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El vínculo entre el ser humano y los animales: aspectos psicológicos y psicopatológicos

Paula Calvo Soler

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El vínculo entre el ser humano y los animales:

Aspectos psicológicos y psicopatológicos

Tesis preparada por **Paula Calvo Soler** para optar al título de Doctora por la Universitat Autònoma de Barcelona, en el Departamento de Psiquiatría y Medicina Legal en el Programa de Doctorado de Psiquiatría (UAB).

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RESUMEN

Los animales de compañía ocupan un importante lugar en las sociedades occidentales. Así pues, tiene sentido que se preste atención a la influencia que estos animales ejercen en la sociedad, desde los problemas generados por la convivencia con animales de compañía, hasta los beneficios que aportan a nivel individual y social. Y es la antrozoología la ciencia que esta relación entre humanos y el resto de animales.

Mediante esta tesis se pretende, en primer lugar, a partir de muestras de población española, añadir investigación en el ámbito de la antrozoología internacional, ampliando el conocimiento de cómo es a nivel psicosocial la relación o vínculo con los animales de compañía, mediante el estudio de estas relaciones desde tres ángulos diferentes y complementarios:

- La existencia de un vínculo humano-animal en la convivencia rutinaria entre un animal de compañía y el ser humano adulto que es su propietario.
- El aprovechamiento consciente de este vínculo humano-animal, mediante la aplicación terapéutica del mismo.
- La existencia de un vínculo humano-animal disfuncional en determinados individuos humanos.

El objetivo general de esta tesis doctoral es profundizar en la relación que se establece entre el ser humano y los animales de compañía, tanto en su vertiente positiva como negativa.

Para estudiar el vínculo humano-animal en la convivencia con los animales de compañía, se llevó a cabo un estudio con una muestra de conveniencia de participantes voluntarios propietarios de perros en España. El objetivo era explorar la existencia de diferentes patrones de relación de las personas con sus perros y los factores y/o variables que pudieran contribuir en los diferentes patrones de relación propietario-perro, desde el punto de vista de la percepción del propietario. Tras recopilar 1140 respuestas y analizar los resultados, encontramos dos patrones diferenciados de propietarios de perro (según su relación propietario-perro), un tipo emocional y otro pragmático.

Para estudiar la aplicación terapéutica de la relación humano-animal se llevó a cabo un ensayo clínico controlado a pequeña escala de un programa de terapia asistida con animales (TAA) para pacientes con esquizofrenia incluidos en un proceso de rehabilitación psicosocial. El objetivo era conocer los efectos del programa de TAA en un grupo de pacientes (grupo tratamiento) en comparación con un grupo control, que realizaba otro tipo de programas del proceso de rehabilitación psicosocial. Los resultados encontrados evidenciaron que los pacientes del grupo tratamiento mostraban, significativamente, una mayor adherencia al programa y una mayor mejoría en la sintomatología negativa en comparación con el grupo control.

Como aspecto psicopatológico relacionado con los animales de compañía decidimos estudiar el trastorno de acumulación de animales, puesto que no existían datos previos ni en España ni en Europa. Así, realizamos un estudio retrospectivo de recopilación de 24 casos en España con el objetivo de caracterizar este tipo de trastorno y poder comparar con datos previos. Encontramos que el perfil más habitual de acumulador corresponde a una persona (hombre o mujer) mayor de 65 años que vive sola, que acumula un promedio de 50 animales, la mayoría comprometidos en su bienestar, pertenecientes a una sola especie (perros principalmente y gatos en menor medida), que presenta una gran comorbilidad con el trastorno de acumulación de objetos (44% de los casos) y con un curso crónico de más de 5 años de acumulación. Estos datos exponían una gran similitud con los estudios previos en países anglosajones, apoyando la idea de que este trastorno de acumulación de animales es transversal en cualquier sociedad humana.

SUMMARY

Companion animals hold an important position in western societies. Hence, it is sensible to pay attention to the way companion animals influence the society. The consequences of the companion animals presence in our society include problems and benefits, individual or social, of living with them.

Through this thesis we intended, first of all, add scientific evidence to international anthrozoology research from Spanish population samples. We tried to extend knowledge of the psychosocial aspects of the relationship or bond between human and companion animals, through studying these relationships from three different but complementary aspects:

- The existence of a human-animal bond in the routine cohabitation between companion animals and adult human beings.
- The conscious utilization of the human-animal bond for therapeutic purposes.
- The existence of some human individuals presenting dysfunctional human-animal bond.

The global objective of this thesis consists of going further into the issue of the relationships between human beings and companion animals, thouching negative and positive aspects.

With the aim of studying human-animal bond in the area of cohabitation between companion animals and their adult human owners, we conducted a study with a convenience sample of volunteer Spanish dog owners. Our objective consisted of, first, exploring the existence of different patterns of owner-dog relationship, and, second, trying to find out the factors and/or variables that could contribute to different patters of owner-dog relationship. We could compile 1140 complete questionnaires. After analysing all data, we found two different patterns of dog owners (from the owner's perspective): a more emotional dog owner profile and a more pragmatic dog owner pattern.

To study the therapeutic approach of the human-animal bond we conducted a small-scale randomized controlled trial of an animal assisted

therapy program (AAT) for patients with schizophrenia who were enrolled in a conventional psychosocial rehabilitation process. The aim of this study was to figure out the effects of the AAT program for a treatment group of patients participating in AAT sessions, in comparison with the effects of other rehabilitation activities for a control group. The results showed that AAT treatment group showed statistically significant better results of adherence to treatment and of improvement of schizophrenia negative symptoms.

We also wanted to study a psychopathological aspect of human relationships with companion animals. We decided to focus our attention on an understudied disorder called animal hoarding, since there were no recorded data from Spain or other European countries. So, we conducted a retrospective study of animal hoarding cases compilation. We recorded 24 cases of animal hoarding in Spain with the aim of characterization of the animal hoarding disorder to be able to compare those characteristics with previous research.. We found that the most frequent profile of animal hoarder was a old (older than 65 years of age) person (man or woman) who lives alone and hoards a mean of 50 animals per case. Most cases showed animal welfare impairment. Usually the animal hoarder only had one species (mainly dogs and secondarily cats). There was an important comorbidity of animal and object hoarding (44% of cases). And most cases had a long course of hoarding (longer than 5 years). This characteristics exhibit many similarities with previous research in anglosaxon countries. These results support the idea that animal hoarding may be a ubiquous disorder in any human environment.

Dedicado a Glop, ese gran compañero de vida de cuatro patas, que dejó marcadas sus huellas en mi persona, para siempre, y que me motivó y acompañó para llegar hasta aquí.

La grandeza de una nación y su progreso moral pueden ser juzgados por el modo en el que trata a sus animales.

Mahatma Gandhi

Tormenting and killing of beasts by people, particularly children, would harden their minds even towards men.

John Locke (1693)

Sólo espero llegar a ser un día la gran persona que mi perro cree que soy.

Anónimo

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ÍNDICE

INTRODUCCIÓN GENERAL

1. Justificación del estudio del vínculo entre personas y animales de compañía en España y en el mundo

Los animales de compañía ocupan un importante lugar en las sociedades occidentales. Así, en Estados Unidos un 68% de las familias conviven con un animal de compañía (APPA 2016). En Europa se calcula que 75 millones de hogares tienen algún tipo de mascota (FEDIAF 2014). Y en España tenemos un 49'3% de hogares con animales de compañía (ANFAAC 2013), especialmente perros (26% hogares) y gatos (19% hogares) (FEDIAF 2014). Además, en 2016 el mercado de los animales de compañía en España supuso más de 1000 millones de euros de facturación (AedPAC 2017).

Si tenemos en consideración la amplia presencia de animales de compañía en nuestro entorno, tiene sentido que se preste atención a la influencia que estos animales ejercen en la sociedad, desde los problemas generados por la convivencia entre propietarios y no propietarios de animales de compañía, hasta los beneficios que aportan a nivel individual y social.

Existen diferentes teorías y mecanismos que pueden explicar la base de estos efectos de la interacción humano-animal entre personas y animales de compañía. Entre las principales explicaciones tenemos, en primer lugar, la teoría de la biofilia (Wilson 1984), que nos indica el necesario interés innato del hombre por la naturaleza y, por tanto, por los animales, ya que en los inicios de la historia humana este tipo de conocimientos podría tener consecuencias en la supervivencia de los humanos. Es decir, a mayor conocimiento tuviera el ser humano en cuanto al funcionamiento de las dinámicas de la naturaleza y el comportamiento de los animales, más fácil le resultaría predecir los peligros que podían acaecer del entorno o aprovechar los recursos que el entorno le ofreciera (Wilson 1984; J. Serpell 1996).

También como modelo de comprensión del vínculo humano-animal se plantean, en segundo lugar, la teoría del sistema de apego (Bretherton 1985; Cassidy and Shaver 1999) y, en relación con el sistema de apego, la existencia

del comportamiento afiliativo como rasgo universal humano (Depue 2005; Schultheiss and Brunstein 2010), que reflejan la innata necesidad del ser humano de relacionarse con otros individuos de su misma especie y de crear vínculos de afiliación y afección con ellos, llegando a crear lazos de apego con algunos. Estas necesidades humanas de afiliación y apego pueden ser uno de los mecanismos que expliquen la creación de afiliaciones y apegos incluso con individuos de otras especies (Serpell 1996; Podberscek, Paul, and Serpell 2005; Julius et al 2013; Sable 2013). De hecho, sobre las afiliaciones del ser humano con otras especies se ha propuesto un modelo basado en la tendencia del ser humano al antropomorfismo, mediante una serie de mecanismos cognitivos que llevan a la atribución de estados mentales a otros animales (Urquiza-Haas and Kotrschal 2015). En este modelo se sugiere que las atribuciones mentales a otros animales se apoyan en procesos correspondientes al desarrollo del dominio social, como la empatía, y en procesos más generales, como el razonamiento inductivo o causal del ser humano.

En tercer lugar, aparecería, como base de la interacción humano-animal, el sistema de comportamiento de cuidados a terceros que es inherente al ser humano (Brown, Penner, and Brown 2012) y que parece activarse también por la interacción con los animales (Julius et al. 2013). Es decir, la tendencia innata por parte del ser humano a cuidar de otros (Brown, Penner, and Brown 2012) puede trasladarse a querer cuidar de otros animales para satisfacer esa necesidad etológica humana (Serpell 1996; Podberscek, Paul, and Serpell 2005; Julius et al. 2013; Sable 2013). Además, parece que determinadas características de algunos animales, como ser peludos o tener aspecto infantil, podrían activar los mecanismos de cuidados parentales de las personas hacia otros animales (Serpell 1996; Beetz, Uvnäs-Moberg, et al 2012; Julius et al 2013; Thorn et al 2015). En definitiva, estos sistemas innatos en el ser humano, que favorecen y afectan a la relación que tenemos entre nosotros y nuestra necesidad de buscar y ofrecer apoyo social, igual que ayudan a establecer relaciones entre personas, parece que podrían explicar también cómo nos relacionamos y establecemos vínculos con otros animales, permitiendo, a

través de nuestros sistemas de apego, afiliación y cuidados, que nos sintamos vinculados a otras especies (Julius et al 2013).

Además, a nivel neurofisiológico se ha estudiado ampliamente el mecanismo biológico que regula las reacciones relacionadas con las interacciones aceptadas y agradables entre humanos. Así pues, al producirse una interacción social positiva entre personas se libera dopamina, endorfinas, oxitocina y vasopresina, a la vez que se produce una reducción de los niveles de cortisol, epinefrina y norepinefrina (hormonas estas últimas que aumentan en situación de estrés). El sistema oxitocinérgico ocupa una posición central en esta cadena de reacciones. Por ejemplo, actúa sobre el eje HPA (hipotálamo-pituitaria-adrenales) (Heinrichs, von Dawans, and Domes 2009; Ross and Young 2009; Young 2009; Brown, Penner, and Brown 2012). Este mismo mecanismo neurofisiológico aceptado para las interacciones sociales entre humanos también se ha empezado a estudiar en el ámbito de la interacción humano-animal. Así pues, se propone el sistema de la oxitocina, que es el implicado en los sistemas de apego y en los de comportamiento de cuidados a terceros en el ser humano, como el sistema que también regula las interacciones entre las personas y sus animales de compañía (Beetz, Uvnäs-Moberg, et al 2012; Julius et al 2013; Freund et al 2016).

Por tanto, tenemos diferentes tipos de aproximaciones para explicar el vínculo de las personas con sus animales de compañía, desde la psicosocial hasta la neurofisiológica, todas compatibles entre ellas.

En definitiva, teniendo en cuenta que existen unas bases que explicarían la existencia de un vínculo entre personas y animales de compañía, se han obtenido algunos resultados que indican que esta relación podría estar aportando beneficios a ambos, como en el estudio de Nagasawa et al del 2015 donde se observaban reacciones fisiológicamente positivas tanto en los perros como en sus propietarios al mirarse mutuamente (Nagasawa et al 2015). Si nos centramos, entonces, en los aspectos positivos que aportan los animales de compañía, encontramos que su presencia en el entorno humano va asociada a beneficios para las personas tanto psicológicos como fisiológicos, ya que se ha visto, por ejemplo, cómo la interacción con perros reduce los niveles de estrés

en niños con trastornos del apego (Beetz, Julius, et al 2012) o cómo hay correlación entre buenos indicadores de salud y la convivencia con animales de compañía (Headey and Grabka 2011), entre otros muchos resultados positivos encontrados (Crowell-Davis, Curtis, and Knowles 2004; Barker and Wolen 2008; Beetz, Uvnäs-Moberg, et al 2012; Friedmann, Barker, and Allen 2011; Headey 2014).

Pero también existen aspectos negativos debidos a la presencia de animales de compañía en nuestra sociedad. Así, las carencias en tenencia responsable de un animal de compañía pueden llevarnos a situaciones de crueldad o maltrato hacia los animales. Esta crueldad puede ser por maltrato por acción, como en los estudios en familias con historial de violencia doméstica donde se demuestra que el animal de compañía se convierte en una víctima más (McPhedran 2009; McEwen, Moffitt, and Arseneault 2014) o como los estudios en que se relaciona la violencia hacia los animales con la violencia hacia las personas, es decir, que aquellas personas con tendencia a ser crueles con los animales tienen una alta probabilidad de mostrar violencia hacia otras personas (Henry 2004; Ascione et al. 2007; Louise Petersen and Farrington 2007; Vaughn et al 2009). Pero el maltrato animal también puede ser por omisión, empezando por el abandono de perros y gatos, que tiene serias implicaciones económicas y sociales (Fatjó et al 2015), y acabando por los casos de acumulación de animales, donde el bienestar de los animales está seriamente comprometido por la incapacidad del acumulador de cubrir sus necesidades básicas (Nathanson 2009).

En general, a nivel internacional se ha producido un creciente interés en los últimos 25 años por el estudio del ámbito del vínculo humano-animal, a través del desarrollo de la ciencia llamada antrozoología (Uttley 2013), que, aunque estudia la relación de los humanos con cualquier otra especie animal, se ha focalizado especialmente en el ámbito de los animales de compañía, por su amplia presencia y sus altos niveles de contacto con las personas. Encontramos, por ello, numerosos estudios sobre los efectos y los mecanismos de la interacción con animales de compañía en muchos países, sobretodo anglosajones y germánicos (Blazina, Boyra, and Shen-Miller 2011; Christopher

Blazina and Kogan 2016; Freund et al 2016). Así, por ejemplo, en Gran Bretaña se han llevado a cabo una serie de estudios para comprobar los efectos positivos de la interacción con animales en el desarrollo infantil, sobretodo de la empatía (Williams, Muldoon, and Lawrence 2010; Muldoon, Williams, and Lawrence 2016). Y a pesar de que en España casi la mitad de los hogares tienen un animal de compañía (ANFAAC 2013), apenas existe bibliografía sobre estudios en nuestro país de las características de la tenencia y la convivencia con animales de compañía. Por ello, llevar a cabo estudios en España sobre el vínculo entre personas y animales de compañía colabora a añadir nuevas evidencias en el ámbito de la antrozoología.

Así pues, a diario se producen gran cantidad de interacciones con animales de compañía en España y en el mundo entero, con sus consecuencias, tanto positivas como negativas, pero hasta ahora existía un gran desconocimiento de la naturaleza y/o las características de esta relación humano-animal en la sociedad española.

Mediante esta tesis se pretende, en primer lugar, a partir de muestras de población española, añadir investigación en el ámbito de la antrozoología internacional, ampliando el conocimiento de cómo es a nivel psicosocial la relación o vínculo con los animales de compañía, mediante el estudio de estas relaciones desde tres ángulos diferentes y complementarios:

- La existencia de un vínculo humano-animal en la convivencia rutinaria entre un animal de compañía y el ser humano adulto que es su propietario.
- El aprovechamiento consciente de este vínculo humano-animal, mediante la aplicación terapéutica del mismo.
- La existencia de un vínculo humano-animal disfuncional en determinados individuos humanos.

2. El vínculo humano-animal en la convivencia con los animales de compañía

En principio, al intentar cuantificar y tipificar el vínculo entre una persona y un animal de compañía, se puede aplicar como base una teoría de psicología social bien establecida: la *teoría del intercambio social* (Emerson 1976; Cropanzano and Mitchell 2005). Esta teoría explica las relaciones sociales en función de un balance entre los costes y los beneficios que supone esa relación para cada uno de los dos actores de la misma. Así, las relaciones sociales que resultan positivas (y que, por tanto, no estarán en riesgo de romperse) para los componentes de la relación son aquéllas en las que los beneficios compensan o superan a los costes según la percepción de cada uno de los participantes de la relación. Este marco teórico que explica las interacciones sociales entre humanos, también es viable para explicar las relaciones entre humanos y otros animales (Netting et al 1987; Rehn & Keeling 2016).

Como ha quedado reflejado en el anterior apartado, está ampliamente reconocido que los seres humanos se vinculan con sus animales de compañía (Serpell 1996; Podberscek, Paul, and Serpell 2005; Julius et al 2013). Y, de hecho, la relación y el vínculo de una persona con su perro está plenamente aceptada y muy estudiada (Dwyer, Bennett, and Coleman 2006; Kotrschal et al 2009), hasta el punto de que un estudio publicado recientemente en Science, tal como comentamos en el apartado anterior, indica que existe reacción neurofisiológica mutua (liberación de oxitocina) cuando un propietario y su perro se miran a los ojos (Nagasawa et al 2015).

Entonces, aplicando la teoría del intercambio social al ya reconocido, como se ha explicado anteriormente, vínculo entre seres humanos y sus animales de compañía, se han creado herramientas psicométricas que permiten evaluar los niveles de vínculo que se establecen entre un propietario y su perro. Una de las principales herramientas para medir este vínculo humano-perro que se utiliza a día de hoy es la escala Monash Dog Owner Relationship Scale (MDORS), la cual se creó a partir de la implementación de la teoría del

intercambio social en la relación entre una persona y su perro, es decir, se trata de una escala que mide costes y beneficios percibidos por un propietario en cuanto a la convivencia con su perro (Dwyer, Bennett, and Coleman 2006). Así, durante la construcción y validación de esta escala MDORS llegó a concluirse que, según la teoría del intercambio social, la relación entre un propietario y su perro tiene tres componentes principales a cuantificar: el vínculo emocional, la interacción social y el coste percibido.

