

Animal-Assisted Therapy in the Treatment of Substance Use Disorders: A Systematic Mixed Methods Review

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There is a need for evidence-based interventions that can contribute to more positive treatment outcomes for substance use disorders. Animal-assisted therapy is a supplementary intervention in which certified animals are used in a structured and goal directed manner in the treatment of various health problems. This review aims to systematically investigate and evaluate the available literature and thus hopefully contribute to future research. The electronic searches were performed in the databases PsycInfo, Medline, and Web of Science. Searches of reference lists were also performed. As the research on this particular field is scarce, the inclusion criteria had to allow for a relatively great variation in methods, interventions, and populations. Still, only ten studies were included, of which three were quantitative, six were qualitative, and one was a mixed methods study. All of the included articles examined the effect of AAT in the treatment of substance use disorders. The populations investigated included both women and men aged 13 to 55 years undergoing treatment for substance use disorder. A segregated design was applied, where the quantitative results were pooled using narrative synthesis and the qualitative using metasummary, all of which were combined in a final configuration. Three of the quantitative studies found significant correlations, and the metasummary indicated several reoccurring themes across the qualitative studies. However, a general lack of systematic investigation and an excess of explorative research were identified, and the majority of the articles neglected to report information important for replication. More thorough and systematic investigations are needed. A tentative explanatory model, with a hypothesis generating aim, is presented, in which the qualitative findings function as moderators or mediators of the relationships indicated by the quantitative studies.

Keywords: Animal-assisted therapy, substance use disorder, systematic review, mixed methods, tentative explanatory model

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Between 16 and 39 million people worldwide have a substance use related disorder and the number of unrecorded cases are presumed to be high (Degenhardt & Hall, 2012). Substance use disorders (SUDs) are complex phenomena, and there is continuous discussion within the field as to the exact distinction between the different types of SUDs (Smedslund et al., 2011). The World Health Organization ([WHO], 1992) distinguishes ten different mental and behavioral disorders due to use of substances in the International Classification of Diseases 10 (ICD-10). For the literature reviewed in this paper, the distinction between the diagnoses harmful use and dependence syndrome is of particular importance.

Harmful substance use is defined by WHO (1992) as a maladaptive pattern of substance use leading to effects that are detrimental to the individual's mental or physical health. Furthermore, the pattern of use will often have negative effects on the individual's social life in terms of interpersonal conflict, problems with meeting the demands of school or work, and legal or economic problems (WHO, 1992).

Substance dependence is described by WHO (1992) as a syndrome of behavioral, psychological, and cognitive character, where the individual continues to use psychoactive substances despite significant problems related to their behavior. WHO (1992) mentions six diagnostic criteria, where the presence of three or more is required. These include a strong need to use the substance, loss of control, withdrawal, substance tolerance, an increasing degree of indifference towards other positive activities, and a continued use of the substance despite the presence of harmful consequences.

SUDs can be understood as a complex syndrome that involves

psychological, genetic, neurological, physical, and environmental factors (Lossius, 2012; Miller & Carroll, 2006), and it poses a serious health challenge which has profound ramifications for both the individual and the society (Folkehelseinstituttet, 2014).

Comorbidity with other mental disorders, physical health issues, and criminal behaviors are common among SUD patients (Iversen, Lauritzen, Skretting & Skutle, 2008; van Amsterdam, Pennings, Brunt, & van den Brink, 2013). Factors such as low self-esteem, self-stigma, poor identity formation, stress, and affect regulation are well documented as both risk factors and contributors to continued use (Arnett, 2005; Fox, Axelrod, Paliwal, Sleeper, & Sinha, 2007; Luoma, Kohlenberg, Hayes, Bunting, & Rye, 2008; Sinha, 2001; Staisewicz & Maisto, 1993). Furthermore, the incidence of personality disorders are heightened among individuals with SUDs (Kessler, 2004), and the link between certain personality traits and SUDs is well documented (Robins, 1998). Personality is linked to attachment styles (Cihan, Winstead, & Laulis, 2014), and there is a heightened prevalence of insecure attachment styles relative to secure attachment styles among SUD patients. This appears to be related to their poor ability to regulate affect (Golder, Gillmore, Spieker, & Morrison, 2005).

Several factors complicate treatment. High dropout rates and frequent relapses are documented challenges (Greenfield et al., 2004; Lie & Nesvåg, 2007). Other factors that can hinder a positive outcome are elevated levels of stress in treatment together with low treatment motivation and engagement (De Leon, Melnick, & Kressel, 1997; Hiller, Knight, Leukefeld, & Simpson, 2002). As motivation to

engage in treatment is a consistent predictor of treatment retention (De Leon et al., 1997), this is an aspect of SUD treatment that needs to be enhanced. More knowledge about therapeutic variables that can contribute to the improvement of treatment for this population is needed.

Despite the clear distinction between the two syndromes in ICD-10, there is a lack of consensus regarding the terms used to describe SUDs in the populations examined in the reviewed literature. In addition, the majority of the included studies do not address the subject of a present diagnosis or not. Nevertheless, this paper will use the term *substance use disorder (SUD)* to refer to both the diagnoses harmful use and dependence syndrome, as well as in instances where a diagnosis is not addressed, but in which the individual is undergoing treatment for his or hers use.

Animal-assisted therapy

Animal-assisted therapy (AAT) is a treatment intervention where animals are used as part of a structured goal-directed treatment for various health problems (Pet Partners, 2012). The most frequently used animals are dogs and horses; however cats, rabbits, dolphins, and farm animals are also used. The relationship between humans and animals is a well- documented phenomenon, and studies document that strong mutual affectional ties can develop between humans and companion animals (Prato-Previde, Custance, Spiezio, & Sabatini, 2003). Humans perceive their animals as providing emotional security and comfort, particularly during distress (Headey, 1999), and animals can thus function as attachment objects (Zilcha-Mano, Mikulincer, & Shaver, 2011). Pet Partners (2012), an international and

well-known organization and one of the largest certifiers of therapy animals in the USA, present the following definition of animal-assisted therapy:

A goal-directed intervention in which an animal meets specific criteria is an integral part of the treatment process. AAT is directed and/or delivered by a health/human service professional with specialized expertise, and within the scope of practice of his/her profession (“Animal-Assisted Therapy”, para. 1, 2012).

