
(3) The article was specific to equine-assisted interventions, and not animal-assisted therapy more broadly.
(4) Either a quantitative or qualitative assessment of outcome was used.
(5) The article was written in English, or was translated to English.

Data extraction

Data were extracted and recorded for each study and included information on sample size, target population, inclusion of a control group, type of control group, method of measurement and type of outcome measured. To reduce variability, we grouped the studies into clusters depending on the different populations addressed by the intervention. The needs and difficulties of individuals participating in equine-assisted interventions differ widely among populations. It is therefore likely that the efficacy of equine-assisted interventions may also differ for different populations. Once the studies were clustered, we interpreted the conclusions drawn by the authors of each study.

Results

The initial search produced 4503 articles in total, which was reduced to 2293 by removing duplicates. An initial review of the abstracts was conducted to

remove articles that were clearly unrelated to the therapeutic use of horses, leaving 188 articles. After exclusion of articles, a total of 15 articles remained. Details of these articles are displayed in Table 1. There was substantial variation in the extent to which the various interventions were shown to be beneficial and in the extent to which the design of the studies enabled causal conclusions to be drawn. Only one additional article was identified through the equine-assisted interventions repository once the selection criteria had been applied. Sample sizes of the studies ranged from single cases ($n = 1$) to relatively large samples ($n = 164$). The majority of studies identified in the review ($n = 13$) did not include a control condition, or used a convenient comparison group that lacked random assignment. The methods by which psychological outcomes were assessed varied substantially, with some studies utilising psychometric measures (Cuypers, De Ridder, & Strandheim, 2011; Holmes, Goodwin, Redhead, & Goymour, 2012) and others relying on qualitative interviews (e.g. Burgon, 2011) or behavioural observations (e.g. Holmes et al., 2012). In addition to these methodological factors, the interventions themselves differed between studies in terms of length, standardisation and focus.

The studies identified in this review investigated the effects of equine-assisted interventions for individuals with autism, schizophrenia, attention deficit hyperactivity disorder (ADHD), cerebral palsy, behavioural difficulties, physical pain and children identified as being at risk.

All studies obtained from the systematic review reported at least some beneficial psychological effects of equine-assisted activities. However, there were apparent differences for each of the populations as shown below.

Autism

Five studies examined the effects of an equine intervention on children with autism. Sample sizes in each of these five studies were small ($n = 3$) to moderate ($n = 58$). Only two of these studies used a control group (Bass, Duchowny, & Llabre, 2009; Gabriels et al., 2012), of those, one is a randomised controlled trial (RCT) (Bass, Duchowny, & Llabre, 2009). Bass et al. (2009) conducted a RCT to investigate the efficacy of a therapeutic horseback riding intervention on the social responsiveness of children with Autism. The intervention consisted of 12 weekly 1 h sessions designed to foster the development of verbal communication, motor and social skills. The therapeutic horse-riding activities comprised: (1) a mounting and dismounting component, (2) stretching activities, (3) riding skills, (4) social and communication skills games while on their horse and (5) horsemanship activities (e.g. grooming). Relative to a randomly allocated wait list (i.e. non-active) control condition ($n = 15$), children who participated in the equine intervention ($n = 19$) displayed significant increases in social motivation and decreases in inattention and distractibility. As no follow-up assessments were reported, conclusions could not be drawn about the duration of impact. However, the study included a control group, random assignment and assessments that adequately measured the nominated outcomes.

Due to its design, a study by Bass et al. (2009) offers a relatively strong level of evidence.

In another well-designed study, Kern et al. (2011) also investigated the effects of an equine-assisted activities intervention in a sample of 24 children with autism, and assessed individuals 3–6 months prior to the intervention so that children could serve as their own controls. The intervention was of 6 month duration and involved weekly horse-riding lessons as well as a range of equine activities (e.g. grooming, leading and tacking responsibilities) aimed at facilitating relationship building and bonding skills that can be transferred from the participants, their instructor and horse to their family and home life. Although no improvement was evident in terms of parent–child interactions as assessed by the Timberlawn Parent–Child Interaction Scale, the children exhibited improvements in symptoms of autism, as measured by the Childhood Autism Rating Scale. An overall increase in the parent-rated quality of life measure was also found; however, given that the improvement in quality of life was present throughout the course of the study (including the pre-treatment waiting period), the authors suggested that this increase may be due to enrolment rather than the specific effects of the intervention.