La investigación anterior sobre la convivencia y tenencia de un perro, usando la escala MDORS u otras herramientas, se ha dirigido hacia diferentes aspectos del vínculo humano-animal: 1) el análisis de las características psicológicas de este vínculo (Handlin et al 2012); 2) la relación con los niveles hormonales (cortisol y oxitocina) (Handlin et al 2012; Thielke and Udell 2017), 3) la relación en casos de problemas de conducta caninos (Bennett and Rohlf 2007); 4) la relación con las características del perro y/o del propietario (Bennett and Rohlf 2007; Meyer and Forkman 2014); 5) la relación con prácticas de tenencia responsable (Rohlf et al 2010); 6) la relación con el abandono de animales (Patronek et al 1996; DiGiacomo, Arluke, and Patronek 1998), y 7) la relación entre la perspectiva del perro y la del propietario (Rehn, Lindholm, and Keeling 2014).

A partir de este punto es donde en esta tesis se plantea, en primer lugar, aplicar la teoría del intercambio social al estudio de las relaciones de personas adultas con sus perros, mediante una herramienta ya creada y validada, la escala MDORS. Como la investigación anterior no había utilizado las herramientas existentes para definir claramente tipologías concretas de propietarios, principalmente, en esta tesis se ha querido, mediante la aplicación de la escala MDORS, explorar una población para determinar si se pueden definir patrones discretos (clusters) de propietarios de perro, es decir, diferentes perfiles de propietarios de perro según el nivel y la tipología de vínculo que perciban. Además, se ha querido conocer si existen factores concretos, como la edad, el nivel educativo o el género de la persona que finalmente afecten al tipo de patrón de vinculación que se establece entre el propietario y el perro, ya que en estudios previos se ha visto que hay

diferencias en la simple tenencia de animales de compañía, en la forma de relacionarse con estos animales, y/o en las actitudes hacia ellos según diferentes características socio-demográficas de la persona (nivel de ingresos, edad, género) (Herzog, Betchart, and Pittman 1991; Herzog 2007; Downes, Canty, and More 2009; Martins et al 2013).

3. Aplicación terapéutica del vínculo humano-animal

Quizás la principal contribución de la investigación en antrozoología hasta el momento es la exploración de los efectos de la interacción humano-animal en la salud humana: la prevención de la obesidad (Coleman et al 2008; Westgarth et al 2012; Wohlfarth et al 2013); la reducción de los riesgos de enfermedades cardiovasculares (Levine et al 2013; Schreiner 2016), y la promoción del ejercicio físico y la salud en la tercera edad (Raina et al 1999; Winefield, Black, and Chur-Hansen 2008), entre otras cosas.

Parece que se van esclareciendo las bases fisiológicas de estos efectos positivos en la salud humana debidos a la interacción con animales de compañía. Como se ha comentado anteriormente, se propone que en una persona se produce la activación del sistema oxitocinérgico al tener una interacción agradable con un animal, lo cual conlleva una serie de consecuencias neurofisiológicas positivas que explicarían los beneficios aportados por dicha interacción humano-animal (Beetz, Uvnäs-Moberg, et al 2012; Julius et al 2013).

Debido a la creciente percepción pública de los beneficios proporcionados por la interacción con animales, en todo el mundo y en nuestro país especialmente, en la actualidad existe una fuerte emergencia de las llamadas Intervenciones Asistidas con Animales (IAA), basadas en la presunción de que estas intervenciones funcionan por la especial relación con los animales de compañía inherente a los beneficios de la interacción humano-animal (Fine 2010). En cuanto a los resultados de este tipo de intervenciones asistidas con animales, a día de hoy parece que existen diversos beneficios terapéuticos en diferentes tipos de pacientes, desde aquellos con afectaciones

físicas, como enfermedades cardiovasculares (Cole et al 2007), hasta aquellos con trastorno mental (Barak et al 2001; Pedersen et al 2011). Según las revisiones sistemáticas realizadas hasta el momento sobre el ámbito de las IAA, parece ser que se obtienen principalmente beneficios de tipo psicosocial y especialmente en el ámbito de trastornos del desarrollo (autismo en niños principalmente) y trastornos mentales (en adultos), sobre todo cuando los animales empleados son perros (Nimer and Lundahl 2007; Kamioka et al 2014). De todas formas, estas mismas revisiones sistemáticas concluyen que la mayoría de estudios realizados sobre las IAA presentan dificultades metodológicas y está todavía sin determinar claramente qué tipo de beneficios pueden lograrse, en qué tipo de colectivos y/o perfiles de usuarios es más eficaz su aplicación, cuáles serían las dosis más eficientes (frecuencia de sesiones, tiempo de duración del programa, etc.), y cuáles son los mecanismos que explican su funcionamiento.

Así, existen ámbitos donde se aplican en mayor medida las IAA, como en el tratamiento de trastornos de la salud mental (Kamioka et al 2014; Maujean, Pepping, and Kendall 2015). Y en este campo, parece que se empiezan a recopilar evidencias científicas de los efectos positivos de las IAA, principalmente en los beneficios psicosociales que se derivan de este tipo de terapia. Aun así, debido a las dificultades metodológicas que implica realizar estudios en IAA, incluso en el ámbito de la salud mental donde frecuentemente se llevan a cabo, queda todavía por conocer exactamente qué tipo de IAA es la más adecuada para cada tipo de paciente o usuario. Por ello, para salvar el obstáculo de las limitaciones metodológicas intrínsecas a las IAA, conviene ampliar el número de estudios, para poder acumular más conocimiento científico que nos indique si las IAA son realmente efectivas en el tratamiento de trastorno mental y, exactamente, cuáles son la metodología y los perfiles de usuarios más adecuados para obtener mejores resultados terapéuticos.

Por todo ello, con esta tesis se planteó añadir evidencia científica en el campo de las IAA dentro del ámbito de la salud mental humana, mediante la realización de un estudio clínico aleatorizado y controlado con pacientes con esquizofrenia que participaron en un programa de terapia asistida con perros,

para conocer los posibles efectos, en diferentes aspectos (sintomatología, estrés y adherencia al tratamiento) de este tipo de terapia en pacientes con esquizofrenia institucionalizados, para poder incrementar el conocimiento sobre los efectos de las IAA en este tipo de pacientes, como se ha propuesto, tal como hemos dicho, en diferentes revisiones sistemáticas de IAA (Nimer and Lundahl 2007; Kamioka et al 2014; Maujean, Pepping, and Kendall 2015)

4. Formas disfuncionales de tenencia de animales de compañía: el trastorno de acumulación de animales

En los anteriores puntos de esta introducción me he referido especialmente a los efectos positivos de la interacción entre seres humanos y animales de compañía, pero también hemos de tener en cuenta los aspectos negativos de estas relaciones, generalmente con consecuencias perjudiciales para los animales implicados. Dentro de estos aspectos negativos de la relación humano-animal, quedan incluidos principalmente los que implican crueldad, maltrato y/o negligencia en el cuidado de los animales de compañía. Al principio de esta introducción ya hemos diferenciado la existencia del maltrato y/o crueldad hacia los animales tanto por acción como por omisión..

Así, existe el maltrato y la crueldad hacia los animales infringida de manera totalmente consciente e incluso disfrutando de ello. Principalmente estos casos se relacionan con falta de empatía en la persona, con trastornos asociados a comportamientos violentos de la persona generalizados, con una objetivización de los animales y/o con catalogarlos como seres de un grupo inferior (Haden and Scarpa 2005; Arluke 2006; Ascione and Maruyama 2011). Dentro de este ámbito de la crueldad activa hacia los animales es de gran relevancia social la ya demostrada tríada de violencia en la familia, es decir, existe una alta correlación entre el abuso, en un mismo hogar, hacia los niños, la pareja y los animales de compañía (DeGue 2011). Por ello, el estudio de los factores que afectan a la convivencia con animales de compañía, finalmente, también nos lleva, por

su íntima conexión, al estudio de las relaciones dentro del entorno de la familia.

También se considera maltrato animal el fenómeno universal del abandono de animales de compañía por parte de sus propietarios (Fatjó et al 2015), que supondría un fracaso de la convivencia humano-animal por un defecto de vínculo quizá, como diversos estudios parecen apuntar, en los que se habla de las causas que impiden o afectan negativamente a la relación de un propietario con un perro, y que parecen indicar que, por ejemplo, uno de los factores principales que dificultan la relación propietario-perro son los problemas de conducta del perro y la falta de información que tenga el propietario sobre este tipo de complicaciones (Serpell 1996; Marston and Bennett 2003; Mondelli et al 2004; Bennett and Rohlf 2007).

Uno de los fenómenos que supone un efecto negativo del vínculo, concebido de forma inadecuada, entre personas y animales de compañía es el del trastorno de acumulación de animales (Patronek 1999; Patronek 2001; Nathanson 2009). Considerado también como un tipo de maltrato animal por omisión (Nathanson 2009), este trastorno fue reconocido como tal en 2013, al ser incluido en la categoría de trastornos de acumulación en la 5ª edición del Manual diagnóstico y estadístico de los trastornos mentales (DSM-V) (Mataix-Cols et al 2010; American Psychiatric Association. DSM-5 Task Force. 2013). Además, en cuanto al trastorno de acumulación de animales parece que se trata de un fenómeno transversal del que se pueden ver casos en muchos lugares del mundo (Patronek 2001). Aun así, se trata de un trastorno muy poco estudiado, tanto en cuanto a etiología como en cuanto a epidemiología (Patronek 1999; Nathanson 2009; Patronek and Nathanson 2009).

Este trastorno muestra serias implicaciones a nivel de salud en tres aspectos: salud mental del acumulador, bienestar de los animales implicados y salud pública (Patronek 2001; Hoarding of Animals Research Consortium 2002; Kuehn 2002; Nathanson 2009). Es decir, cuando surge un caso de trastorno de acumulación de animales, en primer lugar, tenemos una persona que vive en condiciones insalubres y con problemas de salud mental. En segundo lugar, un caso de acumulación de animales suele llevar a la negligencia en los cuidados

de los animales afectados, los cuales suelen tener serios problemas clínicos y comportamentales. Finalmente, el trastorno de acumulación de animales supone también un problema de salud pública, puesto que en aquella comunidad donde se ubica uno de estos casos hay peligro, a partir de los animales enfermos y hacinados, de transmisión de enfermedades infecciosas y/o parasitarias y de toxicidad en el entorno por culpa del amonio acumulado por no tener el espacio de los animales adecuadamente higienizado. Además, la acumulación de restos de animales puede atraer plagas tanto de insectos como de otros animales. En definitiva, el trastorno de acumulación de animales no se limita a la persona implicada, sino que podemos considerarlo como un problema social y comunitario.

El trastorno de acumulación de animales, en cuanto a su etiología, parece implicar la existencia de un vínculo del propietario hacia los animales de compañía, pero que, por causas aún no bien conocidas, llevan a una negligencia en el cuidado de sus animales (Arluke and Killeen 2009; Brown 2011; Steketee et al 2011; Ramos and Cruz 2013). Un modelo etiológico de la acumulación de animales ha sido planteado por el grupo Hoarding of Animals Research Consortium (https://vet.tufts.edu/hoarding/), que fue el primer grupo de investigación dedicado a estudiar este trastorno. En este modelo se propone que el acumulador de animales como una persona que en su infancia padeció algún tipo de trauma, principalmente por abusos, maltrato o negligencia parentales y que, entonces, padecería algún tipo de trastorno del desarrollo, que podría estar agravado por factores genéticos, fetales, psicosociales o del entorno. Todo esto podría provocar un trastorno del apego y que, en el caso de que la persona presente rasgos de personalidad de poca introspección, inestabilidad emocional, y vida caótica interna y externamente, podría llevar a relaciones humanas inadecuadas que no colaborarían a saber sobrellevar traumas y estrés en la etapa adulta. Entonces, la persona con estas características podría refugiarse en el amor y aceptación incondicional que ofrecen los animales, llegando a excederse en la intención de ocuparse de los animales, cosa que a la vez le estaría aportando un sentido de identidad, autoestima y control a su vida. Y, al padecer la persona un suceso traumático o

de crisis en su vida (una pérdida grave, por ejemplo, de trabajo o de pareja), su capacidad de sobrellevarlo sería insuficiente y caería en la acumulación de animales en exceso, hasta el punto de no cumplir con las necesidades mínimas para el bienestar tanto de los animales como del acumulador mismo (**Figura 1**) (Patronek, Loar, and Nathanson 2006; Patronek and Nathanson 2009; Nathanson 2009; Brown 2011; Steketee et al 2011; Nathanson and Patronek 2012). En este modelo incluso se habla de diferentes tipologías de acumuladores, siendo el más común y conocido el acumulador-rescatador de animales, que se consideraría un tipo de altruismo patológico, puesto que, justificándose como salvadores de animales maltratados o abandonados, acumulan animales que, finalmente, padecen maltrato por parte del acumulador debido a su negligencia para cumplir con los mínimos cuidados que los animales necesitan (Nathanson and Patronek 2012).

Conocer la etiología y la epidemiología del trastorno de acumulación de animales se considera una prioridad para poder crear protocolos eficientes de prevención del trastorno, de detección precoz de casos, de actuación eficiente pluridisciplinar (tanto sobre los animales, como sobre el acumulador) al detectar algún caso, y de tratamiento del acumulador (Patronek, Loar, and Nathanson 2006).

En consecuencia, según lo explicado anteriormente, el estudio y recogida de casos de trastorno de acumulación de animales supone poder avanzar en este campo todavía poco investigado. Por ello, mediante esta tesis se ha pretendido poner de relieve la existencia de este tipo de trastorno también en España, caracterizar los casos, y comprobar las similitudes con los casos de los pocos estudios previos realizados en otros países (Papazian et al 2002; Lawrie and Nsw 2005; Berry, Patronek, and Lockwood 2005; Reinisch 2009; Steketee et al 2011; Ockenden, De Groef, and Marston 2014).

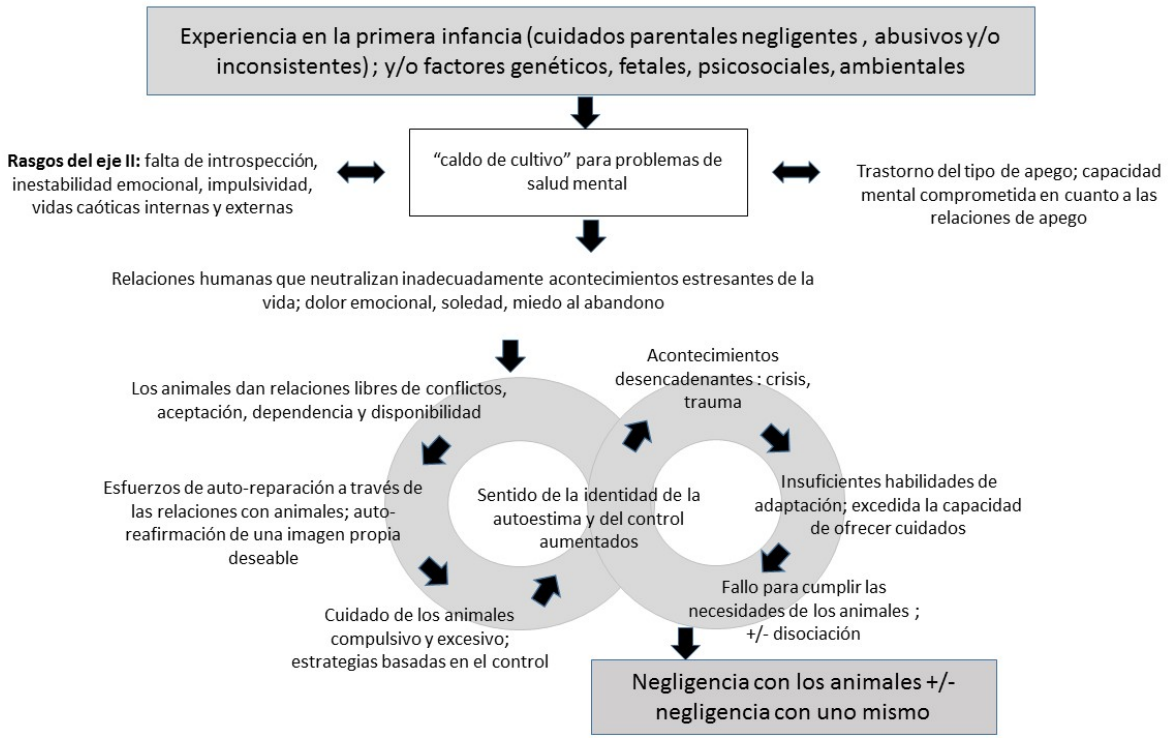

Figura 1: Propuesta de modelo etiológico del trastorno de acumulación de animales. Modificado de "Nathanson, JN, and Patronek, GJ. 2012. Animal Hoarding: How the Semblance of a Benevolent Mission Becomes Actualized as Egoism and Cruelty. In *Pathological Altruism*, 107-116. New York: Oxford University Press.

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OBJETIVOS

Objetivo general:

El objetivo general de esta tesis doctoral es profundizar en la relación que se establece entre el ser humano y los animales de compañía, tanto en su vertiente positiva como negativa.

Objetivos específicos:

1. Explorar la existencia de diferentes patrones de relación de las personas con sus perros, desde el punto de vista de la percepción del propietario, en el marco de la teoría del intercambio social.

2. Explorar la contribución relativa de las tres dimensiones (interacción, vínculo emocional y coste percibido) de la relación entre las personas y sus perros en la identificación de patrones generales de la relación.

3. Explorar los factores sociodemográficos del propietario que puedan determinar el patrón de relación de las personas con sus perros.

4. Estudiar la conexión entre el patrón de relación de las personas con sus perros y el nivel de satisfacción con la vida (medida con la escala Cantril) del propietario del perro.

5. Estudiar el efecto de un programa de terapia asistida con perros (TAA) como adyuvante en el tratamiento de la sintomatología de pacientes con esquizofrenia integrados en un proceso de rehabilitación psicosocial.

6. Estimar el impacto en los niveles de estrés, medidos a partir del cortisol salival, de los pacientes con esquizofrenia que participan en una sesión de terapia asistida con animales.

7. Recopilar casos de trastorno de acumulación de animales en España y caracterizarlos en función del perfil del acumulador y de los animales afectados.

8. Valorar el impacto del trastorno de acumulación de animales en el bienestar de los mismos, en una recopilación de casos de dicho trastorno en España.

CAPÍTULO 1

HIghly educated men establish strong emotional links with their dogs: a study witn Monash Dog Owner Relationship Scale (MDORS) in Committed Spanish Dog Owners

Basado en:

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RESEARCH ARTICLE

Highly Educated Men Establish Strong Emotional Links with Their Dogs: A Study with Monash Dog Owner Relationship Scale (MDORS) in Committed Spanish Dog Owners

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Abstract

The characteristics of the human-animal bond may be influenced by both owner-related and dog-related factors. A study was designed to explore the existence of different dog ownership patterns and their related factors.

We created an on line questionnaire that included demographic questions about the dog and the owner, a Spanish version of the Monash Dog Owner Relationship Scale (MDORS) and a validated measure of satisfaction with life (Cantril's ladder).