The use of AAT has shown positive results in the treatment of various mental disorders, such as depression, anxiety, and post-traumatic stress syndrome (Berget, Ekeberg, Pedersen, & Braastad, 2011; Holmes, Goodwin, Redhead, & Goymour, 2012; McCullough, 2012; Pedersen, Martinsen, Berget, & Braastad, 2012). These disorders often co-occur with SUDs (Iversen et al., 2008; Stewart & Israeli, 2001), and for many, they can represent a contributor to continuous use as substance use represents a coping mechanism for painful psychological problems. As addressing the underlying mechanisms of the substance use is a central part of treatment, these findings can represent an important addition to existing SUD treatment. AAT has also been found to have a positive effect on other risk factors and challenges associated with SUDs. For instance, Balluerka, Muela, Amiano and Caldentey (2014) found that teenagers with a history of traumatic experiences and mental health issues showed a more secure attachment style after undergoing AAT, and that AAT facilitated a secure therapeutic relationship between the

patient, therapist, and dog. This is an important finding, as insecure attachment styles are common among SUD patients and represent a factor that can complicate treatment. This can partly be explained by the fact that people with an insecure attachment style may struggle to establish a therapeutic alliance (Smith, Msetfi, & Golding, 2010). In accordance with this, AAT is also found to significantly strengthen the therapeutic alliance (Minatrea & Wesley, 2008; Wesley, Minatrea, & Watson, 2009), an important predicting factor of treatment outcome (Martin, Garske, & Davis, 2000).

Furthermore, other studies have found that AAT have a positive effect on individuals who have suffered childhood trauma, such as sexual abuse, with the participants showing a lower degree of trauma symptoms (Dietz, Davis, & Pennings, 2012). As childhood trauma is a risk factor for the development of SUDs (Wilsnack, Vogeltanz, Klassen, & Harris, 1997), and a contributor to continuous use, these findings are highly relevant for SUD treatment interventions. Studies furthermore indicate that the use of animals bring new dimensions to therapy, such as a non-judgmental attitude and mirroring of body language (Stiltner, 2013; Træen, Moan, & Rosenvinge, 2012), and contribute to a more adequate regulation and better recognition of emotions (Burger et al., 2009; Stetina et al., 2011).

However, there are also results indicating that AAT does not have a significant effect on mental problems such as depression and anxiety (Dhooper, 2004; Rosswog, 2007). For instance, Barker, Pandurangi, and Best (2003) found no significant effect of AAT on levels of depression or anxiety. Furthermore, the available literature has been criticized for being

methodologically weak and exploratory rather than randomized and controlled (Anestis, Anestis, Zawilinski, Hopkins, & Lilienfeld, 2014; Kazdin, 2010; Marino, 2012). Still, several reviews and meta-analyses have been performed in recent years (Anestis et al., 2014; Hoagwood, Acri, Morrissey, & Peth-Pierce, 2016; Kamioka et al., 2014; Nimer & Lundahl, 2007; O’Haire, 2013) identifying a rapidly increasing number of experimental studies. With regards to AAT in the treatment of SUDs, the research is scarce, and to the authors’ knowledge, no review has been done up to the present. Therefore, there is a need for a systematic review of this specific combination.

The aim of this systematic mixed methods review is to provide an overview of the existing research regarding AAT in the treatment of SUDs and to identify possible methodological challenges of this emerging research field. A further aim is to investigate how the qualitative findings can act as conceivable moderators and mediators of the possible associations between AAT and various outcomes. A tentative explanatory model of these relationships, with a hypothesis generating aim, will be presented.

Method

This systematic review is based on the guidelines from the PRISMA statement (Moher, Liberati, Tetzlaff, & Altman, 2009). As the PRISMA statement primarily is developed for meta-analyses of randomized controlled trials, some of the items are not applicable to this review. For instance, the assessment of risk of bias, is not assessed in this review.

Several techniques have been applied to strengthen the validity and reliability of the results. First, a comprehensive description of data

gathering and analysis (Moher et al., 2009) is provided. Second, the results were reviewed by an independent rater (Johnson, 1997) (a graduate student in psychology). Regarding the metasummary, methods concerning validity in qualitative research were applied, such as reflexivity and low inference descriptors of the original findings (Johnson, 1997).

Inclusion criteria

As research on AAT and SUDs is scarce, the inclusion criteria had to allow for a relatively great variation in methods, interventions, and populations. However, a few criteria were set to ensure the quality of the review. All studies concerning AAT in the treatment of SUDs were considered, although the final inclusion consists only of studies in Scandinavian and English.

The decision was made that in the studies included, an explicit substance use diagnosis was not necessary; however, all participants must be participating in a treatment intervention for substance use. In addition, studies with dual-diagnosis participants were also included. Participants of all ages and both sexes were included.

Only studies that used an AAT intervention in accordance with the definition of AAT (Pet Partners, 2012) presented in this paper were included. Qualitative, quantitative, and mixed methods studies were included, while studies that were anecdotal in nature were excluded. Initially, only studies published in peer reviewed journals were to be included; however due to the low number of studies in general, poster presentations and unpublished doctoral and master's dissertations were also included.

Search strategy

Electronic search. The search was

performed directly in three databases between 3rd and 4th of August 2014. No limits for publication year were set. Different versions of the core key words "animal-assisted therapy" were used. In addition to "animal"; "pet," "equine," and "canine" were used in combination with "therapy," "assisted," and "facilitated." The search words were used in all possible combinations combined with *or* to ensure that all published studies were retrieved.

PsycInfo provided 759 results, Medline provided 581 results, and Web of Science provided 578 results, a total of 1,918 results. Of these, 431 were duplicates which provided a total of 1,487 results. It was concluded that there were too many versions of the term "substance use disorder" that a combined search with AAT would be sufficient. This resulted in a manual strategy where the abstracts and titles of all 1,487 articles were manually searched for articles that met the inclusion criteria.

In addition, Google Scholar was used to make a complementary wide search for studies published between 1980 and 2014 containing both the English term "animal-assisted therapy," yielding 5,860 results, and the Norwegian term "dyreassistert terapi," yielding 47 results. The electronic searches provided in total five eligible studies.

An exhaustive search of the reference lists of the five above-mentioned studies was undertaken to retrieve studies that were not identified by the electronic search. In addition, e-mail contact with central researchers was applied to retrieve studies not identified by the electronic search or the reference lists. These strategies yielded five eligible studies. Thus, a total of ten studies were included in this review.