In a similar study, Gabriels et al. (2012) examined the effects of a 10 weekly sessions of therapeutic horseback riding on 42 children and adolescents with autism spectrum disorders (aged 6–16 years). The outcomes were compared to a wait list control group ($n = 16$). The weekly intervention was one hour in duration and had a two-part focus: therapeutic intervention and horsemanship. Individual therapeutic and horsemanship goals were set by the instructors based on an initial evaluation of participants' developmental ability and horsemanship skill. The intervention consisted of exercises and activities that addressed physical, psychological, cognitive, social, and horsemanship skills. The weekly sessions followed the same routine each week: (1) put riding helmet on; (2) sit and wait on the bench; (3) mount horse; (4) horse-riding activities; (5) dismount horse; (6) groom horse; and (7) put away equipment. The horse-riding activities involved both instructions in technique and assistance to reach personal goals. Participants in the equine intervention ($n = 42$) were assessed prior to and immediately following the intervention. Participants in the wait list control group ($n = 16$) completed the same assessments with a 10 week interval between Time 1 and Time 2. When compared to participants in the wait list condition, participants in the intervention group showed significant improvements in self-regulation behaviours (i.e. irritability, lethargy, stereotypic behaviour and hyperactivity), expressive language skills, motor skills and verbal praxis/motor planning skills.

Memishevikj and Hodzhikl (2010) described four case studies of children with autism who underwent a 10 week equine-assisted therapeutic intervention. The intervention was of 30 min duration and included horsemanship activities (e.g. grooming), riding exercises (e.g. mounting the horse and riding in the arena) and equine-assisted therapeutic tasks that required the application of psychological, cognitive and physical skills (e.g. getting the horse from one side of the arena to the other side, going with the horse across obstacles). Two of the four children displayed improvements in symptoms of autism, such as

sociability, as measured by the Autism Treatment Evaluation Checklist (ATEC). Finally, Taylor et al. (2009) reported three case studies of children with autism and found that following the 16 week hippotherapy intervention involving horse-riding activities (e.g. leading the horse to walk over poles, weave through cones and trot), children displayed improved volition and greater overall motivation as measured by the Pediatric Volitional Questionnaire. Neither of these studies included control groups, but both confirmed the findings of the other studies.

Taken together, the studies demonstrate some promising findings in regard to the use of equine-assisted interventions for children with autism, particularly in relation to social skills. Further research in this area is greatly needed to clarify the benefits of this intervention and ensure that useful interventions are made widely available.

ADHD & behavioural difficulties

Only two studies investigated the impact of an equine intervention on children or adolescents with learning and attention deficits. Although both studies did not use well-controlled designs, their findings were similar in that they demonstrated behavioural improvements following the intervention. Cuypers et al. (2011) investigated the effects of a twice-weekly, 8 week therapeutic horseback riding intervention focussed on caring for the horses, and horse riding. Particular focus was given to enhancing participants' attention to the horse and related activities. For example, at the beginning of the intervention, participants were encouraged to concentrate on their own horse and were gradually encouraged to also focus on other participants and their horses (i.e. keeping the same distance between them). Participants were also taught to vary their own positions on the horse (e.g. forward facing, rear facing, side facing and standing). The participants were five children with ADHD, who displayed improvements in behaviour and, interestingly, in overall quality of life, following the intervention. However, due to the small sample size, and the lack of a control group, attributing these changes to the horse activity was not possible.

Holmes et al. (2012) explored the effect of an equine-assisted activities intervention, without a trained therapist, in 11 adolescents with subclinical emotional and behavioural difficulties. Participants attended four consecutive, 3 h sessions. The intervention focussed on developing skills relating to taking care of a horse, such as grooming, fitting head collars, picking out feet and fitting rugs, as well as education regarding safety with horses. Results revealed reductions in anxiety, and behavioural improvements, but no increase in self-esteem. It is possible that symptoms such as anxiety and behavioural problems may be more amenable to change in a short time frame than more stable traits, such as self-esteem. However, the lack of a trained therapist may also have meant that opportunities to embed positive lessons were missed. As with the previous study, the lack of control group and the small sample size limited the extent to which definitive conclusions can be drawn about the role of the horse in these outcomes.