We collected 1140 valid responses from adult dog owners, who were recruited using the client databases of Spanish veterinary practices. We explored the presence of groups within the population using Principal Components Analysis (PCA) of the MDORS variables combined with Hierarchical Cluster Analysis (HCA). Two groups were found; Group I having a higher level of emotional involvement with their dogs compared with Group II. Binary logistic regression was used to explore demographic factors that influenced group membership. Four variables were significantly associated with membership of Group I ($p<0.0001$); male gender of the owner (OR=32.36), high school level of maximum educational attainment (OR=0.052), university level of maximum educational attainment (OR=8.652), and owner Cantril's score (OR=0.807).

The results obtained from this convenience sample demonstrate that different patterns of dog-ownership may be present within a population of owner-dog dyads, and that certain owner characteristics are associated with the type of owner-dog relationship. Future research could apply a similar approach to different types of sample population in order to identify specific patterns of dog-ownership.

Introduction

Dogs have become an important component of western societies and a large proportion of homes include a pet dog. According to recent estimates, 21% of European households [1] and 36.5% of US households own a dog [2]. With 31 % of households owning a pet dog, Spanish levels of dog ownership are typical for Europe [3]. Since differences in the patterns of relationships between dogs and owners have implications both for human and canine welfare and health, the formation, nature and consequences of human-dog relationships have been receiving increasing scientific attention [4]. Pet ownership has been shown to have potential benefits for human psychological and physical wellbeing [5] including a range of benefits for cardiovascular health [6]. However, whilst many human-dog relationships are successful, some fail and lead to relinquishment or abandonment [7]. It is therefore important to broaden our knowledge of patterns of dog ownership to understand those factors that may contribute to the success or the failure of human-dog relationships.

Emerson's social exchange theory considers a relationship to be successful if there is a positive balance between the benefits and costs of that relationship [8]. If a relationship's costs outweigh its rewards, then people tend to terminate or abandon it. The social exchange theory has been applied to pet-owner relationship, with researchers investigating the benefits and the costs of dog ownership and developing methods to assess the balance between benefit and cost for dog-owner dyads [4, 9].

Benefits of dog ownership include the dog's unconditional display of affection and acceptance, non-judgmental love and demand for interaction. The social support provided, together with increased social interaction, lead to positive physiological, neurochemical and psychological effects [7, 10].

Costs of dog ownership include accommodation issues, impediments to lifestyle, changes in social/family network and/or financial factors [7, 11, 12]. The study of owner-dog relationship profiles offers an alternative method to

study the costs and negative aspects of dog ownership, and thereby to bring to light important factors contributing to a successful owner-dog relationship.

It has been found that certain owner factors, such as age, sex, income/social class, marital status, rural/urban residence and household type, can have an effect on the profile of pet ownership [13-15]. The Monash Dog Owner Relationship Scale (MDORS) was created and validated for the assessment of human-companion dog relationships. This scale follows the principles of the social exchange theory and includes subscales relating to owner-dog interaction, emotional closeness and perceived costs [4].

Previous research on dog-ownership, using MDORS or other tools, has focused on different aspects of the human-animal bond, including: 1) analysis of the psychological characteristics of this bond [16], 2) relationship with hormone levels (cortisol and oxytocin) [16], 3) relationship with behaviour problems [17], 4) relationship with dog and owner characteristics [17, 18], 5) relationship with responsible ownership practices [19], and 6) relationship between owner and dog perspectives [20].

The aim of the present cross-sectional study was to look for different patterns of owner-dog relationship and to identify those owner and/or dog dependent factors, which influence the quality and type of relationship from the owner's perspective. To make a simple assessment of the owner's satisfaction with life, and to explore the relationship between this and characteristics of the dog-owner bond, we included Cantril's Self Anchoring Ladder [21].

We found two patterns of dog-owner relationship that differed in quality, mainly of the emotional aspect of the relationship, as well as those owner and dog characteristics, which were associated with those patterns. These results highlight factors to take into account when predicting the development of the relationship between a dog and its owner and further research of this kind may identify risk factors for dog abandonment and relinquishment. Given that the methodology of this study produced interesting and insightful results with a convenience sample, future research could apply the same approach to different kinds of populations to explore other forms of human-dog interactions, such as between service users and their assistance dogs.

Materials and Methods

Ethics statement

Permission to perform this study was sought, and obtained, from the Research Ethics Committee of the Department of Psychiatry and Legal Medicine at the Universitat Autònoma de Barcelona and the Clinical Research Ethics Committee of the Hospital del Mar Medical Research Institute.

Survey participants were fully informed about the purpose and background of the study by e-mail. As the study survey was entirely anonymous, informed signed consent was not required from participants. Participants were also able to abandon the online survey anytime.

Subjects

From April to November 2013, the Spanish Small Animals Veterinary Association (AVEPA) contacted its member veterinary practices to recruit them to take part in the study. Participating clinics were given instructions to e-mail their clients with a request to answer an anonymous online survey. During the client enrolment period, which was from April 2013 until January 2014, a total of 1850 adult current dog owners participated.

Materials

The online survey consisted of four sections:

- Owner demographics and characteristics of pet-ownership, such as sex, age, maximum level of education, family role, regional location, type of residential area (e.g. city/town/rural), and duration of ownership.
- The characteristics of the dog, such as sex, neuter status, age, size and breed.
- A standardized, back-translated Spanish language version of MDORS questionnaire [4]. The MDORS is a 28-item five point Likert multidimensional scale to measure the owner's perceived relationship with their dog. The MDORS includes three sub-scales related to separate

dimensions of the human-dog relationship; Owner-dog Interaction, Perceived Emotional Closeness, and Perceived Costs. There is no existing data to determine level of relationship quality (e.g. high, medium or low) from MDORS scores. So, scores can only be compared within a specified group of human-dog dyads. Higher scores in any of the three sub-scales of the MDORS indicate a positive perception with respect to that subscale, even if those variables belong to the sub-scale of perceived costs of MDORS. Higher scores in the Interaction Level sub-scale of MDORS mean higher level of interaction, higher scores in the Perceived Emotional Closeness sub-scale of MDORS mean higher emotional closeness, and higher scores in the Perceived Costs sub-scale of MDORS mean lower perceived costs for the owner.

- A validated Spanish version of Cantril's Self Anchoring Ladder [21, 22]. This psychometric tool consists of a single question to evaluate overall satisfaction with life. Respondents are asked to report their current level of satisfaction with life on a scale from zero (worst possible life) to 10 (best possible life). Satisfaction with life is considered one of the two major aspects of subjective wellbeing, with the other being emotional wellbeing [23].

Data analysis

When the client enrolment period ended in January 2014, three inclusion criteria were applied to select a population that was suitable for the intended analysis; respondents had to be from Spain, they had to have owned the dog for at least one year (to ensure there was a stable dog-ownership pattern), and they had to be 25 years of age or older. A high minimum age had to be specified to ensure that respondents were old enough for their maximum level of educational attainment and family role to be meaningful, and not merely a reflection of the limitations imposed by their age at the time of responding. Responses with inconsistent or incomplete data were also eliminated (for example when duration of ownership exceeded the dog's present age). This left a total of 1140 survey responses.

A total score and scores for each of the MDORS subscales were calculated according to the protocol set out by the authors of that scale [4].

Descriptive statistics were performed using Graphpad Prism 6. Prior to hierarchical clustering, all 28 items of the MDORS were included as variables in a Principal Components Analysis (PCA) model. This was for dimension reduction, to create a smaller number of variables that summarised the systematic relationships in the MDORS data. For the PCA, all data was first unit-variance scaled and mean centred. The model was automatically generated in SIMCA P+12, with the final number of principal components being determined by the point at which the addition of further principal components did not increase the cumulative value of Q^2 for the total number of components (as a measure of goodness of prediction) A two component model was generated, with the "emotional closeness" sub-scale items providing the strongest loadings for the first principal component and the "perceived costs" sub-scale items primarily loading onto the second principal component. Scores for the two principal components were then used for HCA (Ward's method, also performed within SIMCA P+12). A dendrogram plot (Fig 1) was generated, with the vertical axis set to indicate the loss in within-cluster similarity (the variance increase) as clusters merged. This was used to select the cluster solution for the later analysis; a two-cluster solution was chosen as this offered the greatest the greatest between cluster distance. The resulting model was explored and validated using Projection to Latent Structures-Discriminant Analysis (PLS-DA) to establish which MDORS variables contributed most to the difference between the two groups. Binary Logistic Regression (BLR. Enter method; SPSS 22) was used to identify those owner and dog characteristics which contributed to group membership.

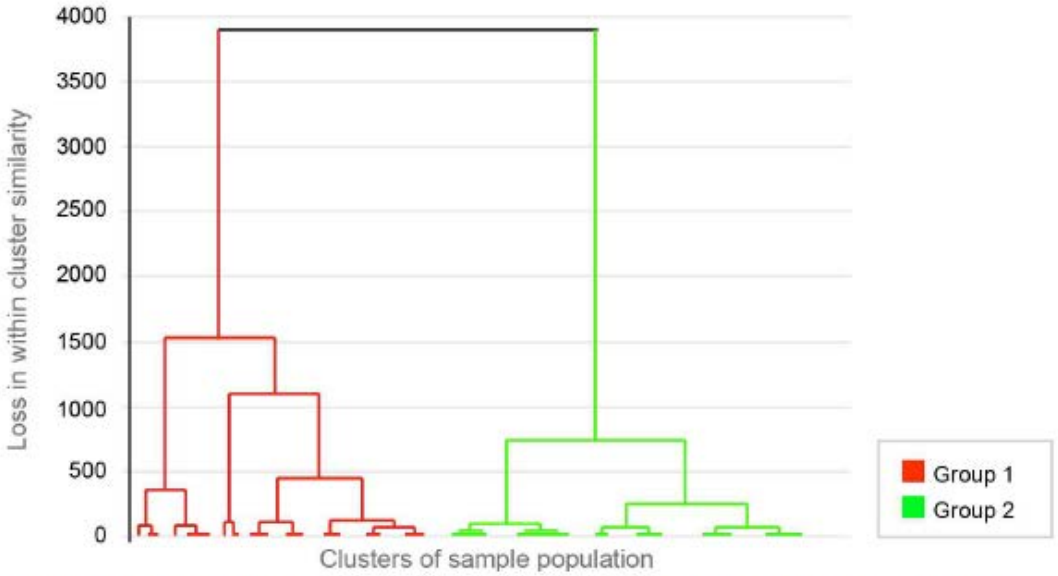

Fig 1. Dendrogram plot generated from the hierarchical cluster analysis of Principal Component analysis of MDORS results of the population study: Clusters distribution. This dendrogram represents the result of the HCA (Hierarchical cluster analysis). The plot shows the distribution of the sample population in different clusters. The sample population appears principally distributed in two groups (two big clusters) after PCA-HCA: Group I (higher emotional dog-owner bond) and Group II (lower emotional dog-owner bond). The vertical axis indicates the loss in within cluster similarity (i.e. the variance increase, when clusters are merged). The horizontal axis represents the cluster groups of all the individuals of the sample population.

Results

Recruitment process

We obtained 1850 completed questionnaires. After filtering all those responses using the pre-established inclusion criteria, we had 1140 completed and valid responses for analysis, which was considered the final study population.

Demographics

There was a sex bias in the respondent population, with 28.30% men and 71.70% women. The mean age of respondents was: 39.86 (SD= 10.24). Demographic characteristics of the sample are shown in Table 1. Demographic data for the Spanish national population (citizens of 25 years old or more) for 2013 (year of the study data collection) have been included in Table 1 to allow comparison with the demographics of the study [24].

Table 1. Dog Owners' Demographics of the study sample.

	N	% of the study population	% Spanish population (2013)
SEX			
Men	**324**	28.30	49.48
Women	**818**	71.70	51.43
AGE Mean 39.86 (SD = 10.24)			
25 to 40 years old	**649**	56.92	30.08
41 to 65 years old	**479**	42.01	31.26
> 65 years old	**12**	1.05	38.65
FAMILY ROLE			
Couple without children	**426**	37.36	21.64
Couple with children	**372**	32.63	34.92
Live alone	**136**	11.92	24.2
Son/daughter living with parents	**136**	11.92	-
Single-parent family	**75**	6.57	9.37
Share household with no relatives	**14**	1.22	3.09
Grandparent at family home	**11**	0.96	-
Other role	**28**	2.45	6.73
MAXIMUM ATTAINED EDUCATION LEVEL			
University	**658**	57.71	33.70
Vocational training	**224**	19.64	-
High school	**169**	14.82	21.70
Basic level	**89**	7.80	44.60
TYPE OF AREA			
Urban	**769**	67.45	-
Rural	**372**	32.63	-
SPANISH REGION			
Centre	**374**	38.80	23.54
North East	**326**	28.59	18.80
Eastern Coast	**161**	14.12	13.79
North	**110**	9.64	8.18
South	**90**	7.89	20.75
North West	**55**	4.82	8.18
Canary Islands	**15**	1.31	4.54
Balearic Islands	**9**	0.78	2.39

There was an almost equal split between male and female dogs, and pure and crossbred dogs; 41.31% were crossbreed dogs and 58.68% were pure breed dogs, the latter comprising 35 different breeds of which the most common was the Yorkshire Terrier (n = 79). Size of dogs was classified according to the dog's weight. Characteristics of the dogs of the sample are shown in Table 2.

Table 2. Demographics of dogs of the study sample.

	Total number	Percentage
SEX		
Male	**554**	48.59%
Female	**586**	51.40%
BREED		
Cross breed	**471**	41.31%
Pure breed	**669**	58.68%
SIZE		
Mini (< 2kg)	**30**	2.63%
Small (2-10kg)	**415**	36.40%
Medium (11-25kg)	**372**	32.63%
Large (26-50kg)	**304**	26.66%
Giant (>50kg)	**19**	1.66%
AGE Mean 5.43 (SD = 3.62)		
1–5 years old	**679**	59.56%
6–10 years old	**314**	27.54%
>10 years old	**147**	12.89%
TIME OF OWNERSHIP		
1–2 years	**354**	31.05%
3–5 years	**381**	33.42%
6–10 years	**279**	24.47%
>10 years	**126**	11.05%

Cantril's Self-Anchoring Scale

Mean score for Cantril's Self-Anchoring Scale was 7.03 (SD=1.713). See Fig 2 for the distribution of values.

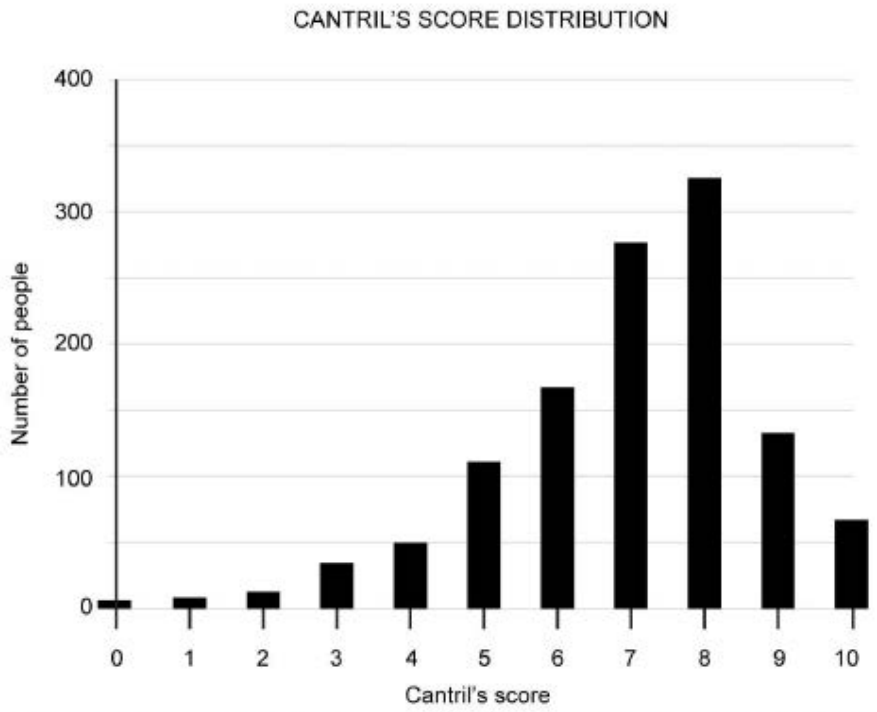

Fig 2. Cantril's score (Satisfaction of life score) distribution of the dog-owners of the sample population.

Dog-owner relationship: MDORS results

Mean scores for single items, subscales, and the total MDORS score are summarized in Table 3.

Table 3. MDORS results: Mean scores for single items, subscales and the total MDORS score.

MDORS ITEM	Mean (SD)
Sub-scale I: Dog-Owner Interaction (Score range: 9–45)	**36.35 (4.76)**
How often do you kiss your dog?	**4.20 (1.50)**
How often do you play games with your dog?	**4.79 (0.61)**
How often do you take your dog to visit people?	**3.97 (1.36)**
How often do you buy your dog presents?	**3.16 (1.04)**
How often do you give your dog food treats?	**4.10 (1.19)**
How often do you take your dog in the car?	**3.25 (1.16)**
How often do you groom your dog?	**3.13 (1.18)**
How often do you hug your dog?	**4.83 (0.58)**
How often do you have your dog with you while relaxing, i.e. watching TV?	**4.88 (0.53)**
Sub-scale II: Emotional Closeness (Score range: 10–50)	**44.70 (5.27)**
My dog helps me get through tough times.	**4.54 (0.69)**
My dog is there whenever I need to be comforted.	**4.63 (0.66)**
If everyone else left me, my dog would still be there for me.	**4.74 (0.58)**
I would like to have my dog near me all the time.	**4.22 (0.97)**
My dog provides me with constant companionship.	**4.39 (1.21)**
How often do you tell your dog things you don't tell anyone else?	**4.28 (1.34)**
My dog is constantly attentive to me.	**4.19 (0.94)**
How traumatic do you think it will be for you when your dog dies?	**4.67 (0.55)**
My dog gives me a reason to get up in the morning.	**4.36 (0.85)**
I wish my dog and I never had to be apart.	**4.64 (0.73)**
Sub-scale III: Perceived Costs (Score range: 9–45)	**38.18 (4.98)**
How often do you feel that looking after your dog is a chore?	**4.66 (0.80)**
It is annoying that I sometimes have to change my plans because of my dog.	**4.09 (0.95)**
How often does your dog stop you doing things you want to?	**4.41 (0.81)**
There are major aspects of owning a dog I don't like.	**4.22 (0.94)**
It bothers me that my dog stops me doing things I enjoyed doing before I owned it.	**4.30 (0.87)**
My dog costs too much money.	**3.51 (1.13)**
My dog makes too much mess.	**4.08 (1.00)**
How often do you feel that having a dog is more trouble than it is worth?	**4.76 (0.66)**
How hard is to look after your dog?	**4.16 (0.78)**
Total MDORS (out of a possible 140)	**119.20 (11.07)**

The scoring system corresponds to the original MDORS scale [4]. Each item has a score range between 1 and 5. Score ranges for each sub-scale are included too. (SD = standard deviation)

All MDORS variables were included in a PCA, This produced a two component model (R^2=0.419, Q^2=0.198). See Table 4 for results of loadings of the PCA.