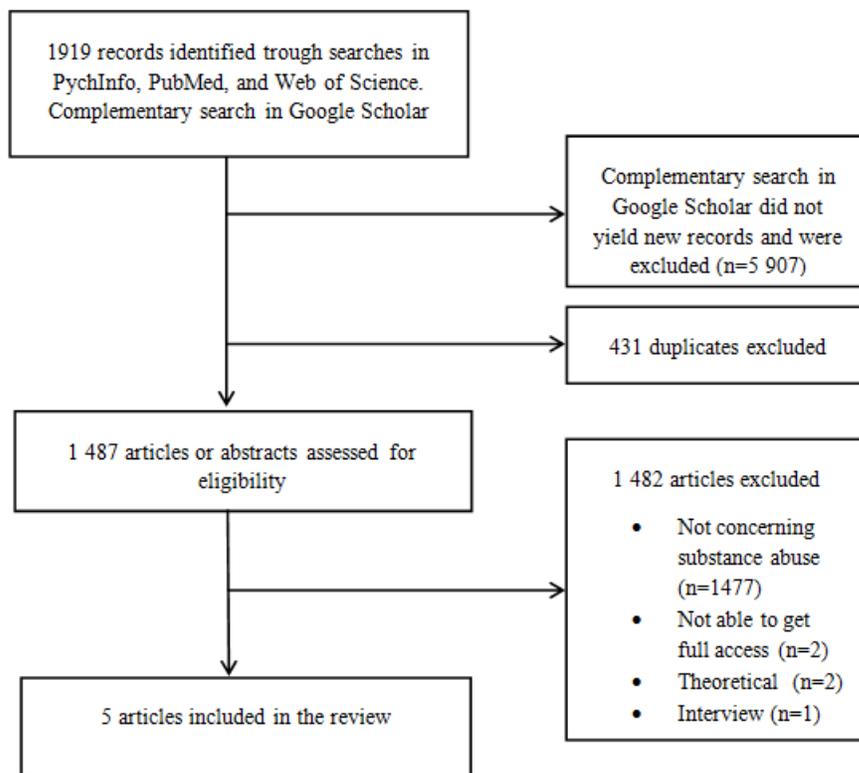


Figure 1. Flowchart illustrating the electronic search process.

Extraction and synthesizing of the data

A segregated mixed methods design (Sandelowski, Voils, & Barroso, 2006) were applied to review the findings, as studies with both qualitative and quantitative designs were included. This method allows the use of different methods for synthesizing the quantitative and qualitative findings, which for the purpose of this study, are narrative synthesis and metasummary, respectively. These separate syntheses are then followed by a final configuration of results, where the relations among, and complementation of, the findings are discussed. A segregated design is appropriate when quantitative and qualitative methods are assumed to assess different aspects or dimensions of a given phenomenon, and perceived as complementing rather than confirming or refuting each other

(Sandelowski et al., 2006).

The heterogeneity of the outcome measures, interventions and research foci of the quantitative studies led to the conclusion that they were too heterogeneous to enable a meaningful statistical pooling of results (Deeks, Higgins, & Altman, 2008). Thus, the quantitative data were pooled using narrative synthesis, a method that does not demand statistical analyses and is suitable for heterogeneous quantitative data (Mays, Pope, & Popay, 2005). Data extracted from the studies included characteristics of the dataset, methodological information, and results (see Table 1). All results that were defined as findings or results were extracted.

The six studies with a qualitative design and the qualitative findings from the one mixed methods study were synthesized

using the metasummary method. Metasummaries can be used in systematic reviews to synthesize qualitative data that have been analyzed to a lesser degree, such as with the use of thematic analysis (Sandelowski & Barroso, 2003), which was the case for the included studies. This method utilizes a quantitative oriented aggregation approach to synthesize qualitative data, and consist of three steps (Sandelowski & Barroso, 2003; Sandelowski, Barroso, & Voils, 2007). The first step is the extraction of relevant findings from each study. Consistent with other published metasummaries (Sandelowski, Lambe, & Barroso, 2004; Williams, 2006), the extracted findings were considered as themes or units of meaning explicitly reported in the articles. In instances where themes were presented as lower order themes or units of meaning, the latter were extracted in an effort to preserve the complexity of the findings. In addition to findings, characteristics of the dataset and methodological information were also extracted (see Table 2). The second step is to reduce the findings to abstracted findings (see Table 3).

The final step is to calculate frequency effect sizes (Onwuegbuzie, 2003). This is a means by which the frequency of occurrence of a theme is calculated, thereby documenting the presence of that theme. For the present study, each article was treated as one unit, independent of page length or sample size, in accordance with the qualitative imperative to preserve the integrity of each study regardless of such quantities (Sandelowski & Barroso, 2003). The calculation was done by dividing the number of studies reporting a given abstracted finding, minus duplicates, by the total number of studies, minus duplicates (Onwuegbuzie, 2003; Sandelowski et al., 2007). The main focus of the final configuration will be a tentative explanatory

model, constituting hypotheses of how the qualitative findings can possibly function as moderators or mediators of the quantitative findings.

Results

Central Characteristics of the Included Studies

Quantitative studies. As shown in Table 1, three papers utilized a quantitative design and one a mixed methods design. Two of the papers specified a substance use diagnosis, whilst the other two only addressed the subject in the general terms “dependence” and “substance abuse”. Kern-Godal Walderhaug, Arnevik, and Ravndal (2012) present preliminary results of data collected over an 18-month period between 2011 and 2012. The authors do not provide information about substance type or comorbidity, and information about theoretical framework is missing. The data were records of treatment completion, analyzed using Pearson Chi-square for relation measures and odds ratio to indicate the strength of the relation.

Minatrea and Wesley (2008) used the same therapist in two groups of participants. The same therapeutic method was used and the same themes were addressed. They provided detailed information regarding both the therapist and the therapy dog, and all sessions were videotaped. However, the authors do not provide information about the size of the control group nor about relevant substances or comorbidity. Information about the overall program length is also missing. The participants’ attitudes towards pets were screened using the Pet Attitude Scale ([PAS] Templer, Salter, Dickey, Baldwin, & Veleber, 1981), while rating of the therapeutic alliance was assessed using the Helping Alliance Questionnaire ([HAQ] Luborsky et al., 1996) and the Session Rating Scale (Duncan et al., 2003). The

data were analyzed with a one-way ANOVA, and effect size calculated using eta squared.

Pollack (2009) used pre- and post-self-reports to measure levels of psychological difficulties and readiness to change; however she does not provide baseline measures. The variables were assessed with the Behavior and Symptom Identification Scale (Eisen, Grob, & Klein, 1986) and the University of Rhode Island Change Assessment Scale (McConaughy, Prochaska, & Velicer, 1983), respectively. Pollack (2009) does not provide information about comorbidity in the population and information about length and design of the overall treatment program is missing. The data were only analyzed descriptively.