Schizophrenia

Only one study focused on people with schizophrenia. In the study conducted by Cerino, Cirulli, Chiarotti, and Serpa (2011) 24 adults with schizophrenia participated in a 40-session therapeutic riding intervention (over 24 months). The intervention comprised individual and group sessions, and the aim was to improve participants' self-esteem, social functioning and reduction in stigma. Each session consisted of three phases – Phases 1 and 3 comprised groundwork and grooming activities with the aim of improving participants' knowledge of the horse and ability to communicate with their horse in a tactile non-verbal way; and Phase 2 consisted of riding activities to teach participants the basic riding skills as well as improving their level of self-esteem, social functioning and reduction of stigma. At the end of the intervention, participants displayed an improvement in the negative symptoms of schizophrenia (i.e. absence of appropriate emotional and social behaviours). Interestingly, the improvement in the negative symptoms was found for participants with both first onset and chronic schizophrenia. The absence of a control group once again limited the extent to which definitive conclusions can be made about the role of the horse in determining the outcomes. Nevertheless, the results provide promising evidence that an intervention involving equine-assisted activities may have social and affective benefits for adults with schizophrenia. However, the duration of the intervention suggests that these benefits may require costly and consistent input.

At-risk youth

Three studies examined the benefits of an equine intervention for youth identified as being 'at-risk'. Burgon (2011) used qualitative interviews to examine the experience of a therapeutic horsemanship programme among a sample of at-risk adolescents ($n = 7$). The participants described increases in self-esteem, self-confidence and empathy as a result of the intervention. In this study, participants engaged in a range of equine-assisted activities (e.g. spending time with horses, observing and discussing horse behaviour and psychology, riding and horsemanship activities) across a two year period, and for varying levels of time depending on their commitment to the programme. The findings of Burgon (2011) indicate that equine-assisted activities may be perceived as a beneficial intervention for at-risk youth, even without a great deal of psychotherapeutic content.

In a more controlled design, Trotter, Chandler, Goodwin-Bond, and Casey (2008) compared the efficacy of a group equine-assisted counselling intervention with traditional classroom-based counselling for at-risk children and adolescents. This 12 week therapeutic intervention aimed to enhance self-awareness of participants, facilitate awareness of problematic behaviour and foster the development of healthy relationships. The equine intervention consisted of group interactions with horses in order to facilitate the prevention and resolution of emotional and behavioural issues. Compared to the regular classroom-based counselling intervention, participants in the equine

intervention displayed improvements in self-esteem, social stress and behavioural symptoms following the intervention. Although there were several strengths of this study, including its large sample size (n = 164), a major limitation was the lack of random assignment to the two conditions. Specifically, participants self-selected into the intervention they preferred and, perhaps not surprisingly, the large majority of participants elected to participate in the equine intervention (n = 126) rather than classroom-based counselling (n = 38). In the absence of random assignment, it remains unclear how reliable the difference in outcomes are. However, overall, the study demonstrated beneficial psychological effects of an equine intervention when compared with a more traditional school-based counselling programme.

A similar study conducted by Bachi et al. (2012) investigated the effect of equine-facilitated psychotherapy on self-image, trust, satisfaction with life and self-control in a group of at-risk adolescents (n = 29) who lived in a residential treatment facility. The intervention group consisted of 14 adolescents and were compared with a matched control group (i.e. non-active) of 15 adolescents. Participants in the intervention group participated in individual weekly equine-facilitated psychotherapy sessions for a total of seven months. Results revealed no significant differences between the two groups in self-image, trust, satisfaction with life and self-control. However, there was a trend towards positive changes for the intervention group on all four variables. It is possible that the relatively small sample (n = 29) may have limited the extent to which the differences between the groups could be detected.