Table 4. Results of the PCA of MDORS variables results of the population of the study.

MDORS Item	PC 1	PC 2
1. I wish my dog and I never had to be apart	0.281048	-0.105922
2. I would like to have my dog near me all the time	0.280355	-0.133206
3. My dog helps me get through tough times.	0.275265	-0.093508
4. My dog is there whenever I need to be comforted.	0.267292	-0.144414
5. How traumatic do you think it will be for you when your dog dies?	0.254623	-0.124108
6. My dog gives me a reason to get up in the morning	0.254571	-0.100460
7. If everyone else left me my dog would still be there for me	0.241787	-0.120916
8. How often do you hug your dog?	0.215651	-0.113394
9. How often do you tell your dog things you don't tell anyone else?	0.207531	-0.165469
10. There are major aspects of owning a dog I don't like	0.199263	-0.187088
11. How often do you buy your dog presents?	0.186887	-0.130078
12. My dog is constantly attentive to me.	0.168597	-0.128240
13. How often do you play games with your dog?	0.154548	-0.045927
14. How often do you have your dog with you while relaxing?	0.151960	-0.054691
15. How often do you take your dog to visit people?	0.150283	-0.029251
16. How often do you kiss your dog?	0.141473	-0.133000
17. How often do you groom your dog?	0.129786	-0.018630
18. How often do you give your dog food treats?	0.119461	-0.093175
19. My dog provides me with constant companionship.	0.100983	-0.095220
20. How often do you take your dog in the car?	0.087641	-0.062846
21. How often does your dog stop you doing things you want to?	0.119011	0.378664
22. It bothers me that my dog stops me doing things I enjoyed doing before I owned it	0.171475	0.362851
23. It is annoying that I sometimes have to change my plans because of my dog	0.202842	0.348500
24. It is annoying that I sometimes have to change my plans because of my dog	0.172377	0.304502
25. My dog makes too much mess.	0.107552	0.293268
26. How hard is it to look after your dog?	0.157785	0.252871
27. How often do you feel that having a dog is more trouble than it is worth?	0.135970	0.239314
28. My dog costs too much money	0.080734	0.224907

The Table shows the loadings of each variable of the MDORS for each factor (PC1 and PC2) detected by the PCA. Main loadings for each PC are shaded yellow. (PC = Principal Component)

Scores for the two principal components were then used in hierarchical clustering. A dendrogram (Fig 1) was used to visually select the solution with the greatest distance between clusters. This resulted in a model with two clusters (groups); Group I accounted for 56.1% of the population and Group II for 43.9% of the sample population (Fig 1). The validity of these groupings was tested using PLS-DA, which produced a model with two predictive components (R^2Y= 0.611 Q^2= 0.592). The reliability of the PLS-DA model was confirmed using a permutations method, in which the values of R^2Y and Q^2 of models with randomly permutated class membership were compared with values for the real model. The real model outperformed all of the permutated models. As further confirmation of the quality of the model, analysis of variance of cross-validated residuals (CV-ANOVA) for the PLS-DA model was highly significant ($p<1x10^{-20}$). To improve interpretability, an orthogonal signal correction filter was applied to create an O-PLS-DA model with a single predictive component (R^2Y= 0.595, Q^2= 0.589, CV-ANOVA $p<1x10^{-20}$). This showed that Group I was associated with higher loadings for all 28 of the MDORS variables. A bar chart of loadings from the O-PLS-DA model shows those items which contributed most strongly to the discrimination between Groups I and II (Fig 3), with items such as "I would like to have my dog near me all the time", "My dog helps me get through tough times", and "My dog is there whenever I need to be comforted" featuring most strongly.

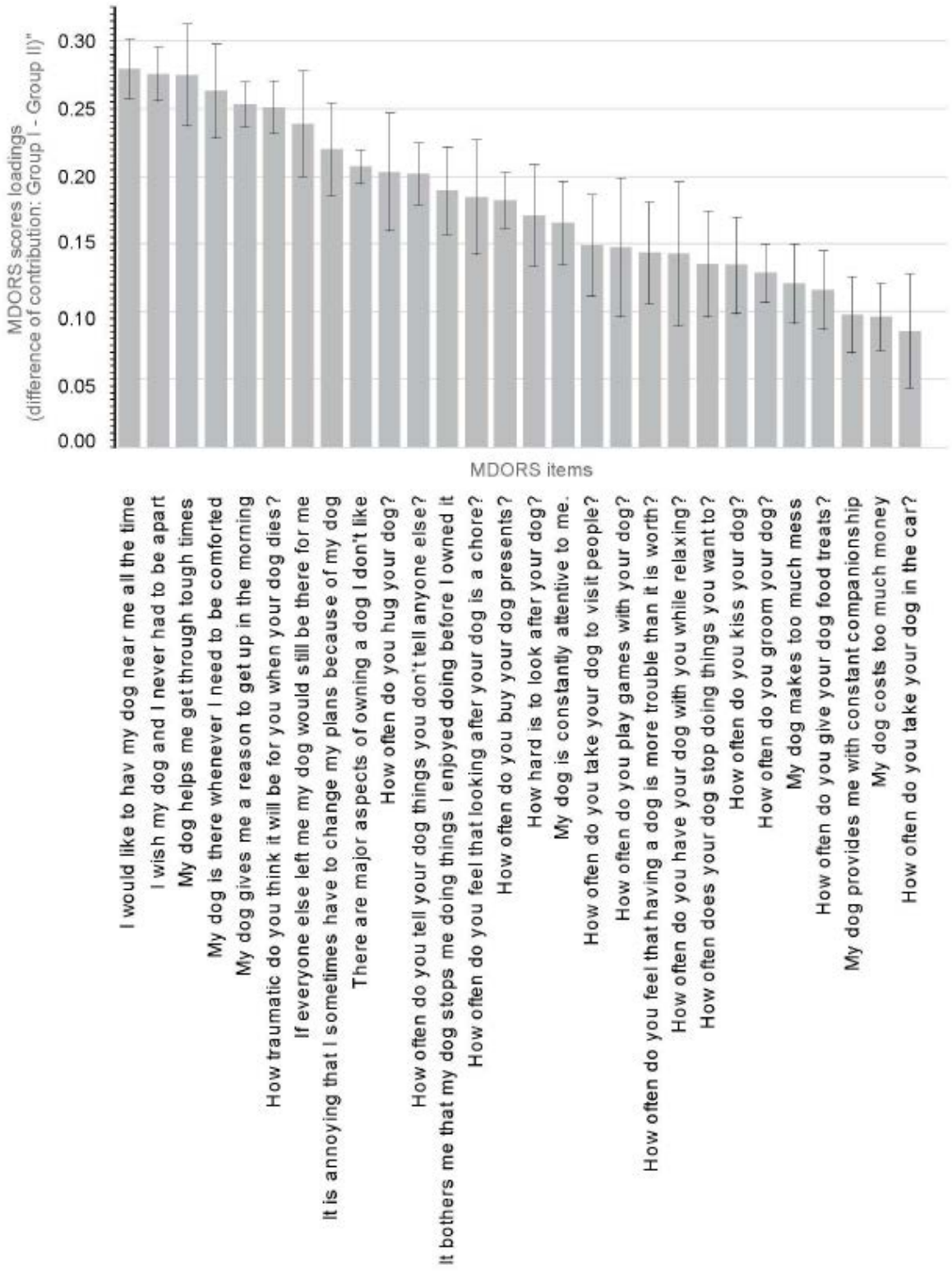

Fig 3. Difference in contribution of MDORS (Monash Dog Owner Relationship Scale) variables of Group I compared to Group II. This graph shows the difference in contribution (score loadings) of each MDORS variable in Group I (higher emotional dog-owner bond) in comparison to Group II (lower emotional dog-owner bond). Group I was associated with higher loadings for all 28 of the MDORS variables, but main differences were found in the loadings for the emotional aspects of MDORS.

A binary logistic regression (BLR) model was then used to identify owner and dog characteristics that were associated with membership of the two groups defined by PCA-HCA. Variables were selected for inclusion in the binary logistic regression model (Enter method) using appropriate univariate contrasts; only variables for which there was a significant difference between Groups I and Group II were included ($p<0.1$, as a standard approach for BLR). Classification accuracy for the model was 83.8%, Nagelkerke R^2 was good (0.66), and the model passed an omnibus test (chi-square=707.44, df=8, $p<0.0001$). According to the model, four variables, presented here in descending order of influence, were found to contribute significantly to membership of Group I; university level of maximum educational attainment (OR=8.65, $p<0.0001$), male owner (OR=32.36, $p<0.0001$), high school level of maximum educational attainment (OR=0.05, $p<0.0001$), and owner Cantril's score (OR=0.81, $p<0.0001$) Table 5. According to the model, the rest of the variables included in the demographic questionnaire, such as dog characteristics (e.g. age, sex, duration of ownership, owner's age or owner's family role, did not contribute to membership to any of the two identified distinct groups (Group I and Group II).

Table 5. Results of binary logistic regression analysis.

Variables	S.E.	Significance (p)	OR
Owner sex: male	0.331	<0.0001	32.359
Family role: One parent family	0.347	0.5710	0.822
Family role: flat mate	0.805	0.3260	0.454
Maximum education level: basic	3737.680	0.9950	0.000
Maximum education level: high school	0.405	<0.0001	0.052
Maximum education level: University	0.207	<0.0001	8.652
Dog size: mini	0.588	0.0710	2.892
Cantril's score (1 point increase)	0.056	<0.0001	0.807

This table shows the probability of each variable to be present in a dog-owner of Group I (more emotionally dependent dog-owner relationship).
S.E. = Standard error; OR = Odds Ratio

Discussion

The main aims of this research were to find groups within the population with respect to the perceived relationship with their dog, assessed as a balance of costs and benefits of the relationship (social exchange theory) [8], and to identify dog and owner factors that might be associated with each pattern.

Demographics of the population of the study

Since this study was conducted with a convenience sample, it is interesting to compare our sample population with Spanish population official statistics for the year 2013 (the year that this study was conducted), to gain an impression of biases present in our convenience sample. As shown in Table 1, some characteristics of our convenience sample are overrepresented in comparison to the census characteristics of the 2013 Spanish population; female gender, university education level, people from North East and Central Spain, couples living without children and people living alone.

Although women were overrepresented (71.7% of respondents), the proportion of male and female owners was similar to previous studies of pet ownership in which recruitment was voluntary [4, 25-29]. Evidence suggest that women may, in general, be more willing to participate in online surveys than men [30]. In addition, given that recruitment was through veterinary clinics, perhaps the recruitment favoured women because they were more involved in their pet's care and visits to the clinic. Given that mothers may be more involved and engaged with childcare than fathers [31] and the relationship between people and their dogs includes a pattern of care-giving that is similar to that between parents and children [32-34], perhaps women are more involved in dog care, because they tend to be more involved in the childcare tasks. Another possible reason for the overrepresentation of women in this study could be sex differences in the use of social media and internet resources. Previous research has suggested that women use internet tools more for private social connectivity than men [35, 36]. As pet ownership is part of the spectrum of a person's private social life, the use of internet-based methods to recruit cases

could not only capture the interest of women more than men, but also favour the dissemination of information through female social networks.

A majority of the study participants were university educated (57.71%). This overrepresentation of highly educated people agrees with previous research; for example, in a study of a self-selected sample of 1016 adult dog owners in Australia, 62% of the participants had a university level of education [19]. This could indicate that dog ownership engagement and interest is greater in people with higher levels of education, but it may simply relate to differences in the use of internet resources by people with different educational backgrounds and occupational status [35, 36]. Some studies have shown that more educated and more affluent people are more likely to participate in surveys [30].With pet-ownership being costly, there may also be an effect of differential exposure to dogs during childhood; families with higher socio-economic status may be more able to afford to own a dog and provide their children with the resources needed to achieve higher education levels. Some research supports the link between socioeconomic status and pet ownership [15], although not all previous research has shown this direct correlation between socio-economic status and dog owning [15, 37]. This point will be discussed later in this section, when considering the factors related to quality of owner-dog relationship.

Being part of a couple without children or living alone were family roles that were over-represented in our study, compared with national Spanish demographic data. This may be explained by differences in pet ownership levels in these groups. For example, single people appear to be more inclined to adopt dogs [38] and have a special emotional link with their dog [18]. The same appears to be true for couples without children, who may be specially bonded with their dogs [18]. Also, in our study population dogs are importantly located in homes with children, which agrees with previous research about types of household composition preferably owning a dog (such as homes with children) [13, 37].

Participants from some areas of Spain (North East and Centre) were overrepresented. This could be due to the differences in internet use ; national

statistics demonstrate that North East and Central Regions exceeds the national Spanish average internet usage [39]. These are also two of the three Spanish regions with the highest populations of officially registered dogs, accounting for 29.25% of total registered Spanish dog population [40]. These regional over-representations may also reflect cultural differences in the perception of dogs, with some areas of Spain have more committed dog owners who are more willing to participate in an online survey about their relationship with their dogs.

With respect to the population of dogs included in this study, there was a balanced proportion of males and females. Almost 60% were purebred, which is similar to previous studies [4, 19].

The recruitment methods and inclusion criteria for this study introduce some limitations. The population was self-selected, and perhaps only really concerned and attached owners would be willing to participate in this kind of research project. Being recruited solely through veterinary clinics, the socioeconomic status of the participating dog owners might be skewed, as has been found in previous studies [41]; it is likely that owners who regularly attend veterinary clinics would also be those with a higher socioeconomic status, especially in the current economic climate.

Cantril's Self-Anchoring scale results

At 7.03, the mean score for Cantril's self-anchoring scale for the study population was 11.23% higher than the reported Spanish average (6.32) [42]. Perhaps people who choose to own dogs experience a higher level of satisfaction with their lives than the general population, or maybe owning a dog makes a difference when considering one's overall quality of life, as some studies have demonstrated that pet ownership is correlated with better health quality of life [43, 44] and psychological benefits [5]. Higher scores on Cantril's scale have been found to be associated more strongly with income than emotional well-being [23], and positive life evaluation has been linked with educational level [45]. So, perhaps people who decide to, or can afford to, own a dog might be those who are already more materially satisfied with their lives.

This is supported by some studies that show a relationship between socio-economic status and pet ownership, even though this relationship is not always direct and is dependant on the geographic and cultural context [13, 14, 46]. However, this difference may simply be the effect of self-selection of the study population. People who are more positive and satisfied with their lives might be more motivated to participate; previous research has showed that hedonic and affective factors influence people's willingness to participate in a survey [47]. Also, as we mentioned before, some studies have shown that people who are more educated and affluent are more likely to participate in surveys [30] and high levels of satisfaction with life are linked to high income [23].

Pet ownership can have a positive or negative impact on an owner's quality of life [48], and further research on the link between pet ownership and life satisfaction would be of value.

Dog-owner relationship: MDORS results

Our approach to assessment of the type of dog-owner relationship was to use an existing scale that was developed using the social exchange theory [8]. This theory considers any relationship outcome as a balance between costs and benefits provided to an individual through that relationship. The MDORS [4] incorporates the assessment of both the costs and benefits of the owner-dog relationship. This contrasts with previous research that has focused exclusively either on costs or benefits [5,11].

No meaning can be ascribed to specific values of MDORS, or its subscales, due to a lack of normative data for the scale. So, it is not possible to classify owner-dog relationships as "good" or "bad" based on MDORS scores alone [4]. Within our study population, PCA-HCA identified two groups with differing relationship quality, with Group I membership being associated with generally higher values across all MDORS items. This kind of modelling and classification into different groups of quality of dog ownership has not been presented in previous research [4, 16-20]. Hence, the first and main finding of this study is that, even though we used a convenience sample of committed owners, we were able to distinguish and to characterise differing patterns of dog

ownership. So, future research could apply this methodology to other different kind of samples to identify other types of dog ownership patterns.

In the O-PLS-DA model that was used to compare the two groups we identified, the variables with the strongest loadings for Group I included “I would like to have my dog near me all the time”, “My dog helps me get through tough times”, “My dog gives me a reason to get up in the morning”, and “My dog is there whenever I need to be comforted” (Fig 3). In Group I dyads, which accounted for more than half of participants, the dog was therefore endowed with many of the characteristics of a friend, partner or confidant, and provided valuable social support for the owner. This indicates that membership of Group I could be strongly influenced by owner perception of, and need for, social and emotional support from the dog. In contrast, respondents in Group II either did not experience, or did not need, this type or level of emotional support from their dog. Group I members also underrated perceived costs compared with Group II. However, it is important to remember that Group II does not represent a collection of owner-dog dyads with a poor relationship. Although Group II dog owners appear to be less emotionally dependent on their dogs, this shouldn’t be considered to be negative.. At the very least, Group II respondents are all committed dog owners who attend a veterinary clinic and were sufficiently motivated to complete the questionnaire. So, considering the previous analysis of the differences of the loadings of all MDORS variables between Group I and Group II, one may interpret that, even though all dog owners in the study are committed dog owners, Group I may represent owners with higher need for an emotionally supportive bond with their dogs and Group II may represent dog owners who are without such emotional dependence on their dogs.

This difference may relate to other aspects of the owner’s life, lifestyle and personality. To understand the factors involved in groupings of our study population, we used Binary Logistic Regression, and found four variables that were significantly associated with group membership (Table 5). Male respondents were 32.36 times more likely to be in Group 1 (the high relationship quality group), and people with a university level of maximum educational attainment were 8.65 times more likely to be in that group. For

every 1-point increase in Cantril's Self Anchoring Scale score, respondents were 23.92% (1/0.807 = 1.24 times) less likely to be in Group 1, and people with a maximum education attainment level of high school were 19.23 (1/0.052) times less likely to be in that group.

Our results therefore indicate that owner-related factors are apparently influential in the quality of dog-owner relationship. This agrees with previous research, in which human factors have been found to have an important effect in dog-owner relationship, experiences and management, such as relinquishment [7], level of attachment to the dog [26, 49], responsible dog ownership practices [19, 26] or level of relationship [18,26]. Ultimately this may indicate that certain aspects of the owner-dog relationship may be a marker of the person's psychological state and/or the availability of, and individual ability to use, other sources of social support.

The effect of male owner could be explained by a bias in recruitment. As previously mentioned, women constitute the majority of participants in any voluntary-recruitment study of pet ownership [4]. So, perhaps only men with a very specific, emotionally dependent, bond with their dogs were sufficiently motivated to participate in this study. This could also relate to a lack of other sources of emotional support for these individuals. As previous research has found, it seems men and women have distinct expectations for dog ownership and they differ in what the ideal characteristics of a dog are. Women seem to prefer calm and compliant dogs, while men prefer energetic, faithful and/or protective dogs [28, 29]. Men and women seem to differ also in the way they assess their dogs' behaviour, as men tend to report more disobedience in their dogs than women [17]. Sex differences are also observed in the way people interact with their dogs; women communicate more verbally with their dogs than men [32-34]. These sex differences in communication and dog-characteristic preferences could form the basis for differences in owner-dog relationship profile. However, further research would be needed to address the effect of owner-gender on the pattern and style of dog ownership.