Wesley et al. (2009) used the same therapist in both groups, utilizing the same therapeutic methods and addressing the same themes. The paper provides a detailed description of the participants, therapist, and therapy dog, but information about the length of the overall treatment program is missing.

The participants' ratings of the therapeutic alliance were assessed using the HAQ (Luborsky et al., 1996) and their attitudes towards pets were screened using the PAS (Templer et al., 1981). The data were analyzed with a one-way ANOVA and effect size calculated using Eta-squared.

Qualitative studies. As seen in Table 2, only one of the seven studies addressed the presence of a substance use diagnosis, the remaining studies addressed the subject in general terms, such as chemical dependence, substance abuse, drug addiction, addiction, and drug problems. All of the studies analyzed the data thematically. The majority, however, did not further specify the type of method or any theoretical perspective. Brenna

(2013), Coetzee, Beukes and Lynch (2013), and Stiltner (2013) used Braun and Clarke's (2006) six guidelines for a thematic analysis as a framework, while Phillips (2004) used Tesch's (1990) guidelines. Brenna (2013) stated that the study had an ethnographic aspect and was conducted within a hermeneutical perspective, while Phillips (2004) reported a phenomenological perspective. All studies explicitly stated their research questions or aim with the study, although the degree of specificity varied among the studies. Furthermore, several studies neglected to provide important information about the population. Brenna (2011) and Campbell-Begg (2000) did not provide information about substance type and comorbidity. Pollack (2009) did not provide information about age and comorbidity in the population. The latter is also true for Coetzee et al. (2013). Several studies also neglected to provide important information about the study setting. Brenna (2011) did not address the primary intervention, and three of studies did not provide information about the overall program length and design (Bark, 2011; Brenna, 2013; Pollack, 2009).

Several studies discussed research bias, and took action to ensure the validity of the results, which in qualitative research is the degree to which the findings reflect the reality (Hinds, Scandrett-Hibden, & McAulay, 1990). The majority of the studies had their transcripts validated either by the participants or a colleague, with the exception of Bark (2011), Campbell-Begg (2000), and Pollack (2009). Methodological triangulation, in which several techniques are used to evaluate a single construct, such as combining two or more data sources or methods, is a validation technique in qualitative research (Thurmond, 2001). However, none of studies utilized more than one method for data collection. Only

Brenna (2013) and Pollack (2009) utilized more than one source of data, and Phillips (2004) used Dukes' (1984) four verification procedures. In the matter of replicability, all studies provided a description of study setting, data collection, and analysis, although the level of detail varied. Furthermore, all studies, except those by Pollack (2009) and Coetzee et al. (2013), provided transcripts of question guides

Quantitative Studies – Narrative Synthesis

As shown in Table 1, the results are promising, with AAT having a significant effect on the outcome variables. However, none of the studies established a solid causal relationship between AAT and the outcome variables.

Dropout rates. Kern-Godal et al. (2012) found significant differences² between the two groups ($X^2=10.7$, $p<0.01$) with individuals participating in the EAT program having a 3.6 times higher chance of getting a positive outcome compared to those who did not participate in EAT.

Therapeutic alliance. The results from Minatrea and Wesley (2008) and Wesley et al. (2009) were significant

($F(1.229)=25.44$, $p<0.001$, $\eta^2=0.100$), with the participants in the AAT group reporting a more positive experience of the alliance. Wesley et al. (2009) furthermore examined demographic subgroups. All subgroups indicated significant differences between the AAT and the control group, except for the dual diagnosis clients ($F(1.134)=0.130$, $p>0.719$), clients with social service involvement ($F(1.76)=0.062$, $p>0.804$) and clients seeking treatment for alcohol ($F(1.125)=2.91$, $p>0.091$).

Readiness to change and psychological symptoms. Pollack's (2009) results were not significant, and she did not provide baseline measures. However, the results from the descriptive analysis indicated that participants in the AAT group showed an increased readiness to change ($M=10.76$, $SD=1.6$) as indicated by increased scores on URICA, compared to the control group, where the scores decreased ($M=8.37$, $SD=1.9$). Furthermore, both groups showed a decrease in perceived psychological symptoms as measured by BASIS 32, (M treatment= 74 , $SD=.43$ and M control= 75 , $SD=.5$), however no significant difference was identified between the two groups.

Table 1
Central characteristics of the quantitative studies including the one mixed methods study

Source	Research Design	Analysis	Population	Substance diagnosis and type. Comorbidity	Primary intervention	Overall program length and design	AAT intervention	Outcome Measure	Purpose	Results
Kern-Godal et al., 2012	Quantitative	Pearson Chi square/odds ratio	n=88 males/38 females aged 16- 26 CG (n=45)	-- --	--	18 months Group therapy	12x90 min sessions with horses	Records of treatment completion	EAT effect on dropout rates	EAT reduced dropout rates (s)
Minatrea and Wesley, 2008	Quantitative	One way ANOVA	n=24 sex/age -- CG (n= --)	Dependence diagnosis and -- --	Choice theory/reality therapy	-- Group therapy	One dog attended group sessions	Helping alliance Questionnaire	AAT effect on therapeutic alliance	AAT strengthened therapeutic alliance (s)
Pollack, 2009	Mixed methods	Descriptive/ Thematic (NVivo)	n=10 females age -- CG (n=5)	Diagnosis -- and poly substances --	12-step program and CBT	-- --	12x90 min sessions with horses	BASIS and URICA	Patients exp. with EAT	No effect
Wesley et al., 2009	Quantitative	One way ANOVA	n=114 males/117 females aged 18-55 CG (n=96)	Dependence diagnosis and poly substances depression /anxiety	Choice theory	-- Group therapy	One dog attended group sessions	Helping alliance Questionnaire	AAT effect on therapeutic alliance	AAT strengthened therapeutic alliance (s)

Note. -- = not reported; PS = Psychological symptoms; RC = Readiness to change; CBT = Cognitive behavioral therapy; EAT = Equine-assisted therapy; AAT = Animal- assisted therapy; (s) = significant; (ns) = non-significant.