Intellectual disability

Only one study focused on adults with intellectual disability. Borioni et al. (2012) compared an onotherapy intervention (donkey therapy) (n = 15) with an equestrian rehabilitation intervention (n = 8) Borioni et al. (2012). The onotherapy intervention consisted of three stages: (1) approaching and contact; (2) interaction with a donkey; (3) teaching the donkey to respond to command. The horse-related activities involved a more structured intervention conducted in four phases: (1) hippotherapy, which was an individualised therapeutic intervention with a focus on physical ability; (2) equine re-education, which involved learning to train the horse; (3) pre-sporting riding, which encouraged the development of a relationship with the horse and learning about equine sports; and (4) horse carousel, which involved performing with other riders (Borioni et al., 2012). The authors developed their own outcome measures based on adaptations of existing measures, which were not validated. Nevertheless, individuals in the horse intervention reported improvements in autonomy, and affective-relational areas that were not present in the donkey-related group. Given that onotherapy may be considered as a form of equine-assisted activity, it is difficult to determine the impact of the horse intervention in this case. Further, so many different types of interventions were included in the horse-related intervention, and it is not possible to conclude what type of activity was beneficial or whether the differences merely reflected the increased intensity of the

intervention. Despite these limitations, the results suggest that engagement of the horse in therapy and learning activities may be beneficial for the psychological and social development of adults with intellectual disability. They also suggest that the horse and horse-related activities may play a critical role in those beneficial outcomes even with minimal levels of psychotherapeutic input.

Cerebral Palsy

Two studies were concerned with the use of an equine intervention for children with cerebral palsy. Frank, McCloskey, and Dole (2011) reported a single case study of a child with cerebral palsy. This child received 16 weeks of hippotherapy (twice weekly, for 8 weeks). Although the focus of the intervention was on physical factors (e.g. postural control, trunk contraction, balance and coordination), psychological outcome measures were also included. The child displayed higher levels of perceived competence following the programme, suggesting the likelihood of beneficial effects that might be evident in a larger sample.

Unfortunately, the only larger study conducted in the area of cerebral palsy did not include specific psychological measures. Davis et al. (2009) randomly assigned 99 children with cerebral palsy to either a 10 week structured therapeutic horse-riding intervention ($n = 50$), or a control condition ($n = 49$) that consisted of usual activities. Participants in the intervention group participated in activities designed to emphasise various physical movements to improve postural control, balance, trunk strength and trunk/pelvis dissociation. Results revealed no significant differences between the two groups in gross motor function, health status and quality of life, but did find an improvement in family cohesion in the equine intervention condition. In addition to the use of random assignment, the relatively large sample size is a significant strength of this study, as it provided adequate statistical power to detect an effect if one was present. However, it is possible that broad measures of quality of life may not detect the specific types of changes one might expect to occur following equine-assisted activities. Thus, conclusions cannot be drawn as to the specific psychological benefit of an equine intervention for children with cerebral palsy.

Physical pain

Hakanson, Moller, Lindstrom, and Mattson (2009) examined the effects of an equine-assisted therapeutic intervention on 28 patients with back and neck pain. The intervention consisted of riding lessons twice a week, with a focus on physical outcomes (i.e. pain, body control and sleep). The number of sessions varied from 2 to 32 (median 7) ranging from 5 to 45 min depending on participants' needs and endurance and the number of horses available. Psychological outcomes (i.e. anxiety and self-confidence) were measured using the visual analogue scale and participants reported increases in self-confidence, body control and sleep. However, there were no significant changes pertaining

to levels of intensity and duration for pain and anxiety. By qualitatively analysing session notes and telephone call recordings, the researchers found an increase in positive emotion and well-being. As with the majority of studies, Hakanson et al. (2009) did not use a comparison group, and therefore, definitive conclusions cannot be drawn as to whether or not the horse played a role in these outcomes.

Discussion

In this review of 15 studies, we sought to assess the current state of the evidence with regards to the psychological benefit of equine-assisted interventions. Overall, all studies reported at least some beneficial psychological effects of equine-assisted interventions. Across all the populations, only preliminary yet promising support was found for the efficacy of equine-assisted interventions. However, this was largely due to the dearth of well-designed randomised controlled studies that reduced the ability to attribute outcomes to the inclusion of equines.

Methodological considerations

It is notable that only two of the fifteen studies included in this review were RCTs. Another five studies used a non-randomised control group or a quasi-experimental design. These more controlled studies tended to demonstrate no improvements at the individual level in outcomes such as self-control, satisfaction and interpersonal trust. However, they all showed improvements in social and behavioural outcomes, suggesting a role for equine-assisted interventions in building socially appropriate responses.