Maximum level of educational attainment appears influential in the quality of owner-dog relationship, with university educated individuals being

significantly more likely to have a strongly emotional relationship with their dogs, particularly when compared with people who had a high school level of maximum educational attainment. This agrees with other positive effects of higher educational level, such as better outcomes in certain tasks by the children of parents with college degrees compared to those without college degrees [50], or the positive effect of high parental socio-economic status in parent-child quality of relationship [51]. Again, this parent-child pattern could be transferred to the owner-dog pattern [32-34]. This could mean that socio-economic status, which includes dog owner's educational level, may have an important effect on the quality of dog-owner relationship. It is also possible that educational attainment may affect expectations of pet ownership, with lower educational level leading to a greater mismatch between expectations and the reality of dog ownership. This hypothesis is supported by a previous study [28] that found a relationship between level of owner education and the characteristics of the imaginary ideal dog. The authors found a negative correlation between educational level and the expectation that the ideal dog should be sociably acceptable, energetic, faithful and protective; the more educated the owner, the less they expected from their dog. However, another explanation for the association between educational level and membership of Group 1 could be that adults with higher socioeconomic status were more likely to come from similarly high socioeconomic status families that had the resources to afford dog ownership; people with this background were more likely to have lived in dog-owning households that not only provided greater positive exposure to dogs but also enabled those children to model adult care-giving toward a pet dog. This interpretation is supported by a study showing that childhood exposure to pets positively influences adult attitudes towards pet owning [37] However, other studies have found no connection between occupation and social class, and dog ownership. A study in Central Italy showed no difference in educational level between dog owners and the non-owners [52]. Other studies showed that some social classes are more likely to own a pet-dog, like small farmers in Ireland [13]. A study in the UK showed an inverse relationship between educational level and the presence of a dog in the

household [14]. Therefore, the relationship between dog ownership and socioeconomic status seems to be influenced by cultural and national factors. No studies of this kind have been carried out in Spain, so it is very difficult to place our findings in a cultural context.

Although none of the characteristics of dogs were significantly associated with Group I membership, the “mini” size of dog bordered on significance and had an odds ratio worthy of note (OR=2.892, p= 0.07). This is consistent with results from previous research in which size of dog has been found to be related to the owner’s perception of the dog’s behavior and with the level of shared activities with the dog [17]. In that research, an inverse relationship was found between size and owner interaction; the smaller the dog, the more the owner would interact with it.. The “mini dog size” factor may also be explained by the “canine cuteness effect” [53], which is a tendency for dog owners to report stronger relationships with dogs they perceive to be cute. It could be that smaller dogs could be perceived cuter than others. The number of “mini size” dogs in our sample was quite small (less than 3% of the sample population), which might explain the borderline significance.

We also found that for every one-point increase in general satisfaction with life (Cantril’s Self Anchoring Scale), the person was 1.24 times less likely to be in Group I. Cantril’s Scale is a measure of life evaluation, which is much more closely related to income and education than emotional wellbeing [23]. Given that in our study higher educational level was associated with a more emotionally dependent relationship, it might be that the effect of increasing Cantril scores was predominantly related to income and wealth for our study participants. Those with higher Cantril scores might have been more materialistic in outlook or it might be that material wealth, and in particular income, enabled individuals to engage in activities that reduced the value of social support from the dog (such as being able to spend more time with family and friends). Alternatively, perhaps the less a person is satisfied with their life, the more they look for social support [45, 54]. Dogs are considered an element of people’s social network [55] and a buffer of negative impacts [56]; perhaps those people who are less satisfied with their life situation look for support and

comfort from their dog companion. However, in a US study, for the income range to $75,000 emotional wellbeing also rises with annual income [23], with the median income in the USA being $51,190 at that time [57]. If, as is likely, participants in our study were mostly middle-income earners, and for this population Cantril scores were an indirect measure of income then it is possible that increased Cantril scores were indicative of generally increased emotional wellbeing, which would reduce the value of social support available from the dog.

Conclusions

By using a scale that applies the social exchange theory to measure costs and benefits of the owner-dog relationship [8], we have been able to identify groups with systematically different patterns of dog-owner relationship. This difference related mostly to the benefits of the owner-dog relationship (emotional closeness and level of interaction). This approach could represent a useful method for the detection of different owner-dog relationship patterns in other populations. Moreover, future studies could investigate the implications of those different owner-dog relationship patterns and consider measures to prevent their possible negative implications.

This study found an association between the quality of dog-ownership pattern and a number of owner characteristics; the owner's sex and maximum level of educational attainment appeared to be the most important factors. These results may have implications for population selection and demographic profiling in studies that incorporate assessments of the owner-dog bond. However, more research is needed to identify dog characteristics and precise profiles related to different dog-ownership patterns.

Our results also suggest a somewhat surprising relationship between the type of owner-dog relationship and the owner's evaluation of life satisfaction. The complexity of interpreting this finding suggests that it should be regarded as a priority for further human-animal bond research.

Findings from this study could be used to advance cross-cultural validation of the MDORS scale, as other researchers have done in other non-Anglo-Saxon cultures [16].

Since our study found differences in owner-dog relationship in a self-selected population of owners recruited through veterinary clinics; further research could use the same methods to explore dog-ownership patterns in non-committed or less responsible dog owners. This might help to identify factors of risk for unsuccessful and less responsible dog ownership and its negative consequences.

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CAPÍTULO 2

Animal Assisted Therapy (AAT) program as a useful adjunt to conventional psychosocial rehabilitation for patients with schizophrenia: results of a small-scale raondomized controlled trial

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Animal Assisted Therapy (AAT) Program As a Useful Adjunct to Conventional Psychosocial Rehabilitation for Patients with Schizophrenia: Results of a Small-scale Randomized Controlled Trial

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Abstract

Currently, one of the main objectives of human-animal interaction research is to demonstrate the benefits of animal-assisted therapy (AAT) for specific profiles of patients or participants.

The aim of this study is to assess the effect of an AAT program as an adjunct to a conventional 6-month psychosocial rehabilitation program for people with schizophrenia. Our hypothesis is that the inclusion of AAT into psychosocial rehabilitation would contribute positively to the impact of the overall program on symptomology and quality of life, and that AAT would be a positive experience for patients.

To test these hypotheses, we compared pre-program with post-program scores for the Positive and Negative Syndrome Scale (PANSS) and the EuroQoL-5 dimensions questionnaire (EuroQol-5D), pre-session with post-session salivary cortisol and alpha-amylase for the last four AAT sessions, and adherence rates between different elements of the program.

We conducted a randomized, controlled study in a psychiatric care center in Spain. Twenty-two institutionalized patients with chronic schizophrenia completed the 6-month rehabilitation program, which included individual psychotherapy, group therapy, a functional program (intended to improve daily functioning), a community program (intended to facilitate community reintegration) and a family program. Each member of the control group (n=8) participated in one activity from a range of therapeutic activities that were part of the functional program. In place of this functional program activity, the AAT-treatment group (n=14) participated in twice-weekly 1-hour sessions of AAT. All participants received the same weekly total number of hours of rehabilitation.

At the end of the program, both groups (control and AAT-treatment) showed significant improvements in positive and overall symptomatology, as measured with PANSS, but only the AAT-treatment group showed a significant

improvement in negative symptomatology. Adherence to the AAT-treatment was significantly higher than overall adherence to the control group's functional rehabilitation activities. Cortisol level was significantly reduced after participating in an AAT session, which could indicate that interaction with the therapy dogs reduced stress.

In conclusion, the results of this small-scale RCT suggest that AAT could be considered a useful adjunct to conventional psychosocial rehabilitation for people with schizophrenia.

Keywords: animal-assisted therapy, psychosocial rehabilitation, adherence to treatment, schizophrenia, PANSS, EuroQol-5 dimensions, salivary cortisol, salivary alpha-amylase.

Introduction

Interactions with companion animals appear to have positive effects on physiological, psychological and social aspects of human wellbeing (Fine, 2010). Animal-assisted therapies (AAT) seem to produce therapeutic benefits in different kinds of patients, from those with physical ailments, such as cardiovascular disease, to those with mental disorders ranging from dementia to depression (Pedersen et al., 2011) and schizophrenia (Barak et al., 2001). It has been suggested that AAT might help to develop the therapeutic relationship between patients and healthcare professionals, and could improve the therapeutic atmosphere (Fine, 2010; Julius et al., 2013); animals in AAT can act as social facilitators, social modulators and amplifiers of emotional reactivity (Fine, 2010).

However, scientific evidence for the benefits of AAT is still very limited (Kamioka et al., 2014; Nimer and Lundahl, 2007;), partially due to intrinsic difficulties of performing research with AAT (Kamioka et al., 2014; Nimer and Lundahl, 2007). Typical methodological limitations of AAT include: small sample size, difficulties of blinding, lack of an adequate control group, selection bias due to including only participants who like animals, lack of physiological

evaluation, short program duration and the limited number of professionals and animals that currently participate in AAT. Some of these limitations are very difficult to overcome, because of the nature of AAT interventions. For example, in AAT, it is very difficult to find a comparable therapeutic activity for the control group, and it is impossible to blind for the presence of the animal. Since AAT is still considered an alternative therapeutic approach, very few resources are dedicated to it within the health system (Kaplan and Sadock, 1989). As a consequence of these limitations it is important to compile studies with partial evidence for AAT efficacy and applicability (Fine, 2010) and to improve and standardize research methodologies (Kamioka et al., 2014).

Recent reviews of AAT research indicate that mental health disorders are a good target for AAT interventions (Kamioka et al., 2014; Nimer and Lundahl, 2007; Rossetti and King, 2010; Villalta and Ochoa, 2007). Some studies have shown that AAT programs could benefit patients being treated for schizophrenia (Chu et al., 2009; Kovács et al., 2004; Kovács et al., 2006; Nathans-Barel et al., 2005). Suggested benefits include effects on self-esteem, self-determination, positive symptomatology, emotional symptomatology, anhedonia and daily functioning (Kamioka et al., 2014; Nathans-Barel et al., 2005; Villalta and Ochoa, 2007; Villalta et al., 2009).

The aim of this study was to assess the effect of an AAT program as an adjunct to conventional psychosocial rehabilitation for people with schizophrenia.

Based on the hypothesis that inclusion of AAT in a rehabilitation program would have a beneficial effect, our study had three objectives; to analyze the impact on symptomatology and quality of life, to evaluate the patient's experience of the AAT sessions, and to assess stress relief during the AAT sessions. For the first objective, the measures used were the Positive and Negative Syndrome Scale (PANSS) (Kay, Opler, and Lindenmayer ,1989; Peralta and Cuesta, 1994), and EuroQoL-5 Dimensions questionnaire (EQ-5D)

(Bobes et al., 2005). For the second objective, we used adherence (proportion of programmed sessions that a patient attended). Adherence was used as an indicator of the relative appeal of the AAT sessions, by comparing adherence for the AAT sessions with combined adherence for the functional program attended by the control group. For the last objective, since stress management is one of the main objectives for the treatment of inpatients with mental disorders (Klainin-Yobas et al., 2015), we evaluated the stress-relieving aspect of the sessions by making a pre- versus post-session comparison of values for salivary cortisol and alpha-amylase for the last four AAT sessions. To our knowledge, previous research on the effects of AAT for patients with schizophrenia has not included the combination of these three different types of objectives (and the associated measures).

Our general objective was to present evidence that was different and complementary to existing research and to identify interesting target measures, such as adherence to treatment and physiological measures, that could be used for future research.

Material and Methods

Study design

The study was a randomized, controlled trial (RCT).

In this study, primary outcomes for all participants were changes in symptomatology (measured with PANSS) and changes in quality of life (measured with EQ-5D). Secondary outcomes of this study consisted of adherence to AAT sessions (AAT-treatment group) versus adherence to other activities of functional rehabilitation (control group), and changes in salivary cortisol and alpha-amylase during AAT sessions, as a measure of stress relief (AAT-treatment group only).

Patients were randomly assigned to the control or AAT-treatment group.

The laboratory technicians who analyzed the saliva samples were only given the patients' ID numbers, and were blinded to whether patients were in

the control or AAT-treatment group. For practical reasons and for issues relating to the availability of resources and personnel, the rest of the process of the study could not be blinded. It was not possible for patients to be blinded to the presence of dogs, and only one hospital neuropsychologist was able to participate in the study (in charge of all of the pre-treatment and post-treatment evaluations of the study, and follow-up of all of the patients). A single researcher not only carried out the collection of the data and saliva samples, but also acted as a guide for the therapy dogs during the AAT sessions.

Sample

The study was conducted in a public psychiatric hospital within an urban area of Spain. In order to avoid the confounding effects of environmental variation, only patients from the same unit were included (MILLE: Long and medium-stay unit). All eligible patients from the MILLE unit who fulfilled the following criteria were included:

- Diagnosis of schizophrenia, according to the Revised 4th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) (American Psychiatric Association 2000).
- Enrolled in a psychosocial rehabilitation process.
- With a projected minimum hospitalization term of 6 months.

A set of exclusion criteria was also applied, which included:

- Compromised mobility.
- Presence of allergies to animals.
- Rejection of contact with companion animals.
- Confirmed diagnosis of a coagulopathy.

These inclusion and exclusion criteria were adapted from previous AAT protocols (Barak et al., 2001; Fine, 2010; Kovács et al., 2004; Nathans-Barel et al., 2005; Villalta et al., 2009; Lang et al., 2010). All patients in the unit who met the criteria were included in the study.

Twenty-four adult patients (Mean age = 47.8 years of age; SD = 6.7) fulfilled the requirements and were included in the study. The patients' mean age at diagnosis of schizophrenia was 20.5 years of age (SD = 5.0). The patients' mean scores for PANSS were: 43.8 (SD =12.3) for General PANSS, 24 (SD = 6.6) for Negative PANSS and 20.6 (SD = 6.6) for Positive PANSS. The EQ- 5D total score mean was 1.8 (SD = 1.5). See **Table 1** for an overview of all of the characteristics of the sample population.

TABLE 1 | Characteristics of the sample.

Patient	Group	Age	Age of onset	Gender	PANSS General	PANSS Negative	PANSS Positive	EQ-5D total	Psychotropic medication	Other medication
1	T	54	17	Man	31	25	11	0	Aripripazol, levomepromazine	Pravastatin, repaglinide, pantoprazole
2	T	66	20	Woman	38	18	22	3	Clozapine, venlafaxine	Pantoprazole, lactulose
3	T	37	21	Man	32	17	9	1	Clozapine, amisulpride, brazepam, pregabalin	–
4	T	58	22	Man	46	36	24	2	Fluphenazine, levomepromazine, biperiden	–
5	T	52	26	Man	50	32	23	1	Clozapine, sodium valproate	Metformin
6	T	47	20	Man	38	19	13	1	Zuclopenthixol, biperiden	Atorvastatin
7	T	41	15	Man	77	39	28	3	Levomepromazine, periciazine, paroxetine, biperiden	–
8	T	33	23	Woman	31	12	15	0	Zuclopenthixol, clonazepam, sodium valproate, biperiden	Gemfibrozil
9	T	35	24	Man	46	25	18	2	Clozapine, fluphenazine, pimozide, clotiapine	–
10	T	47	21	Man	53	29	25	1	Fluphenazine, risperidone, biperiden	Lactulose
11	T	54	15	Woman	37	29	17	1	Risperidone, zuclopenthixol, sodium valproate	–
12	T	44	22	Woman	37	22	27	3	Clozapine, risperidone	Atorvastatin, salmeterol
13	T	50	17	Man	43	24	17	7	Lithium carbonate, clozapine, methylphenidate, sertraline, topiramate, biperiden	Monohydrate lactitol
14	T	55	39	Man	61	27	15	2	Olanzapine, paroxetine, dipotassium clorazepate, biperiden	Hydroxyzine, loratadine
15	T	43	21	Man	47	30	30	2	Fluphenazine, risperidone, sodium valproate	–
16	T	45	19	Man	42	18	34	2	Clozapine, diazepam, sodium valproate	Pantoprazole, lactulose, gemfibrozil
17	C	48	18	Woman	45	26	18	4	Clozapine	–
18	C	47	16	Man	50	20	14	1	Haloperidol, dipotassium clorazepate, biperiden	Lactulose
19	C	53	21	Man	46	16	25	2	Risperidone, quetiapine, sodium valproate, clonazepam	Atenolol, pravastatin, pantoprazole, metformin
20	C	59	25	Man	44	22	21	2	Clozapine, gabapentin, biperiden	–
21	C	51	16	Man	61	26	28	0	Zuclopenthixol, ziprasidone, sodium valproate, biperiden	–
22	C	50	20	Man	15	22	12	0	clozapine	Enalapril
23	C	44	18	Woman	48	15	22	2	Zuclopenthixol, levomepromazine, clotiapine	–
24	C	50	16	Woman	32	27	26	1	Olanzapine, levomepromazine, sodium valproate, phenytoin	–
MEAN (*SD*)	–	**47.8 (6.7)**	**20.5 (5.0)**	–	**43.7 (12.3)**	**20.6 (6.6)**	**24 (6.6)**	**1.8 (1.5)**	–	–

The 24 patients who met the inclusion criteria were randomly assigned to 3 groups, with 8 patients in each group (AAT-treatment groups A and B, and a control group C) (See **Figure 1**). Given the length of the study (6 months), a high drop out rate was expected. Other authors recommend that group size is kept small for AAT sessions (Chu et al., 2009; Fine, 2010; Kovács et al., 2004; Nathans-Barel et al., 2005). To comply with this recommendation, the 16 patients who were to be given AAT were randomly allocated to one of two small therapy groups (8 people in each). There were no differences in the characteristics of these groups, or in the AAT-therapy they received. In the analysis, data from patients in both therapy groups (A & B) was therefore combined into a single group.