Table 2
Central characteristics of the qualitative studies including the one mixed methods study

Source	Research design	Analysis	Population	Substance diagnosis and type. Comorbidity	Primary intervention	Overall program length and design	AAT intervention	Purpose	Results ^a
1. Bark, 2011	Qualitative SSI	Thematic/hermeneutical	n = -- both sexes aged 13-20	-- Dep/eating disorders	12-step program and CBT	--	Horses	Employees exp. with EAT	3 themes
2. Brenna, 2013	Qualitative SSI and Ob	Thematic (Braun and Clarke, 2006)	n=4 male/4 female aged 20- 30	-- --	--	--	12 working sessions with horses	Patients exp. with EAT	5 themes/20 lower order themes
3. Campbell-Begg, 2000	Qualitative Focus groups	Thematic	n=8 sex/age --	-- --	Goal attainment (King, 1997)	21 days GT	One dog attended group sessions	AAT influence on recovery	4 themes
4. Coetzee et al., 2013	Qualitative Focus groups	Thematic (Braun and Clarke, 2006)	n=4 males aged 21-49	Diagnosis -- and alcohol/cocaine --	12-step program	21 days IT/GT	Two hour-long visits to an animal park	Patients exp. with AAT	3 themes
5. Phillips, 2004	Qualitative SSI	Thematic (Tesch, 1980)	n=11 males aged 14-24	Diagnosis -- and poly substances Depression	Family systems therapy	75-80 days IT/GT/FT	Patients assigned a puppy to care for	Patients exp. with AAT	8 themes
6. Pollack, 2009	Mixed methods/SSI and Ob	Descriptive/Thematic (NVivo)	n=10 females age --	Diagnosis -- and poly substances --	12-step program and CBT	--	12x90 min sessions with horses	Patients exp. with EAT	2 themes
7. Stiltner, 2013	Qualitative SSI	Thematic/narrative (ATLAS.ti)	n=8 males aged 13-17	Substance use diagnosis and poly substances ODD/ADHD	Social cognitive theory	6-8 months IT/GT	EAT incorporated to overall program	Patients exp. with EAT	3 themes/11 units of meaning

Note.^a See Table 3 for specifications of themes identified in the original studies. -- = not reported; EAT = Equine-assisted therapy; AAT = Animal-assisted therapy; dep = depression; exp = experience; SSI = semi-structured interview; Ob: observation; IT = individual therapy; GT = group therapy; FT = family therapy.

Qualitative studies – Metasummary

The extraction yielded 27 themes, merged into nine abstracted themes with frequency effect sizes calculated. The themes were organized into three main findings: *Change*, *The Animals*, and *The Program* (see Table 3).

Change. The main finding of Change contains the three abstracted themes, *Mental health/SUD*, *Self-concepts*, and *Responsibility*. These themes reflect changes in the participants observed by the participants themselves, their next of kin or the staff during the treatment process. Changes in Mental health/SUD was identified by approximately 70% of the studies and reflects change in a positive direction such as reduced stress, fewer cravings, and an increase in positive emotions (see Table 3). Changes such as increased self-awareness and regulation, together with pride and an increased sense of identity constitute the theme Self-concepts, which were identified by approximately half of the studies (see Table 3). The last abstracted theme, Responsibility, was identified by approximately one third of the studies. The changes reflect primarily increased feelings of being necessary and an increased sense of responsibility, as the animals needed to be cared for (see Table 3).

The Animals. The main finding The Animals contains three abstracted themes, *Promoting change*, *Unconditional love and support*, and *Connection*. These themes constitute aspects of the animals perceived as important by the participants. The theme Promoting change was identified by approximately 70% of the studies (see Table 3), and reflects which aspects of the animals that the participants or staff believed contributed to change, such as mirroring of body language and emotions, and promoting bonding amongst

group members (see Table 3). How the participants experienced the animals as providing unconditional love and support constitute the theme Unconditional love and support and was identified by nearly half of the studies (see Table 3). The last theme, Connection, was identified by approximately one third of the studies, and reflects how the participants bonded with the animals and experienced safe relationships (see Table 3).

The Program. The main finding The Program contains three abstracted themes, *Positive attitudes*, *Break from treatment*, and *Motivation*. These constitute aspects of the program considered important by the participants. The theme Positive attitudes was identified by approximately one third of the studies and reflects how the participants' perceived the treatment program, such as looking forward to spending time with the animals (see Table 3). The theme Break from treatment was identified by nearly half of the studies, and reflects how the participants viewed the time with the animals as a break from being a patient and a change of focus (see Table 3). The theme Motivation was also identified by nearly half of the studies. This theme constitutes how the participants perceived the treatment program and the animals as increasing their motivation for completing the program (see Table 3).

Table 3
The nine abstracted themes with frequency effect sizes, organized in three main findings

CHANGE (ES)	THE ANIMALS (ES)	THE PROGRAM (ES)
Mental health/SUD (71.4%)	Promoting change (71.4%)	Positive attitudes (28.6%)
The addiction: recovery aided by EAT but not as an independent method ^{(1)a} Feeling good ⁽²⁾ Safe and calm ⁽²⁾ Reduced stress ⁽³⁾ Equine healing partners: building strength, confidence and purpose ⁽⁶⁾ Negative emotions relieved ⁽⁷⁾ Felt more relaxed and experienced a calming atmosphere ⁽⁷⁾ Horses serve as a distraction from negative thoughts and cravings ⁽⁷⁾	Horse communication: horse's non-judgmental state increases trust and self-esteem ⁽¹⁾ Horse as a mirror: of emotions, body language and behavior ⁽²⁾ Growth of bonding and coping mechanisms: the dog facilitated bonding in group and increased self-esteem ⁽³⁾ A reminder of treatment experiences ⁽⁵⁾ Horse gives feedback on body language, emotions and behavior ⁽⁷⁾	Positive experience with the animals: focus on positive talk when describing AAT ⁽⁴⁾ Horse made facility feel more like home ⁽⁷⁾ Facility felt less like an institution ⁽⁷⁾ EAT was preferred over any other previous therapy ⁽⁷⁾ Looked forward to EAT sessions ⁽⁷⁾
Self-concepts (57.1%)	Unconditional love and support (42.9%)	Break from treatment (42.9%)
The teenager: calmness, focus and pride ⁽¹⁾ Self-regulation ⁽²⁾ Leadership ⁽²⁾ Control ⁽²⁾ Cooperation ⁽²⁾ Coping with nervousness ⁽²⁾ Doing something I know ⁽²⁾ To be seen as who I really am ⁽²⁾ Self-awareness ⁽⁴⁾ The change process, connecting with the horse: feelings of personal strength and improved sense of belonging ⁽⁶⁾	Communication ⁽²⁾ Realization of unconditional love ⁽³⁾ Friendship, companionship and relationship ⁽⁵⁾ Source of unconditional love and support ⁽⁵⁾ Mutual comfort, love and support ⁽⁵⁾	Change of focus ⁽²⁾ To be a patient ⁽²⁾ Activities and fun ⁽⁵⁾ Enjoyed hands-on approach ⁽⁷⁾
Responsibility (28.6%)	Connection (42.9%)	Motivation (42.9%)
Feeling necessary ⁽²⁾ Teaches responsibility and discipline ⁽⁵⁾ Serves as parent preparation ⁽⁵⁾	Human comparisons ⁽²⁾ Exclusivity ⁽²⁾ Mutual affection ⁽²⁾ Shared experience ⁽⁵⁾ Bonded and developed trusting relationships ⁽⁷⁾ Connected with the horse as a living being ⁽⁷⁾	Therapy or activity: motivation to complete program ⁽²⁾ Acceptance of companionship: group members formed close friendship ⁽³⁾ Social mediation: positive group associations ⁽⁴⁾