In addition to the design of the studies, there was considerable variation in the measures used to assess psychological outcomes. Specifically, some studies used measures that tapped specific constructs, such as perceptions of self-competence, or self-efficacy (e.g. Trotter et al., 2008), whereas others used broader measures, such as overall life satisfaction (e.g. Davis et al., 2009). It is important that measures selected to assess outcomes are theoretically in line with the aims and scope of the intervention, which was not always the case. For instance, broad indicators of quality of life may not be expected to change following a brief therapeutic horse intervention. In contrast, it is not unreasonable to expect that an intervention based on gaining mastery of a skill involving a large animal may promote a sense of achievement, enhanced self-efficacy or positive affect, as demonstrated by a number of studies contained in this review. Despite methodological weaknesses in the area, there was some evidence that equine-assisted interventions may have a specific positive benefit, at least in the short term.

The nature, delivery, content and duration of horse-related interventions differ so significantly, it is likely that these variations could account for mixed findings. With regard to the length of the interventions, the number of sessions

in the interventions reviewed ranged from 4 (Holmes et al., 2012) to 40 (Cerino et al., 2011). Interestingly, the study that provided 40 sessions of equine-assisted activities to participants resulted in reductions in negative symptoms of schizophrenia (Cerino et al., 2011), which are traditionally quite persistent (McGlaskin & Fenton, 1992). Similarly, a longer intervention was associated with increases in self-esteem (Trotter et al., 2008) whereas a shorter intervention was not (Holmes et al., 2012). Thus, it is possible that some of the inconsistencies in the efficacy of equine-assisted interventions may be due to differences in the length of the interventions. These potential dose effects may be an important issue to consider in future research.

Further, different programmes originate from different philosophical origins and have vastly different qualification requirements that need to be met by programme staff or volunteers. A limitation of the current study is that many of these variables were unable to be extracted from the selected studies. Of the 15 studies, only 5 stated that the intervention was delivered by a mental health qualified professional (Bachi et al., 2012; Burgon, 2011; Cerino et al., 2011; Trotter et al., 2008). These professionals included a mental health physician, a play therapist, an EFP specialist who is both a certified social worker and a certified therapeutic riding instructor, and a counsellor. One further intervention (Memishevikj & Hodzhikj, 2010) was delivered by an instructor with qualifications in equine-facilitated mental health therapy. The remaining interventions may have been designed in accordance with guidelines about equine-facilitated therapy, but were delivered by riding instructors or physical therapists. In some cases, members of the research team may have had mental health qualifications (see Gabriels et al., 2012), but there was no evidence that they delivered the intervention.

The content of the interventions was described in similar ways irrespective of the type of professional involved. Interventions generally including sessions focused on understanding horses, caring for horses, riding skills or training skills and learning tasks (physical, emotional or educational) conducted whilst on or with the horse. Due to the lack of detail, it was difficult to determine the extent to which counselling or psychotherapeutic interventions were included (i.e. beyond basic attention to psychosocial processes). All interventions other than two (Bachi et al., 2012; Memishevikj & Hodzhikj, 2010) were conducted in groups. Another intervention (Burgon, 2011) was delivered in a group, but was not standardised across the participants, with individualised goals being negotiated. Two studies used single case study research designs (Frank et al., 2011; Taylor et al., 2009), but these focused on hippotherapy (physical intervention).

Bachi et al. (2012) found only a positive trend relative to the control group, but no significant differences. The study of an individualised intervention (Burgon, 2011) was qualitative, so improvements in self-esteem, confidence and empathy could not be compared to a control group. The other individualised intervention (Memishevikj & Hodzhikj, 2010) found improvements in only 50% of their small sample. Thus, there was little evidence that individualised interventions offered advantages over group interventions.

The only intervention described as counselling (Trotter et al., 2008) found some improvements beyond that found in the control group, suggesting a number of positive social outcomes associated with the equine intervention. The longest intervention also focused on the most clinical population (Cerino et al., 2011) and showed improvements in positive and negative symptoms. As no control group was used, it is difficult to determine the importance of this finding. Nevertheless, these two studies suggest some role for longer, more intensive interventions delivered by mental health professionals. Overall, however, on the basis of the detail provided in these studies, the only conclusion that can be drawn is that there is little advantage to be gained from the addition of individualised sessions or qualified professionals. Instead, the data suggest that group interventions focusing on physical and horsemanship skills, with some attention to psychosocial processes, may result in improved social skills (Bass et al., 2009), behaviour (Cuypers et al., 2011), positive emotion and self-regulation (Gabriels et al., 2012), quality of life (Cuypers et al., 2011; Kern et al., 2011) and family cohesion Davis et al. (2009).