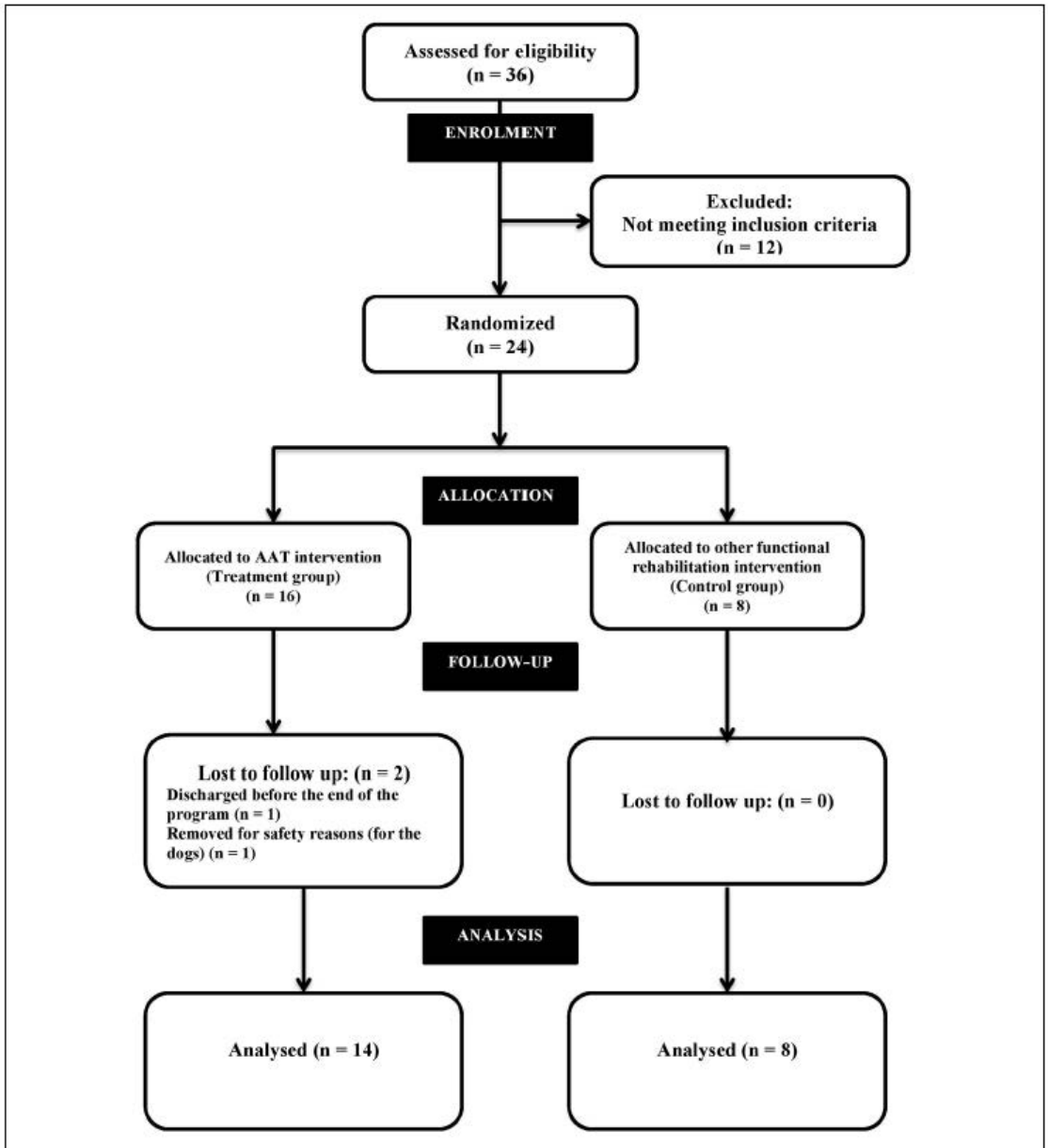

FIGURE 1 | Shows the modified CONSORT flow diagram for individual RCTs of non-pharmacologic treatment (Boutron et al., 2008; Schulz et al., 2010) applied to this study.

Five therapy dogs that had previously been assessed and trained, and had experience of participation in AAT work were used for the study. There is no official dog therapy certification in Spain. A thorough physical and behavioral examination of each dog was performed by a panel of 3 board-certified specialists in veterinary behavioral medicine. This examination included the Ethotest (Lucidi et al., 2005), a test designed to identify suitable therapy dogs, and the C-BARQ (Hsu and Serpell, 2003), a questionnaire for measuring behavior and temperament traits in dogs.

Interventions

The study took place between October 2012 and May 2013. At the psychiatric hospital where the study was conducted, the global psychosocial rehabilitation process consisted of five types of programs: individual psychotherapy, group therapy program, functional program (to improve daily functioning), community program (with social reintegration objectives) and family program. From Monday to Friday every week, all patients treated in this global psychosocial rehabilitation process had to participate in all five types of program.

Patients in all groups participated in the same total weekly number of hours of activity within the psychosocial rehabilitation process. For the AAT-therapy groups (A and B) the AAT program was one of these activities. The AAT program consisted of 6-months of twice-weekly 1-hour sessions (Tuesday and Friday), so that each patient attended a total of 40 AAT sessions (taking into account public holidays). Control group patients attended the same number of sessions in the functional program.

The AAT-treatment involved three types of sessions:

- Sessions to develop the emotional bond between participants and dogs: The participants were taught to handle and take care of the dogs correctly. In this type of session, concepts of animal welfare and responsible ownership were explained and practiced.
- Sessions involving walking the dogs: During the first half of the program, the dogs were walked in a large natural park, so that the patients could

learn to walk the dogs in a calm and controlled manner. For the rest of the program, the participants walked the dogs in the city, where they could experience dog-walking in a social context that is typical of that which is experienced by dog owners.

- Sessions to train and play with dogs: Patients learned to give instructions to the dogs and train them using positive reinforcement training techniques.

During an AAT session 4 of the 5 therapy dogs were always present to interact with the patients. At the beginning of each session, participants were asked to work in pairs. Each working pair was assigned a dog, which they worked with for the remaining hour of the session. During the program there was a rotation between the three types of sessions (emotional bonding, dog walking and dog training with play).

Each patient in the control group was assigned to a single activity from the functional program on the basis of their therapist's criteria, but taking into account the individual's preferences. The choice was between art therapy, group sports (football or basketball), dynamic psycho-stimulation, and gymnastics. These activities were organized so that they closely matched certain important characteristics of the AAT program:

- They were conducted outside the hospital unit where the patients were resident.
- They all involved a similar element of group work.
- Group sizes were small (similar to the AAT sessions).
- Patients were accompanied and supervised off-site by a mental health professional (nurse or similar).
- The activities continued throughout the period of trial (they were unaffected by season).
- The sessions were twice-weekly and of 1-hour duration.

The difference between functional program activities and the AAT sessions was, as far as was possible, restricted to content.

Instruments

To compare evolution in psychiatric symptoms between AAT-treatment and control patients during the 6-month duration of the program, we used the previously validated Spanish version of the Positive and Negative Syndrome Scale (PANSS) (Kay, Opler, and Lindenmayer, 1989). PANSS has been found to be a reasonably valid psychometric tool for people with schizophrenia (Kay, Opler, and Lindenmayer, 1989; Peralta and Cuesta, 1994), and is one of the most widely used tools for the assessment of therapeutic results in schizophrenia treatment. PANSS was administered to all patients during individualized interviews with the hospital neuropsychologist. It was completed for each patient several times in the month before the study started, during the program and in the month after the end of the program.

The same interview approach was used to assess quality of life, using the EuroQoL-5 Dimensions questionnaire (EQ-5D) (Bobes et al., 2005). The EQ-5D has been found to be reasonably valid for use in people with schizophrenia (König, Roick, and Angermeyer, 2007) and is a standard assessment instrument used in this hospital. The neuropsychologist completed the EQ-5D twice with each patient, in the month before the study started and in the month after the end of the program.

Individual attendance at sessions of AAT and the functional program was recorded. Adherence was calculated as the proportion of programmed sessions that a patient attended during the 6-month program period, expressed as a percentage.

In order to study the physiological effects of contact with the dogs during an AAT session, pre- and post-session saliva samples were collected for the last four AAT sessions of the program. Salivary alpha-amylase (sAA) and cortisol were measured. As a biomarker of psychosocial stress, salivary alpha-amylase can be considered to be a measure of the level of activation of the sympathetic nervous system (Holt-Lunstad, Birmingham, and Light, 2008; Rohleder et al., 2006). Salivary cortisol is an indicator of the state of the hypothalamic-pituitary-adrenal (HPA) axis and is a general physiological biomarker of stress (Fortunato et al., 2008; Holt-Lunstad, Birmingham, and

Light, 2008). Saliva samples were collected using a commercial saliva collection kit (Salivettes®, Sarstedt), with the Salivette remaining in the patient's mouth for one minute per sample. Two samples were collected from each patient at each of the 4 sessions; one was collected 30 minutes before the AAT session and the other 10 minutes after the AAT session had finished. Saliva samples were stored in a dry-ice cooled mobile fridge, in which they were delivered to the laboratory to be processed and frozen to -80ºC for later testing. The maximum pre-freezing storage time was 4 hours. After the study was completed, all saliva samples were thawed and analyzed. Cortisol was extracted and analyzed using a commercial immunoassay (Siemens IMMULITE 2000. Siemens Healthcare Diagnostics. Deerfield, IL) (Owen and Roberts, 2011; Tecles et al,. 2014), and alpha-amylase was analyzed using a commercial spectrophotometric assay (Olympus AU2700. Olympus America Inc. Center Valley, PA) (Tecles et al., 2014).

Statistical analysis

We analyzed data from all the participants who completed the 6-month period of the study (N = 22). In the present study, patients were included in the analysis regardless of their level of adherence to their medication regime or any of the five elements of the psychosocial rehabilitation process, and adherence to the AAT program was a main outcome measure. As a result, the present study does not comply with the requirements for a 'per protocol' analysis, in which patients would be excluded for any deviation from treatment. However, because we excluded two patients who did not complete the study we also did not carry out an 'intention to treat' analysis, and so our protocol could be described as a 'modified intention to treat'.

Between-group (control and AAT-treatment) contrasts of PANSS and EQ-5D scores were analyzed using Statistica 10 and GraphPad Prism 6. Data was tested for normality using the Shapiro-Wilk test; parametric data was tested using a t-test, and non-parametric data was tested using the Mann-Whitney U (for unpaired data) or Wilcoxon test (for paired data). For dichotomous variables (patient sex), a chi-square test was used to compare proportions between

groups. Multiple comparisons were made in the EQ5D analysis, so the Bonferroni correction was used to adjust the value of p that was accepted for significance (for example, for 20 comparisons, p= 0.05/20 = 0.0025).

Pre-program PANSS and EQ-5D scores were compared with post-program scores, for the AAT-treatment and control groups separately. After checking normality of data (with the Shapiro-Wilk test), a paired-samples t-test was used with parametric data and the Wilcoxon test was used with non-parametric data.

Adherence to treatment data was checked for normality using the Shapiro-Wilk test. An unpaired t-test (for parametric data) or Mann-Whitney U (for non-parametric data) was used to compare adherence levels between the AAT-treatment group and either overall compliance or compliance for individual activities within the functional programs (control group).

A paired t-test was used to compare pre- with post-session levels of cortisol and alpha-amylase in the AAT-treatment group (data had been found to be normally distributed using the Shapiro-Wilk test).

Ethics

The Clinical Research Ethics Committee of the Hospital del Mar Medical Research Institute (IMIM) approved the clinical-protocol, patient management and participation of the patients.

The Department of Agriculture and Natural Environment of the Catalonia Government approved the animal management protocol for this study. All dogs that participated in the project were given a thorough medical, behavioral and welfare assessment before, during and after the AAT program.

All patients who were eligible for the study received documentation that outlined the study, and they signed an informed consent form. They were able to withdraw from the study at any time.

AAT technicians signed an informed consent form that detailed their responsibilities (confidentiality and conformity) within the project.

Spanish law 15/99 (regarding personal data protection) was applied to all data collection.

Results

Sample characteristics

There were no differences between control and AAT-treatment groups with respect to sex (Chi-square test; $\chi^2(1) = 0.40$), age or initial scores of PANSS and EQ-5D (Mann-Whitney U; $p<0.05$) (See **Table 2** for full details).

TABLE 2 | Initial scores of PANSS and EQ-5D of the analyzed patients of this study.

	Mean (*SD*)				
INITIAL SCORES	**Treatment (*N* = 14)**	**Control (*N* = 8)**	***U***	***Z* adjusted**	**2 sided exact *p****
AGE	48.9 (6.7)	46.7 (7.3)	40.5	1.02	0.29
PANSS positive	18.9 (6.0)	20.7 (5.7)	46	−0.64	0.52
PANSS negative	25.3 (7.5)	21.70 (4.5)	39.5	1.09	0.26
PANSS general	44.3 (12.3)	42.6 (13.7)	51.5	−0.27	0.76
EQ-5D Total score	1.9 (1.8)	1.5 (1.3)	49.5	0.42	0.66
EQ-5D- Health Today (0–100)	80.7 (24.9)	78.7 (18.3)	42	0.94	0.36
EQ-5D- F1 Mobility	0.1 (0.3)	0.1 (0.3)	53	−0.34	0.86
EQ-5D- F2 Personal Care	0.1 (0.4)	**	48	1.02	0.61
EQ-5D- F3 Daily Activities	0.1 (0.3)	0.2 (0.7)	52.5	−0.41	0.81
EQ-5D- F4 Pain/Discomfort	0.4 (0.6)	0.5 (0.5)	50	−0.43	0.71
EQ-5D- F6 Health State 12 m	0.4 (0.6)	0.4 (0.7)	51.5	0.33	0.76

*Comparison between control and treatment group. *Mann–Whitney U Test. Tests are significant at $p < 0.05$. No significant results were found. **Data for the initial item EQ-5D F5 Anxiety was not included because some patients were not able to fully understand the meaning of this item.*

During the program, two patients within the AAT-treatment group withdrew from the study. One patient was discharged from the hospital before the end of the AAT program. The other patient exhibited behaviors that threatened to compromise the welfare of the therapy dogs, and therefore stopped participating in the AAT activity.

Schizophrenic symptomatology (PANSS)

At the end of the program, no significant differences were found between control and AAT-treatment groups (Mann-Whitney U Test, $p<0.05$) with respect to final PANSS or change in PANSS (see **Table 3** for full details). However, there were significant differences in PANSS pre-treatment and post-treatment scores in both control and AAT-treatment groups (t-test; $p<0.05$). In the AAT-treatment group, scores for all PANSS subscales (positive, negative and

general) were significantly lower after the AAT program (t-test; $p<0.05$). In the control group, only positive and general PANSS scores showed a significant decrease after treatment (t-test; $p<0.05$). For full details, see **Table 4**.

TABLE 3 | Differences between control and treatment groups with respect to final PANSS (after 6 months of treatment) or change in PANSS.

	Mean (*SD*)				
	Treatment ($N = 14$)	Control ($N = 8$)	*U*	*Z* adjusted	2 sided exact *p**
PANSS positive score FINAL	13.6 (3.8)	12.9 (5.2)	52	0.24	0.81
PANSS positive change	5.3 (4.8)	7.9 (4.3)	38.5	1.16	0.23
PANSS negative score FINAL	19.6(7.0)	19.9 (5.4)	55	−0.03	0.97
PANSS negative change	−11.7 (7.4)	−8.9 (4.8)	41	−0.99	0.33
PANSS general score FINAL	34.3 (8.6)	30.0 (6.0)	37	1.26	0.21
PANSS general score change	5.6 (8.9)	1.9 (3.4)	45	0.71	0.48

**Mann–Whitney U Test. Tests are significant at $p < 0.05$. No significant results were found.*

TABLE 4 | Differences in PANSS pre-treatment and post-treatment scores in both control and treatment (AAT) groups.

Group	Variable	Number of pairs (pre vs. post)	Mean (*SD*)	*t* (df)	*p*-value
Control	PANSS positive	8	7.87 (4.29)	$t(7) = 5.19$	0.001*
Control	PANSS negative	8	1.87 (3.44)	$t(7) = 1.54$	0.167
Control	PANSS general	8	12.63 (13.57)	$t(7) = 2.63$	0.033*
AAT	PANSS positive	14	5.28 (4.78)	$t(13) = 4.13$	0.001*
AAT	PANSS negative	14	5.64 (8.19)	$t(13) = 2.57$	0.022*
AAT	PANSS general	14	10.00 (8.70)	$t(13) = 4.30$	0.001*

**t-test (considered significant at $p < 0.05$).*

Quality of life (EQ-5D)

No significant difference was found between AAT-treatment and Control groups (Mann-Whitney U test; $p<0.0025$ after Bonferroni correction). In addition, almost none of the EQ-5D items were significantly different after treatment (Wilcoxon test; $p<0.05$) (**Table 5**). Only the score for the general health item (compared with 12 months before) of the EQ-5D was significantly lower after the program in the AAT-treatment group (Wilcoxon test; $p<0.05$). For this item, low scores indicate higher health status, meaning that AAT-treatment group patients perceived themselves to be in a better state of health after the program. However, after applying a Bonferroni correction none of the results of EQ5D was significant different after treatment (for 8 comparisons, $p = 0.05/8 = 0.0625$).

TABLE 5 | Differences in EQ-5D pre-treatment and post-treatment scores in both control and treatment groups.

Group	Variable	Number of pairs	Type of test	*t* (df) or *W*	*p*-value
Control	EQ-5D Total score	8	T	$t(7) = 1.8$	0.11
Control	EQ-5D Health today 12 m	8	W	$W = 9$	0.53
Control	EQ-5D Mobility	8	W	$W = 0$	>0.99
Control	EQ-5D Pain/discomfort	8	W	$W = 3$	0.50
Control	EQ-5D Health State today	8	W	$W = 0$	>0.99
Control	EQ-5D Anxiety/Depression	8	W	$W = -3$	0.50
Control	EQ-5D Daily Activities	8	W	$W = -1$	>0.99
Control	EQ-5D Personal Care	8	**	**	**
Treatment	EQ-5D Total score	14	W	$W = -3$	0.91
Treatment	EQ-5D Health today 12 m	14	W	$W = 37$	0.03*
Treatment	EQ-5D Mobility	14	**	**	**
Treatment	EQ-5D Pain/discomfort	14	W	$W = -3$	0.76
Treatment	EQ-5D Health State today	14	W	$W = 0$	>0.99
Treatment	EQ-5D Anxiety/Depression	14	W	W = 0	0.34
Treatment	EQ-5D Daily Activities	14	W	$W = -10$	0.07
Treatment	EQ-5D Personal Care	14	W	$W = 3$	0.34

*(T) t-test (data passed normality test). (W) Wilcoxon test (data did not pass normality test). *Tests are significant at $p < 0.05$ (If apply Bonferroni correction: $p = 0.05/8 = 0.00625$). **Could not calculate because the values to compare were the same.*

Adherence to treatment

Although patients were encouraged, and expected, to attend all scheduled activities, attendance was entirely voluntary. In the AAT-treatment group, there was an overall 92.9% (SD = 4.7) adherence to treatment for the AAT sessions. The majority of absences from the AAT sessions were due to family or health issues. Only once did a patient not want to attend an AAT session. In the control group, there was an overall 61.2% (SD = 24.8) adherence to treatment for the assigned activity from the functional program.

This higher level of adherence to the AAT sessions, compared with overall adherence to the functional activities, was significant (t-test: t (20) = 4.7; p = 0.0001). We could only compare adherence to AAT-treatment with specific functional program activities for which the number of attending patients was large enough to justify a statistical test (art therapy and gymnastics). AAT showed significantly better adherence than art therapy (Mann-Whitney U test; U = 2; p = 0.01) and gymnastics therapy (Mann-Whitney U test; U = 2; p = 0.01). All detailed data on adherence to treatment are presented in **Tables 6 and 7,** and see **Figure 2**.

TABLE 6 | Patients' adherence to treatment.

Patient ID	Group	Number of programmed sessions	Number of attended sessions	Percentage of adherence
1	Treatment	40	38	95
2	Treatment	40	37	92.5
3	Treatment	40	39	97.5
4	Treatment	40	40	100
5	Treatment	40	37	92.5
6	Treatment	40	34	85
7	Treatment	40	39	97.5
8	Treatment	40	36	90
9	Treatment	40	37	92.5
10	Treatment	40	38	95
11	Treatment	40	37	92.5
12	Treatment	40	34	85
13	Treatment	40	39	97.5
14	Treatment	40	35	87.5
15	Control	28	16	57.1
16	Control	28	6	21.4
17	Control	28	13	46.4
18	Control	21	18	85.7
19	Control	28	25	89.3
20	Control	28	18	64.3
21	Control	56	22	39.3
22	Control	56	48	85.7
MEAN(*SD*)	All patients	37.9 (8.4)	31.1 (10.1)	81.3 (21.5)
	Treatment group	40.0 (0.0)	37.1 (1.9)	92.9 (4.7)
	Control group	34.1 (13.7)	20.8 (12.4)	61.2 (24.8)

TABLE 7 | Differences in adherence to treatment between AAT and other types of functional rehabilitation interventions.