Note. ^a See Table 2 for references corresponding to study numbers. Original themes are reported verbatim. In cases where the theme is not self-explanatory, the theme is followed by a brief specification of details to clarify its belonging in the abstracted theme. ES = Frequency effect size (number of studies reporting an abstracted theme/total number of studies).

Discussion

Summary of the Findings

The results from both the quantitative and the qualitative studies are overall positive, and as such, promising for the use of AAT in the treatment of SUDs. Two of the quantitatively oriented studies found that AAT had a significant positive effect on the therapeutic alliance (Minatrea & Wesley, 2008; Wesley et al., 2009). One reported that AAT had a significant effect on reducing dropout rates (Kern-Godal et al., 2012). Pollack's (2009) descriptive results were not significant, but indicated that AAT could have a positive effect on reducing psychological symptoms and an increasing readiness to change.

The metasummary yielded nine abstracted themes organized into three main findings: Change, The Animals, and The Program. The abstracted themes Mental health/SUD and Promoting change were identified by approximately 70% of the studies, indicating that these themes are central, as they re-occur in different populations and with the use of different animals. Moreover, the frequency effect sizes are overall relatively high, which indicates a general consistency of findings across studies. However, the authors of the quantitative studies stated that they did not manage to establish a solid causal relationship between AAT and the outcome measures. The qualitative studies also vary with respect to thoroughly prepared methods and measures to ensure validity. As such, the current qualitative research, although positive, is tentative and can for the time being primarily function to generate hypotheses that should be investigated systematically.

Limitations of the Study

The search strategy applied in this systematic review has some limitations. The

search was performed in three databases, and although these are thought to cover the majority of publications in the field of psychology, the use of other databases might have produced different results. A further limitation was the issue of retrieving relevant articles, as one non-published dissertation and one published article were impossible to retrieve. Finally, the search for relevant studies was performed through reading abstracts resulting from the initial search of animal-assisted therapy, and it is possible that some studies were missed due to lack of relevant information in the abstracts.

Regarding internal validity, there should ideally have been more than one independent rater of the abstracted themes in the metasummary, and more than one person should have performed the screening for eligible studies. Since all of the results are positive, the risk of publication bias is a possibility. However, not all the included quantitative studies are formally published, which can reduce the risk of publication bias. This lack of formal publication might however also affect the quality and validity of the studies, as they have not been subjected to peer review, which is important to consider when evaluating the results.

Methodological Challenges of the Field

It is well documented that some research designs are better suited to answer research questions regarding the effect of interventions than others, especially with respect to the validity of the research findings (Akobeng, 2005). Validity refers to the extent to which the tests are measuring what they claim to measure, and is of pivotal importance regarding the trustworthiness of the research findings (Akobeng, 2005). Within quantitative oriented research, RCTs are regarded as one of the most robust designs for hypothesis testing. (Akobeng,

2005; Last, 2001). The research on AAT and SUDs have a general lack of such randomization and control (Anestis et al., 2014), and only three studies approaching an RCT design were identified in this review (Kern-Godal et al., 2012; Minatrea & Wesley, 2008; Wesley et al., 2009). Wesley et al. (2009) and Minatrea and Wesley (2008) applied a design that can be categorized as an RCT, with controlled variables and random assignment to either a treatment or a control group. However, Minatrea and Wesley (2008) utilized a sample size in the experimental group ($n=12$) that was smaller than ideal to achieve sufficient statistical power. Low statistical power poses a threat to statistical conclusion validity in that it increases the risk of concluding with no effect, when an effect truly exists (Cozby, 2007). Kern-Godal et al. (2012) only present preliminary results in the form of a poster with little methodological information; hence, it was not possible to assess whether the design applied can be categorized as an RCT. The study utilized a control group, although assignment to either group was not random as participation in the EAT was voluntary. This implies a lack of control over variables that might affect the outcome, as it is possible that the participants who chose EAT have characteristics that allow them to profit better from the program.

Three of the studies reviewed present effect sizes (Kern-Godal et al., 2012; Minatrea & Wesley, 2008; Wesley et al., 2009). Effect size is a quantitative measure of the strength of a phenomenon. There are different ways of measuring effect size, although a larger absolute value always indicates a stronger effect (Cozby, 2007). Two of the studies utilize the measure *eta squared* (Minatrea & Wesley, 2008; Wesley et al., 2009). Eta squared is a measure that describes the ratio of variance explained by the experimental factor while also

controlling for other predictors (Cohen, 1973). It is argued that eta squared is a biased estimate as it only measures the variance explained in the sample and not in the population, hence that it will always overestimate the effect size (Pierce, Block, & Aguinis, 2004). This might question the validity of the findings from Minatrea and Wesley (2008) and Wesley (2009) studies, in which the effect sizes indicate that AAT is the most important contributor to the observed effect in the rating of alliance.

To be able to replicate the findings, a thorough description of the methods, interventions, and participants is important (Cozby, 2007). This is especially important in a relatively new field with limited research. However, in the case of the literature reviewed here, it can be argued that the information provided is less detailed than ideal to enable replication. The exception is Wesley et al.'s (2009) study which provides detailed information on the participants, interventions, and methods.