These points highlight the importance of reporting guidelines in increasing the clarity of research and the need for improved descriptions and standardisation of interventions in future. Without this information, it is difficult to determine the mechanisms of change that might account for both positive and negative results. As noted by Kendall, Maujean, Pepping, and Wright (2014), there are multiple hypotheses that underpin the observed benefits of horse-related activities. To examine these hypotheses, it is necessary to develop standardised interventions and training systems.

As mentioned earlier, RCTs were the minority of studies identified in this review for assessing efficacy of equine-assisted intervention. RCT has been highlighted for identifying intervention efficacy due to their ability to minimise biases introduced by subjective and focused sampling, and they have become the driving force in evidence-based practice (Ho et al., 2008). It is worthwhile to highlight that in instances where RCTs are not possible or available, it has been argued that augmenting a non-experimental or quasi-experimental design with additional statistical methods can provide a rigorous evaluation comparable to an experimental design (Heckman & Smith, 1995; Stuart & Rubin, 2008). Specifically, the issue of selection bias in non-experimental and quasi-experimental designs can be remedied through the use of econometric methods (Heckman & Smith, 1995). Such quantitative methods generally involve matching individuals from a treatment condition to a control group of individuals with comparable characteristics (Stuart & Rubin, 2008). For over two decades, one such approach, propensity score matching, has been identified as a method to support non-experimental designs achievement of results similar to experimental designs (Heckman, Ichimura, Smith, & Todd, 1998; Rosenbaum & Rubin, 1983; Stuart & Rubin, 2008). However, the studies identified in this review did not employ any of these methods, and given the mixed results from employing alternative methods to RCTs and the inability to draw clear conclusions from them (Bratberg, Grasdal, & Risa, 2002; Dehejia & Wahba, 2002; Peikes, Moreno, & Orzol, 2008), the authors argue that RCTs are likely to be

the ideal approach to identify the psychological benefits of therapeutic horse activities.

In summary, the strongest level of evidence (i.e. six of the more controlled studies) was available for children, which revealed strong improved family cohesion Davis et al. (2009), behaviour (Cuypers et al., 2011; Gabriels et al., 2012; Kern et al., 2011; Trotter et al., 2008) and social responsiveness (Bass et al., 2009; Kern et al., 2011). For adolescents in residential settings, there was a positive trend (Bachi et al., 2012) and for a more general population of at-risk youth, social and behavioural improvements were apparent (Trotter et al., 2008). This gives further support to the notion that larger interventions might be required for entrenched conditions. No controlled studies focused on adults, but the few studies that included adult populations all found improvement in positive effect (Borioni et al., 2012; Cerino et al., 2011; Hakanson et al., 2009). This finding suggests that equine-assisted interventions may play an important role in the management of adult depression and anxiety.

Conclusion

Well-designed RCTs of the psychological benefits of therapeutic equine-assisted interventions are greatly needed in order to establish the efficacy of these types of approaches. Further, follow-up assessments are required to determine the longevity of any beneficial effects. It is important that the measures used to assess outcome are not only psychometrically reliable and valid, but that they also adequately assess outcomes one would expect to show change as a result of such an intervention. It would be useful to include measures that assess the specific skills or abilities the intervention aims to enhance, rather than global or broad variables that a brief intervention may not influence as readily. Finally, there is a need to tailor programmes to the specific populations according to age, type/condition and duration. Our review suggests that differential effects might be expected depending on these factors.

Consistent with prior reviews (e.g. Lentini & Knox, 2009), findings from this review indicate that equine-assisted interventions hold much promise, particularly in terms of child/adolescent social and behavioural issues (including those associated with childhood autism, at-risk adolescents and perhaps adult affective disorders). However, the current state of the literature does not allow us to definitively conclude that equine-assisted interventions are efficacious. Nevertheless, there was evidence that these interventions may be of particular benefit to individuals who choose not to engage in, or do not benefit from, traditional forms of therapy. Thus, it is critically important that future research aims to rectify this gap in the literature.

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