Type of compared functional intervention	Number of participants in the control group	Type of test	*t* (df) or *U*	*p*
AAT vs. Art therapy	3	U	$U = 2$	0.010*
AAT vs. Gymnastics	3	U	$U = 2$	0.010*
AAT vs. Psychodynamic therapy	1	U	**	**
AAT vs. Group sport	1	U	**	**
AAT vs. all other	8	T	$t(20) = 4.7$	0.001*

*(T) t-test (data passed normality test). (U) Mann–Whitney U Test (data did not pass normality test). *Tests are considered significant at $p < 0.05$. **Not possible to calculate because not enough values in the control type of intervention.*

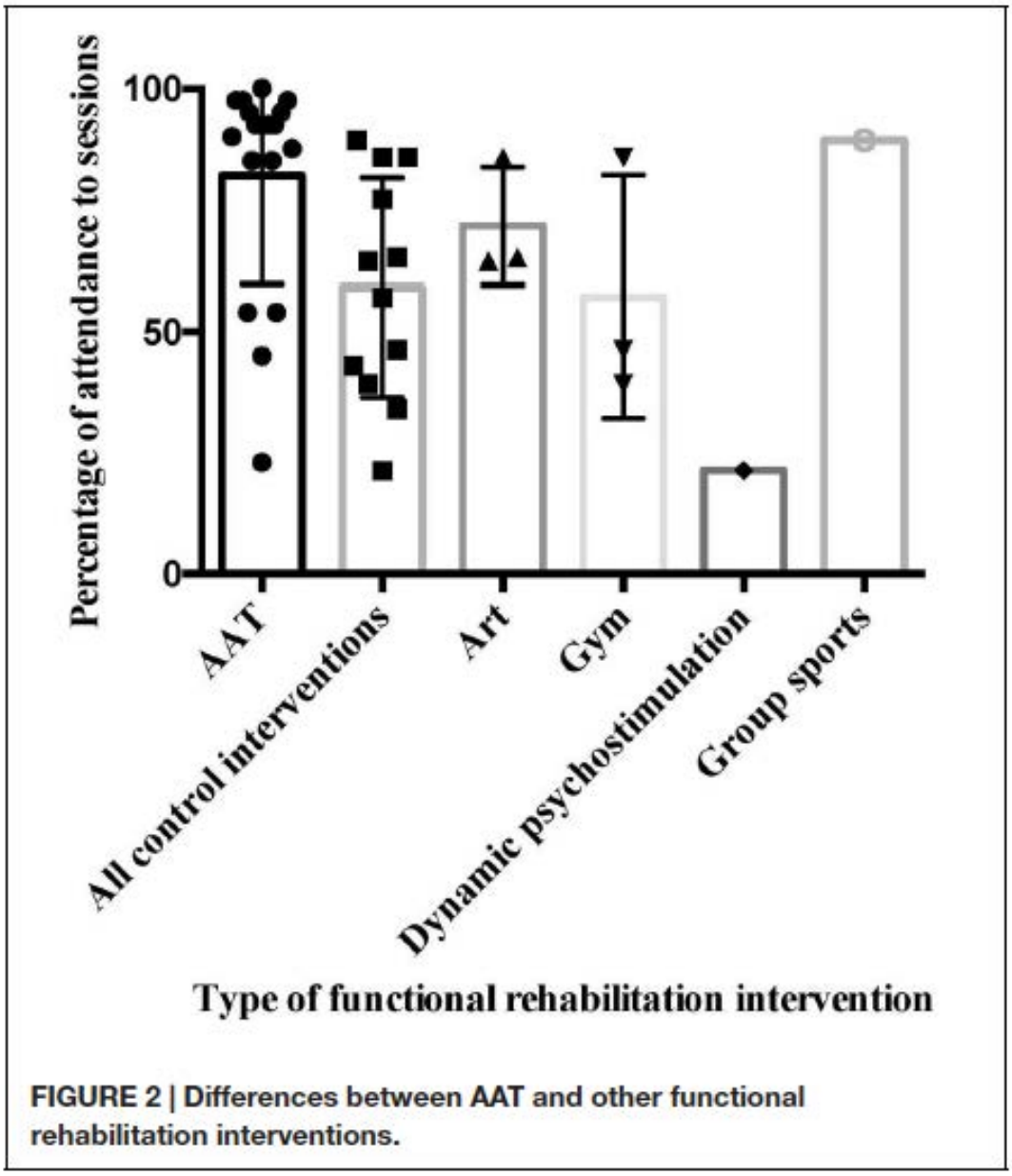

FIGURE 2 | Differences between AAT and other functional rehabilitation interventions.

Salivary cortisol and alpha-amylase

We collected 61 pre-session and 60 post-session saliva samples from the AAT-treatment group. However, some of the saliva samples were too small for analysis and were discarded. Cortisol analysis was performed with 48 matched pairs of samples (matching every corresponding pre-session and post-session sample for each session for which sufficient sample was available). There was a significant decrease in cortisol after participation in an AAT session (Wilcoxon Test; $p<0.05$. Pair-matching was confirmed using the Spearman test ($p<0.05$). Fifty pairs of matching samples were used to measure the effect of the

intervention on salivary alpha-amylase. Salivary alpha-amylase was increased after the AAT sessions, but the difference was not quite significant (Wilcoxon Test; $p=0.059$. Pair-matching was confirmed using the Spearman test; $p<0.0001$).

Discussion

In terms of age and gender, our sample of patients was consistent with the general population of people with schizophrenia, as well as the population of institutionalized people with schizophrenia (Jablensky et al., 2000; Uggerby et al., 2011). All participants were receiving at least one psychotropic drug, as is common in people treated for this condition (Jablensky et al., 2000; Uggerby et al., 2011). Our results could therefore be relevant to other similar institutions that are considering the implementation of an AAT program.

With regard to population size, our study was comparable with similar studies that have investigated the effect of AAT in the treatment of schizophrenia, suggesting some common methodological limitations (Barak et al. 2001; Berget, 2008; Chu et al., 2009; Kovács et al., 2006; Nathans-Barel et al., 2005; Villalta-gil et al., 2009). Apart from the constraint of working with a limited total population of patients within a single hospital unit, and the application of exclusion/inclusion criteria, it should be remembered that AAT has to be conducted in small groups for practical reasons such as the need for proper supervision and a high animal-to-patient ratio (Fine, 2010).

One patient withdrew from the study due to the risk of harm to the therapy dogs. This kind of problem should have been anticipated and taken into account within the exclusion criteria. This should be considered in future studies. Another patient withdrew very early in the study (week 3), and prior to the collection of any outcome data. The recommended approach for superiority studies is an intention to treat analysis, whereby all patients included in the randomization are included in the analysis, and by deviating from this approach in our study we risk an overestimation of the treatment effect (Armijo-Olivo and Magee, 2009). So, whilst the results are interesting and point to a potential

effect of treatment, they cannot be relied upon as general evidence of efficacy in a clinical population.

People with a diagnosis of chronic schizophrenia who live in institutionalized settings have very low levels of social functioning and social activity (Kovács et al., 2004). Individual or combined measures of symptomatology, quality of life and adherence to treatment are commonly used to assess the efficacy of a psychosocial rehabilitation process for patients with schizophrenia (Wilson-d'Almeida et al., 2013), but not together in the same study. By including these measures and adding an assessment of salivary cortisol and alpha-amylase, our study provides an interesting insight into the use of combined measures.

In terms of symptomatology, in the AAT-treatment group we observed an improvement in negative symptoms of schizophrenia like apathy, asociality, anhedonia and alogia, that could be partially explained by the regular interaction between patients and animals. Previous work suggests that AAT programs may be effective in the control of negative symptoms of schizophrenia (Barak et al. 2001; Barker and Dawson 1998; Kovacs et al. 2004; Nathans-Barel et al. 2005). Therapy dogs have been described as social catalysts or mediators of interactions between patients and between patients and their therapists, and these benefits could be extended outside the AAT sessions (Fine, 2010). Since negative symptoms of schizophrenia are relatively insensitive to pharmacological therapies and are associated with a chronic course and high levels of social disability, it is very important to find effective alternative interventions that can be added to standard treatment protocols (Grawe and Levander, 2001; Hammer, Katsanis and Iacono, 1995; Liddle, 2000;). The beneficial effects of AAT on negative symptoms of schizophrenia is therefore worthy of further investigation.

The trend towards an increase in alpha-amylase combined with the significant decrease in cortisol after the AAT sessions suggests that the interaction patients had with the dogs was perceived to be not only engaging, but also relaxing. Increases in alpha-amylase and the activation of the Sympathetic Nervous System (SNS) can occur in positive emotional states

(Fortunato et al., 2008; Payne et al., 2012), and recent research indicates that people with schizophrenia may experience a dysregulation of SNS tone (Monteleone et al., 2015).

The lack of significance for the change in salivary alpha-amylase could be due to the absence of an effect, but also due to the small population size and the small number of collected saliva samples (saliva was only collected for the last four AAT sessions, sample collection was not always successful, and approximately 17% of collected samples had to be rejected due to inadequate sample volume for analysis).

Regarding stress and cortisol levels, previous research has found decreases in salivary cortisol during AAT sessions in other types of patients, such as autistic children (Viau et al., 2010) and insecure attached males (Beetz, Julius, et al., 2012). In a previous study with people being treated for schizophrenia, cortisol levels were not been found to change after interaction with animals (Nepps, Stewart, and Bruckno, 2014). However, in comparison to our study, the AAT protocol for that study did not include repeated sessions for each patient and the ratio of dogs per patient was lower. Long-term and dose effects of AAT on stress levels of patients with schizophrenia still need to be studied. Future studies could take advantage of our experience by extending the measurement of salivary cortisol to all AAT sessions within a program, and a control group, while also looking for long-term and dose effects.

There were some difficulties in collecting saliva samples in this study, both in terms of quantity and quality of saliva. The pharmaceutical treatment of schizophrenia involves drugs that suppress salivation, and as a consequence of their symptomatology, many people with schizophrenia are smokers (Rae et al., 2014). Smoking increases cortisol and decreases alpha-amylase (Granger, Blair et al., 2007), so this could be a confounding factor. Future studies should include data on patients' smoking level, particularly when comparing saliva measures between groups, as between group matching could be important. In addition, personal hygiene and dental care seems to be poor in many people with schizophrenia (Velligan et al., 1997), and the presence of impurities in saliva samples could interfere with the reliability of the measurements (Granger,

Kinlighan et al., 2007). Ideally, a patient should have rinsed his or her mouth with water some minutes before saliva collection, but due to a lack of patient cooperation this was rarely possible. Future research should try to extend and optimize saliva sample extraction and analysis, as it seems cortisol and alpha-amylase could be good markers of AAT effects in people being treated for schizophrenia.

Quality of life measurements did not differ between pre-treatment and post-treatment conditions in either of the two groups. Improvement in symptomatology is not always related to improvement in quality of life in people with schizophrenia as the latter can be affected by other factors such us the level of insight (Hayhurst et al., 2014; Margariti et al., 2015; Wilson-d'Almeida et al., 2013). Previous research has shown that even patients with schizophrenia who are undergoing treatment can experience a progressive decline in their quality of life (Medici et al., 2015). Therefore, a lack of decline in overall quality of life measurements could be interpreted to be a benefit of psychosocial rehabilitation, particularly in chronic patients. Future research could focus on specific domains of quality of life where AAT seems to have a direct effect, such as anxiety and depression (Barker and Dawson, 1998) and social relationships (Villalta et al., 2009).

In the present study, mean adherence to the alternative functional rehabilitation interventions (art therapy, group sports, dynamic psycho-stimulation or gymnastics) was lower in the control group than the AAT-treatment. Previously reported adherence rates to therapeutic sport programs for people being treated for schizophrenia range from 50% to 82% (Beebe et al., 2005; Warren et al., 2011). In the present study there were intrinsic differences between the activities included in the functional program, but they all shared certain features, such as frequency, duration and being conducted outside the hospital. Although the added value of AAT sessions in terms of adherence could be due to a novelty effect, attendance to sessions did not decline during the program. Information about adherence is rarely reported in AAT research, but it could be a very useful indicator in the context of

psychosocial rehabilitation, and deserves further research (Kamioka et al., 2014).

Another factor that could be of importance in adherence to ATT is the human-dog relationship (Nagasawa et al., 2015). An initial bond may be quickly established between a person and a dog, and this bond has a strongly emotional element (Beetz, Uvnäs-Moberg et al., 2012; Dwyer et al., 2006; Fine, 2010), that leads to the development of attachment to the dog (Zasloff, 1996). This attachment could contribute to a person's sustained interest in attending AAT sessions, but could potentially lead to problems when the human-animal bond is disrupted at the end of the program. Further research could monitor the development of the patient-dog bond during an AAT program, and the effects of ending such programs.

Taken together, the various significant results reported in this study (reduction of negative symptomatology, high adherence to the AAT program, and cortisol reduction after AAT sessions) could be explained by the biology of human-animal interactions (Beetz, Uvnäs-Moberg, et al., 2012; Nagasawa et al., 2015). When a person has a enjoyable contact with a dog there is a release of oxytocin, dopamine and endorphins, as well as a decrease in cortisol (Beetz, Julius et al., 2012; Beetz, Uvnäs-Moberg et al., 2012; Julius et al., 2013). This overall reaction seems to enhance pro-social behavior and decrease anxiety and stress, mainly via the hypothalamic-pituitary axis (HPA) (Neumann et al., 2000). Oxytocin administration has previously been proposed as a treatment for psychiatric patients because of its broad pro-social effects on behavior and cognition (Zik and Roberts, 2014). Through the release of oxytocin, positive contact with dogs could produce such psychosocial and psychophysiological benefits. Future research in AAT might also try to study changes in oxytocin levels of people being treated for schizophrenia during contact with animals.

The results of our study raise some questions that could be addressed in future work. Adherence to treatment is a significant problem, especially in lengthy rehabilitation programs with challenging patients. It would be interesting to investigate whether the high level of adherence to AAT that we observed is replicated in other therapeutic situations, and whether adherence really is

different from other closely matched activities. It is possible that the mere presence of a dog in any type of therapy session could improve adherence, especially if the patient has developed a relationship with the dog during AAT, and this effect should be investigated. In all rehabilitation programs resources are limited and the inclusion of AAT could represent an opportunity cost by displacing other activities. It is therefore important to find out whether patients who have participated in AAT go on to experience significant long-term benefits after the rehabilitation program has concluded, compared with patients who have been involved in other activities.

In conclusion, AAT seems to be a worthwhile adjunct therapeutic approach for people being treated for schizophrenia in a conventional psychosocial rehabilitation process, with potential positive outcomes in symptomatology, adherence to AAT program, and stress reduction during AAT sessions.

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CAPÍTULO 3

Characteristics of 24 cases of animal hoarding in Spain

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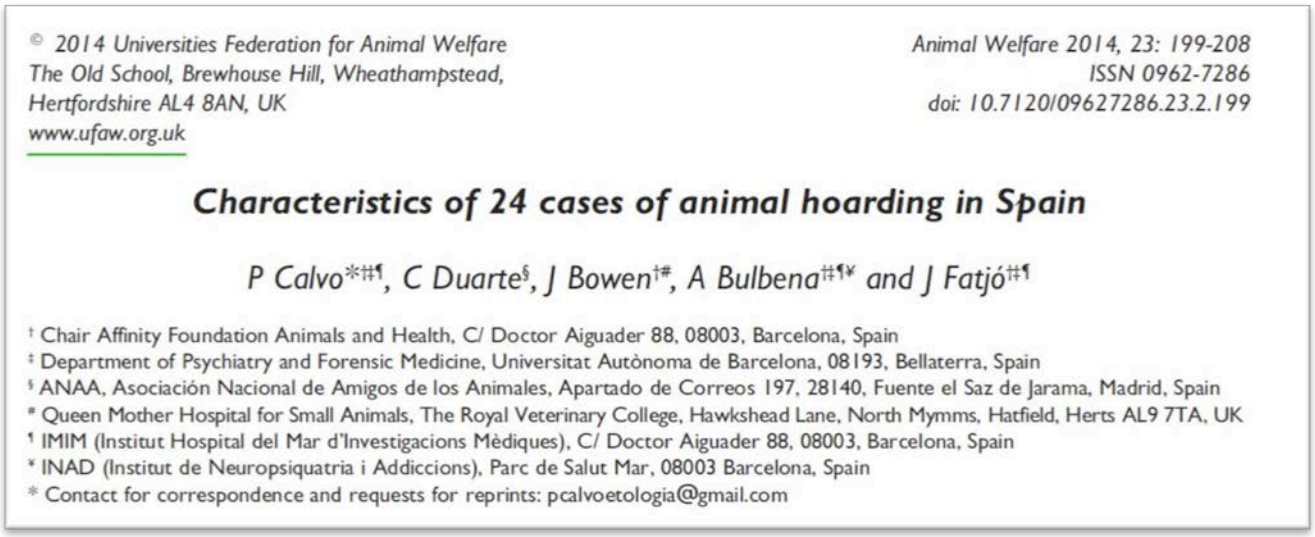

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Characteristics of 24 cases of animal hoarding in Spain

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Abstract

Animal hoarding is considered to be an under reported problem, which affects the welfare of both people and animals. Few published studies on animal hoarding are available in the scientific literature, particularly outside North America. The present study was designed to obtain data on animal hoarding in Spain, with a particular focus on animal welfare issues. Data were obtained retrospectively from 24 case reports of animal hoarding involving a total of 1218 dogs and cats and 27 hoarders. All cases were the result of legal intervention by a Spanish humane society during the period from 2002 to 2011. Hoarders could be characterized as elderly, socially isolated men and women who tended to hoard only one species (dog or cat). Most cases presented a chronic course of more than five years of animal hoarding. The average number of animals per case was 50, with most animals being dogs. In 75% of cases the animals showed indications of poor welfare, including poor body condition, and the presence of wounds, parasitic and infectious illnesses. Amongst the hoarded animals aggression and social fear were the most commonly reported behaviours. To the authors' knowledge, this is the first report on animal hoarding in Spain and one of the first in Europe. Further studies are needed to fully elucidate the epidemiology, cross-cultural differences and aetiology of this under-recognized public health and welfare problem. More research might help to find efficient protocols to assist in the resolution and prevention of this kind of problem.

Keywords: animal hoarding, animal welfare, cat welfare, dog welfare, object hoarding, pathological altruism.

Introduction

The defining features of animal hoarding are the presence of large numbers of animals kept in housing that does not provide the minimum standards expected of responsible pet ownership, and with the keeper being unable to recognize the negative consequences of such conditions on health and behaviour (Edsell-Vetter & Patronek 2011). Thus, collecting a large number of animals becomes a concern when the number overwhelms the ability of the hoarder to provide acceptable care (Patronek 1999).