As in the case with quantitative research, there are also some methods in qualitative research that are regarded as better suited to answer research questions. Thematic analysis is a widely used approach for data analysis in psychological research (Braun & Clarke, 2006). It is an approach that is free from any theoretical position, and thus invites a flexible approach to data analysis (Braun & Clarke, 2006). It has been argued that it is not an independent method in itself, but rather a technique that can be used across a range of specific methods (Ryan & Bernard, 2000). The flexibility of the method includes a lack of concise guidelines (Braun & Clarke, 2006), which implies that researchers applying this method must explicitly state their theoretical position to enable the readers to follow the research process (Holloway & Todres, 2003). All of the studies reviewed here utilized thematic analysis; however, not all

studies specified their theoretical framework. This can hinder the reader's possibility of following the research process and thus also reduce the transferability of the results. Transferability of results also depends upon a detailed description of the data gathering, analysis, and participants (Attride-Stirling, 2001). When this level of detail is less than ideal, as in some of the articles included in this review, the transferability of the results becomes reduced. Even though all the authors stated their research question, many of the questions were general in nature and thus might not be able to generate knowledge about specific mechanisms of AAT. Furthermore, even though several of the studies used methodological triangulation to a certain degree, there was a general lack of thorough preparation of such measures to ensure the validity of the results.

Qualitative oriented designs are exploratory in nature and can contribute to the generation of hypotheses about causal relationships, which is advantageous in a developing research field. However, there is a continued need for more detailed research aimed at specific aspects of AAT and SUDs, and the studies reviewed in this paper are unfortunately more general than ideal. Thus, there is a clear need for more randomized and controlled studies to enable a valid evidence base for AAT in the treatment of SUDs.

Factors of Animal-Assisted Therapy that may Facilitate Change: A Tentative Explanatory Model

Quantitative oriented research is adequate for establishing causal or correlational relationships, whereas qualitative research can contribute to generating hypotheses about possible moderators or mediators of these relationships. Therefore, both the quantitative and qualitative results included

in this systematic review were combined to produce an overall model (see Figure 2). The model aims to tentatively explain the associations between specific factors of AAT identified in the metasummary, and three of the outcome measures identified in the narrative synthesis.

Pollack's (2009) results from her descriptive analysis on AAT's effect on psychological symptoms were not significant. However, several other studies support AAT's beneficial effect on mental disorders and psychological symptoms (Holmes, Goodwin, Redhead, & Goymour, 2012; McCullough, 2012; Pedersen et al., 2012). Thus, it was concluded that the inclusion of the factor Reduction in psychological symptoms would be beneficial. The outcome measure of Readiness to change was not included in the model. Even though this is an important factor in SUD treatment, AAT's effect on this factor with SUD patients has, to our knowledge, not been investigated by studies other than Pollack (2009), and her results were not significant. Furthermore, the abstracted theme Responsibility was excluded from the model, mainly due to the low frequency effect size indicating less consistency across studies.

The abstracted theme Promoting change (see Figure 2) is thought to act as a mediating variable in the model. This variable reflects how characteristics of the animals, such as giving feedback on participants' emotions and mirroring their body language, might promote therapeutic change. Since the animals are the central aspect of AAT (Parshall, 2003) and the participants emphasized how the animals promoted therapeutic change, it is reasonable to assume that certain characteristics specific to the animals govern the relationship between AAT and the outcome measure. Furthermore, the variable Promoting change is also thought to partly

mediate seven of the abstracted themes identified in the metasummary. These seven themes represent moderating variables in this model. In other words, Promoting change is the variable that accounts for the relationships between AAT and the three outcome measures, while the seven moderating variables either strengthen or weaken these relationships. Some of the relationships in the tentative model are more supported by research than others. The outcome Reduction in psychological symptoms is only found in other populations, and some of the moderating variables are only theoretical at this given point.

Psychological symptoms. As seen in Figure 2, the factors Mental health/SUD and Self-concepts are thought to moderate the relationship between AAT and Psychological symptoms. An increase in psychological well-being as a result of interaction with the animals can benefit people with psychological symptoms (Beck & Katcher, 2003). Furthermore, the increase in self-awareness and feelings of personal strength reflected in the variable Self-concepts are factors that are positively associated with self-efficacy (Bandura, 1982; Foster, Neighbors, & Young, 2014). Self-efficacy can increase individuals' ability to cope with difficult emotions connected to psychological symptoms (Bandura 1997, as Cited in Muris, 2002).

Therapeutic alliance. As seen in Figure 2, the variables Mental health/SUD, Connection, and Positive attitudes are thought to moderate the relationship between AAT and therapeutic alliance. The factor Mental health/SUD constitutes how interaction with the animals reduced stress and negative affect.

As high levels of distress are found

to reduce the patient's ability to form an alliance (Knobloch-Fedders, Pinosof, & Mann, 2004), the reduction in negative affect seen in AAT might increase the ability to form an alliance. Furthermore, the patients' positive attitudes towards the program might also contribute to an increased alliance, as patients who receive a treatment that they prefer experience an increase in therapeutic alliance over time (Iacoviello et al., 2007).

The high prevalence of personality disorders (PD) among SUD patients (Verheul, 2001) implies that this population might be particularly challenging with respect to therapeutic alliance, as many such disorders implies difficulties with interpersonal relationships and regulation of emotions. Such difficulties are also prevalent among SUD patients without a PD (Hendershot, Witkiewitz, George, & Marlatt, 2011). The relational connection between the patient and animal is an important aspect of AAT (Parshall, 2003), and animals can function as attachment objects (Zilcha-Mano et al., 2011). According to attachment theory (Bowlby, 1958 as cited in Cihan et al., 2014) interaction with an available and supportive attachment object can foster positive inner working models of interaction, and as such contribute to increased self-worth and an adaptive regulation of emotions (Mikulincer & Shaver, 2007; Zilcha-Mano et al., 2011). Thus, the patients' connections with the animals can create positive experiences with interaction, experiences which can be transferred to human relationships (Forsberg, 2007; Koren & Træen, 2003), and might contribute to an improved foundation for forming a therapeutic alliance.

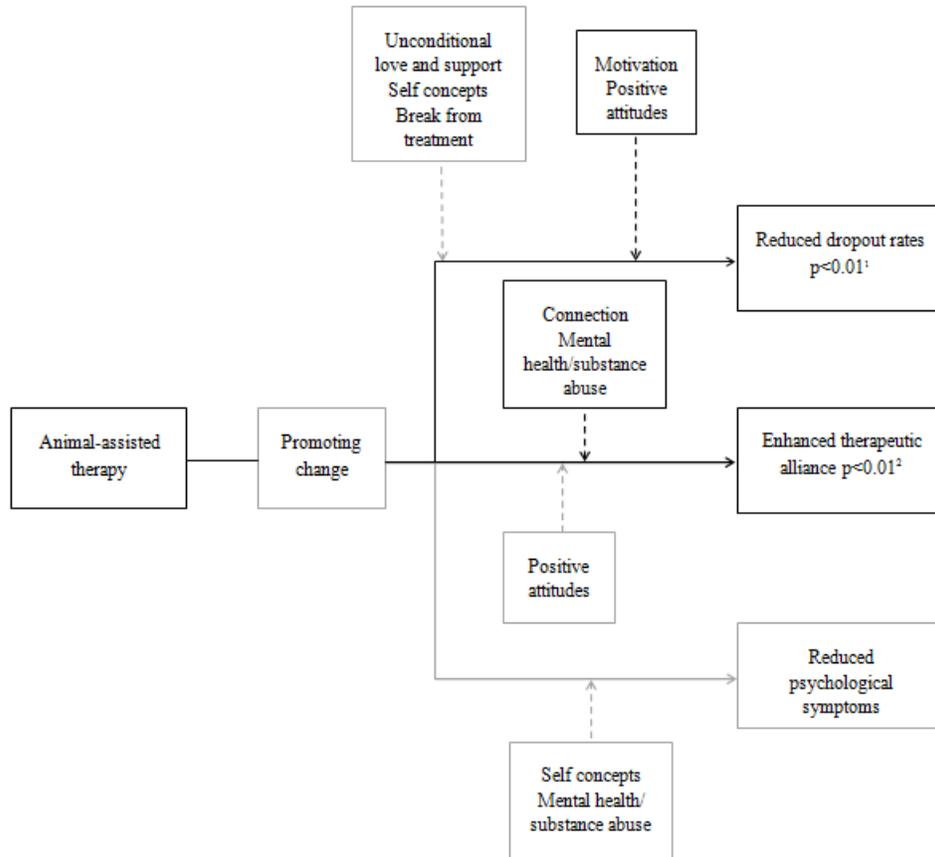


Figure 2. The figure illustrates the tentative explanatory model of the associations between the abstracted themes and the relationships between AAT and three outcome measures indicated by the quantitative studies. Variables with little empirical support or theoretical grounding are presented in the color grey, whereas the variables that have a larger degree of empirical support are presented in black. A solid line indicates a mediating effect while a dotted line indicates a moderating effect. ¹Kern-Godal et al. (2012). ²Minatrea and Wesley (2008); Wesley et al. (2009).

Dropout rates. As seen in Figure 2, the variables Motivation, Unconditional love and support, Self-concepts, and Break from treatment are thought to moderate the relationship between AAT and reduced dropout rates. High dropout rates are a recognized challenge in SUD treatment, and can be a barrier for a successful treatment outcome (Lie & Nesvåg, 2007). Increased motivation is found to reduce dropout from SUD treatment (Ryan, Plant, & O'Malley, 1995), and as such, the motivation created by the animals might contribute to the reduced dropout rates identified by Kern-Godal et al. (2012). Negative attitudes towards the treatment program are found to be one of the reasons for dropping out (Ball, Carroll, Canning-Ball, & Rounsaville, 2006). Thus, the positive attitudes resulting from interaction with the animals might contribute to a reduction in drop out.

The experience of having a break from treatment and the patient role might create a less intense treatment experience and make the process less demanding, and as such reduce dropout. In the same way, the contact with the animals and the receiving of unconditional love might also contribute to a less intense treatment experience, and thus reduce dropout. The reported positive changes in self-concepts, such as pride and self-regulation, can provide the participants with more tools for dealing with distress. As unmanageable distress in treatment increases the probability for dropout, these positive changes in self-concepts may contribute to a reduced dropout rate.

To summarize, the factors of AAT identified in the metasummary can function as mediating or moderating variables of the associations between AAT and the three outcome variables. Some of these hypotheses are supported indirectly by research on effects of AAT

and by research on challenges related to SUD treatment. However, this tentative explanatory model is meant only to present hypotheses about possible associations and to thus function as a guide for future research.

Focus for future research

The presented systematic review identified several methodological weaknesses in the current research, such as insufficient descriptions of data gathering and analyses together with a general lack of randomization and control. As there is still limited research on AAT and SUDs, exploratory qualitative studies are beneficial for further hypotheses generation; however, it is pivotal that they are well prepared with adequate methods and clearly defined research questions.

To our knowledge, no RCT has been performed on AAT's effect on long-term treatment outcomes, such as abstinence. Furthermore, there is a lack of investigation of the specific characteristics of AAT that may facilitate change. This is also true regarding SUDs. As this is a complex syndrome, it would be useful to investigate which factors of SUDs that AAT can affect. The tentative explanatory model presented here indicates hypotheses about such relationships that need to be investigated systematically.

There are some characteristics of SUDs incorporated in the model that would be particularly useful to investigate in relation to AAT, as they are documented challenges among SUD patients. Variables such as self-concepts, affect regulation, attachment, and distress are associated with both the development and sustainment of SUDs, and with documented challenges to a positive treatment outcome, such as treatment

retention and therapeutic alliance (Fox et al., 2007; Hendershot et al., 2011). Distress and affect regulation are found to be improved by AAT in other populations (Allen, Blascovich, Tomaka, & Kelsey, 2001; Burger et al., 2009; Stetina et al., 2011) while self-concepts have at the present only been investigated exploratively, but with positive results (Bachi, Terkel, & Teichman, 2011).

Self-efficacy is associated with some of the variables in the presented model but is not an independent finding. Low levels of self-efficacy are associated with relapse and continue substance use (Maisto, Connors, & Zywiak, 2000), and are found to be significantly enhanced through AAT in other populations (Berget, Ekeberg, & Braastad, 2008). As self-efficacy is found to be a predictor of abstinence (Ilgen, McKellar, & Tiet, 2005), this association between self-efficacy and AAT could be important in the further development of treatment interventions for SUDs.

Conclusion

This systematic review of AAT and SUDs is an endeavor to establish the present status of research and to aid future research. The findings were overall promising, and thus positive for the use of AAT in the treatment of SUDs. However, a marked lack of systematic evidence and several methodological weaknesses were identified, such as less than ideal efforts to ensure validity and replicability. The majority of the studies were exploratory, and none of the quantitative studies managed to establish any solid causal relationships. As such, the findings in this review are tentative, and should for the time being function only as elements for generating hypotheses about the eventual associations between AAT and SUDs. The hypotheses in the model presented

here are to a certain degree supported by research on AAT with patients with other clinical conditions, as well as on characteristics of patients with a SUD. The presented model is therefore presented to serve as an adequate platform for future research.

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