The typical animal hoarder's profile has been described as a middle aged or old woman, usually unmarried and socially isolated who hoards cats (the most often collected animal) or dogs (Hoarding of Animals Research Consortium 2002; Patronek & Nathanson 2009; Steketee et al 2010).

Animal hoarding has a welfare cost for the animals concerned, and can be considered a form of animal cruelty (Arluke 2006). The environment provided is typically found to be inadequate, inappropriate and overcrowded. Furthermore, animal hoarding has detrimental consequences for the hoarders themselves and also for their communities (Patronek & HARC 2001; Arluke 2006).

The community cost arises from the involvement of multiple government agencies, and demands on city council technicians, public health officers and health professionals. Moreover, animal shelters are burdened with the responsibility of immediately housing and caring for what may be a sudden and large influx of seized animals. Many of these animals need intensive veterinary care and some need to be euthanized. They often present a behavioural profile that makes adoption particularly complicated, so that they may remain in the shelter for long periods of time. Altogether, this represents a high economic cost for both animal shelters and administrations. Finally, social services and mental health services may be required to treat the psychological problems of the animal hoarder, although this seems as yet uncommon (Patronek et al 2006).

Animal hoarding seems to be a common and yet under-reported condition. In the US, the authorities identify between 700 and 2000 new cases

of animal hoarding per year. However, this is probably an underestimate, because only the most severe cases are detected (Frost & Steketee 2011). It seems that animal hoarding, and the intended or unwitting cruelty that accompanies it, is increasing or at least is being detected more often, as one online US database of animal cruelty suggests (www.pet-abuse.com/database) (Patronek & Nathanson 2009; Edsell-Vetter & Patronek 2011). Although awareness has increased over the past few years, it is considered insufficient. Increasing problem recognition is a necessary step to develop effective intervention protocols (Nathanson 2009; Patronek & Nathanson 2009).

Whenever information about hoarding reaches the media it is sensationalized. However, the true impact of hoarding is rarely presented. Instead, animal hoarders are often presented as animal lovers who devote their lives to the care of animals at their own expense, or as harmless eccentrics who become the target of humour. In many cases, the result is that there is public sympathy for hoarders and they may even gain popular support (Arluke et al 2002).

Among human health professionals, animal hoarding is only beginning to gain acknowledgement as a distinct psychiatric condition. It does not appear in the current (10th) revision of the World Health Organisation's International Classification of Diseases (ICD-10), and has only been introduced under the broad category of hoarding disorders in the current (5th) revision of the Diagnostic and Statistical Manual of Mental Disorders (APA, 2013) , but not as a distinct diagnostic category (Mataix-Cols et al 2010; Perroud et al 2010; Pertusa et al 2010; Mataix-Cols et al 2011; Marchand & Phillips McEnany 2012; APA 2013; Kring & Johnson 2013;).

The role of shelter veterinarians and staff is usually restricted to mediation in the seizure of the animals, and their subsequent care (Nathanson 2009). However, it has been pointed out that, without a long-term plan and support for the hoarder, recidivism may approach one hundred per cent (Berry et al 2005).

Lack of professional recognition prevents a multidisciplinary approach to the problem and results in a failure to implement standard protocols to deal with

cases of animal hoarding. This often delays the identification of cases and makes interventions less effective (Patronek 1999; Berry et al 2005).

One of the main reasons for the aforementioned difficulties is that animal hoarding is a problem that few scientists study (Patronek 1999; Berry et al 2005). There are only a few peer-reviewed scientific papers on animal hoarding and most of them are case reports conducted in North America. There is no information on the systematic long-term follow-up of animal hoarding cases (Berry et al 2005; Reinisch 2009). Thus, most of the research on animal hoarding has been developed in the USA. Research on animal hoarding in the USA was promoted by a very active group of scientists (HARC- Hoarding of Animals Research Consortium: www.tufts.edu/vet/hoarding/harc.htm). More recently, groups in other countries, such as Australia (Lawrie 2005) and Brazil (Ramos et al 2013) have also started to study animal hoarding. Studies conducted in different countries with a distinctive cultural background could give some insights on the aetiological, cultural and biological factors underlying animal hoarding, as culture can be both a pathogenic and a pathoplastic agent in any psychiatric disorder (Kohn et al 2009).

A retrospective study was designed to start gathering information on animal hoarding in Spain, with a special attention to animal welfare. The methodology of previous studies was partially adopted to allow cross-cultural comparisons (Patronek 1999). The present study is included in an overall project aimed to implement a protocol of intervention in cases of animal hoarding in the Spanish community.

Materials and methods

A study was designed to extract and to analyse data retrospectively on animal hoarding from humane societies and animal shelters.

The following working definition of animal hoarder was adopted: “someone who accumulates a large number of animals; fails to provide minimal standards of nutrition, sanitation and veterinary care; fails to act on the deteriorating condition of the animals (including disease, starvation and even

death) or the environment (severe overcrowding, extremely unsanitary conditions) or the negative effect of the collection on their own health and well-being and on that of other members in the household; and persists, despite this failure, in accumulating and controlling animals." (Patronek 1999; Patronek et al 2006).

A standardized online case report form was produced to collect the required data for the study, based on previous published studies on animal hoarding (Patronek 1999; Hoarding of Animals Research Consortium 2002; Berry et al 2005). A preliminary version of the form was distributed to 24 national and international public health and animal welfare experts with a request for feedback. After refinement, the final version of the case report form included 42 multiple-choice questions and finished with an open-ended commentary box to collect additional comments.

The questionnaire collected information on four aspects: i) the general characteristics of the case, ii) the hoarder's profile, iii) the condition of the animals and iv) the characteristics of the physical environment. Included in the information collected about the characteristics of the case were the source of detection (origin of the initial report), the date and the place of intervention and the reason for the complaint. Regarding the hoarder, we asked about gender, age, health condition, personal care, financial situation, motivation for hoarding, duration of hoarding, level of insight into the situation, family environment and interactions with social and health services, as well as with humane societies. Regarding the condition of the animals, we asked about species, number, identification, location, origin and general health and behavioural condition. The welfare and health condition of the animals were assessed through a pre-defined list of parameters.

For each case, the personnel involved in the intervention were asked to estimate the percentage of animals that were found either dead at the time of the intervention, euthanized shortly after the intervention, living but in bad condition at the moment of intervention, or living and in good condition at the moment of intervention, choosing between four pre-established categories: "less than 25%" of the total number of animals in the location had that condition;

“from 25% to 50%” of the total number of animals in the location had that condition; “from 51% to 75%” of the total number of animals in the location had that condition; or “from 76% to 100%” of the total number of animals in the location had that condition. The estimation of the percentage of infant animals (e.g. kittens or puppies) was obtained following the same approach.

In each case we recorded whether certain criteria (presence of parasites, injuries, lameness, cachexia (very poor body condition), obesity, sickness, death, aggressiveness, fear, cannibalism) were met by at least one of the animals found at the time of intervention.

To further assess the welfare status of the animals, the prominence of certain characteristics was rated from zero to five (malnutrition, injuries, sickness, dirtiness, aggressiveness, fear) with respect to the animal found in the worst condition. Zero meant no presence of that characteristic and five meant maximum level of that characteristic. So, for example, an animal rated zero for fear meant it didn’t show fear at all, while an animal rated five was very fearful.

Regarding the animal’s environment, for each case the perceived availability of food and water was subjectively rated from zero to five, where zero meant no availability and five meant optimal availability. Therefore, if a case was rated zero for water availability, that would mean that no water was present. And if a case was rated five for food availability, that would mean all animals had the adequate amount of food, under the subjective opinion of the technicians who fulfilled the questionnaire.

Information was collected about the type of area, type of location, kind of neighbourhood, presence of special spaces dedicated to animals, general sanitary conditions and accessibility to different areas of the location of residence. The diverse range of locations in which the animals in the study population were kept, such as camping site equipment and apartment, does not lend itself easily to a single descriptive term, so for the purposes of clarity we use the terms “location of residence” and “location” to mean the place where the animals were being hoarded. In addition, we asked whether the hoarder lived within the location where the animals were kept.

Information was also collected about the characteristics of any concurrent object hoarding: what parts of the location were used to accumulate objects (e.g. all over the location or in specific rooms), and what kind of objects was hoarded (garbage, furniture, money or others).

All cases included in the present study were supplied by the Asociación Nacional de Amigos de los Animales (ANAA), a Spanish humane society that takes care of more than 2000 abandoned animals each year, and which is developing educational programmmes to prevent animal abandonment. ANAA veterinarians and technicians completed the standardised case report form using data obtained from databased reports of any interventions that met the criteria of the above working definition of animal hoarding. In addition to the information included in the database, for each case dealt with by the ANAA organization there were complementary sources of information, including press articles, photos and videos.

Data were collected using Survey Monkey, and analysed using MS Excel for Mac 2011 and Prism 6 (GraphPad Software Inc.). The threshold level of probability for significance of the statistical tests (Shapiro-Wilk normality test; Mann-Whitney U test) was set at $p \leq 0.05$.

Results

A series of 24 cases of animal hoarding attended by ANAA from 2002 to 2011 were obtained. Cases came from different areas in Spain, mainly from the area of Madrid. They involved 27 individual hoarders and 1218 animals, mostly dogs and cats.

General case characteristics

In the majority of cases, the initial report came from a humane society (10/24) or a neighbour (14/24). Some cases were also reported by other sources such as social services (1/24), local authorities (1/24) or police department (1/24) (**Table 1**). Most commonly, complaints arose from concerns related to the welfare of the animals, such as the presence of an excessive

number of animals (10/24), malnourished or mistreated animals (10/24) , and animals in need of medical care (11/24). Other complaints related to animal hoarding case reports were: smell (4/24); unhealthy environment (6/24) (**Table 2).**

Table 1 Method by which cases of animal hoarding were reported to ANAA (n = 24).

Source of detection	Number	Percent
Neighbour	14	58.3
Social services	1	4.1
Police	1	4.1
Local authority	1	4.1
Humane society	10	41.6
Non-resident family member	0	
Resident family member	0	
Veterinarian	0	
Fire brigade	0	
Anonymous complaint	0	
Friend or acquaintance	0	
Homeowner	0	
Service staff visiting the household	0	

Percentages do not total 100 because more than one source of detection could be reported in the same case.

Table 2 Reasons for complaints about cases of animal hoarding reported to ANAA (n = 24).

Reason for complaint	Number	Percent
Smell	4	16.6
Unhealthy environment	6	25
Excessive number of animals	10	41.6
Malnourished or mistreated animals	10	41.6
Animals in need of medical care	11	45.8
No formal complaint	2	8.3
Noise	0	
Free-roaming animals	0	
Detected parasites (eg, rats, insects, etc)	0	
Building damages	0	
Garbage accumulation	0	
Unusual human behaviour	0	

Percentages do not total 100 because more than one complaint could be reported in the same case.

In 13 out of the 23 (13/23) cases for which information was available, the animals and the hoarder shared living space in the same location. In the remaining 10 (10/23) cases, the hoarder didn't live with their animals in the same location.

In half of the cases (12/24) the duration of hoarding exceeded five years. Three (3/24) cases were described as recidivist. Signs of object hoarding were present in 44% (8/18) of cases where information about such hoarder behaviour was available (n=18) (see Photo 1).

Hoarders' characteristics

Of the 27 individual hoarders included in the study, 14 were women (14/27) and 13 were men (13/27). Age information was available for 19 out of 27 individuals. Sixty-three per cent (12/19) of the hoarders were older than 65. Only one (1/19) case was described as younger than 41 and the rest (6/19) were middle-aged, from 41 to 65.

In 67 % of cases (16/24) no official support intervention (social services or human health service) had been provided to the hoarder. In only 17% of cases (4/24) the hoarders had received support for the care of their animals. Technicians had direct access to the hoarder in 20 (20/24) cases and in 70% of cases (14/20) the hoarders were reluctant to permit the removal of the animals.

In 83% of cases (15/18) where information was available (n=18), the hoarders were found to live alone.

In 14 cases there was also information about the hoarder's financial situation. Only four options for the subjective evaluation of the hoarder's financial situation were given to the technicians who fulfilled the questionnaire: i) bad financial situation, ii) borderline financial situation, iii) good financial situation and iv) undetermined financial situation. Three (3/14) cases were described as having a bad financial situation and 11 (11/14) were described as having a borderline financial situation. In all cases, the situation was precarious.

In only three cases (3/24) the hoarder admitted that they were living in compromised conditions and in only one case the hoarders (two women) recognised that the welfare of the animals was impaired.

A table (**Table 3**) with compared characteristics between the hoarders and the baseline population of their area has been included.

Table 3 Characteristics of the baseline population of a hoarding case village or town.

Village/town	Inhabitants (n) (2011)	Population density (2011)
San Sebastián de los Reyes	79,825	1,345.03
Sevilla	703,021	4,993.05
Nuevo Baztán	6,295	311.63
Madrid	3,265,038	5,389.9
Valdetorres del Jarama	4,008	119.57
Cadalso de los Vidrios	2,906	61
Chinchón	5,389	46.5
Fuentelsaz	6,673	192.08
San Sebastián de los Reyes	79,825	1,345.03
Quijorna	3,010	117.08
Pozuelo del Rey	987	31.91
Madrid	3,265,038	5,389.9
Talavera de la Reina	88,674	477.18
Madrid	3,265,038	5,389.9
Polán	4,032	25.41
Puerto de Santa María	88,917	558.03
Pelayos de la Presa	2,512	331.4
Madrid	3,265,038	5,389.9
Cádiz	124,892	10,321.61
Sant Josep	23,688	148.63
Portillo	2,250	112.5
Brihuega	2,818	9.52
Torre Val de San Pedro	193	4.36
Venurada	1,860	189.99

* Data are from year 2011 (year of the detection of the last case of animal hoarding included in the study).

Animals

A total of 1218 animals were involved in the 24 cases, including 986 dogs and 232 cats. There was only one case in which farm animals were found in addition to dogs.

The mean number of animals per case was 50 (range 12 to 159 animals). The range for dogs was from nine to 159. The range for cats was from one to 75. Fourteen (14/24) cases involved dogs alone; five (5/24) cases involved only cats and the other five (5/24) cases involved the two species. The

proportion of dogs and cats varied in the five (5/24) cases, but in four (4/24) cases the proportion of dogs was higher than cats, ranging from 60% (15/25) to 92% (11/12) of dogs and only in one case the proportion of cats (16/25) was higher than dogs. Data were tested for normality using Shapiro-Wilk test.In all cases data were not normally distributed and so the Mann-Whitney U test for unpaired samples was used. This test showed a significant difference ($p=0.0012$) between the number of dogs per case (mean=41; range= nine to 159) and the number of cats per case (mean=10; range= one to 75) . Nine (9/13) of the men hoarded only dogs, only one man (1/13) hoarded cats alone and two men (2/13) hoarded both dogs and cats. Six women (6/14) hoarded only dogs, five women (5/14) hoarded only cats and three women (3/14) hoarded both dogs and cats.

Where information was available about the process of accumulating the animals (n=23), this mainly resulted either from the collection of stray animals (16/23) or uncontrolled breeding (18/23). In only four (4/23) cases deliberate breeding was reported. In eleven (11/23) cases the collection of stray animals was combined with uncontrolled breeding. There were five (5/23) cases in which only uncontrolled breeding was reported as the source of animals and three (3/23) cases in which the unique origin of animals seemed to be the collection of strays. Only in one case (1/23) a combination of the three methods of hoarding animals was reported. In one (1/23) case were deliberate breeding and picking up stray animals were reported together. In another single case (1/23) a combination of deliberate and uncontrolled breeding was found. There was only one (1/23) case in which the sole origin of animals seemed to be deliberate breeding.

The perceived availability of food and water were rated on a scale from zero to five., where zero meant no availability at all and five meant optimal availability. For those 23 cases where food availability was recorded, the mean score for food availability was 1.82: four cases scored as zero (which meant no food was present) and none obtained a score of five. In 22 cases water availability was scored and the water availability mean score was 2.18; two

(2/22) cases were scored zero (which meant no water was present for the animals) and none (0/22) scored five. (see Photo 2.)

Dead animals were found in three out of 24 cases (3/24), with dead animals representing less than 25 % of the total number of animals found in the location of each case. In seven (7/24) cases animals were found in such poor health that they had to be euthanized soon after they were seized; these represented less than 25 % of the total number of animals found in the location of each case. In 20 cases (20/24) were animals were found alive but in bad condition (see Photo 3); in 3 (3/24) cases the animals with this condition represented "from 51% to 75%" of the total number of animals found in the location of each case and in 17 (17/24) cases represented "from 76% to 100 %" of the total number of animals found in the location of each case. In only four (4/24) cases were any of the animals found in good condition, and in only one of these cases the majority of animals were in good condition (ranked "from 76% to 100%"). Infant animals were found in 50% (12/24) of cases.(**Table 4**).

Table 4 Proportion of animals found with certain characteristics: number of animal hoarding cases (n = 24).

	Less than 25%	From 25–50%	From 51–75%	From 76–100%	Total number of cases
Animals found dead during intervention	3/24	0	0	0	3/24
Animals found alive during intervention but euthanised for medical or behavioural reasons	7/24	0	0	0	7/24
Animals found alive but in bad condition, but no need to euthanise	0	0	3/24	17/24	20/24
Animals found alive and in good condition	2/24	0	1/24	1/24	4/24
Number of infant animals	7/24	4/24	1/24		12/24

Lack of hygiene was rated on a scale from 1 to 5, with the highest score indicating the poorest hygiene. Poor hygiene was reported in 22 cases (22/24) with the average score for the lack of hygiene of the most affected animal being 3.79. Internal or external parasites were reported in 22 (22/24) of the cases investigated. Injuries were reported in 21 (21/24) cases and the average score for injuries for the most injured animal was 2.37 (range: zero to five, where zero meant no presence of injuries and five meant very serious injuries), which means it was a moderate score. Sickness was reported in 21 (21/27) cases and

the average score for the sickest animal was 3.37 (range: zero to five, where zero meant no presence of sickness and five meant very serious sickness condition) Alopecia was reported in 17 (17/24) cases. Lameness was reported in 14 (14/24) cases . Animals were found collapsed in 14 (14/24) cases. Cachexia was reported in 11 (11/24) cases, obesity was reported in three (3/24) cases and the average score of the worst nourished animal was 2.95 (range: zero to five). Mutilation was apparent in four (4/24) cases (**Table 5).**

Table 5 Characteristics of the animals.

Characteristic/conditions	Presence (n)	Absence (n)
Lack of hygiene	22	1
Parasites	22	1
Injuries	21	3
Limpness	14	10
Alopecia	17	6
Mutilation	4	17
Cannibalism	3	19
Dead animals	4	18
Prostrated animals?	11	11
Aggressiveness	9	12
Fear	23	0

Focusing on the behaviour of the rescued animals it was found that fearfulness was the most reported problem of behaviour in 23 out of 24 (23/24) cases and the average score for the most frightened animal was 3.12 (range: zero to five, where zero meant no presence of fear and five meant the maximum level of fear). Aggression was scored by technicians only in 21 cases and it was seen in nine out of 21 (9/21) cases and the average of the most aggressive animal was 1.45 (range: zero to five, where zero meant no presence of aggressive behaviour and five meant the maximum level of aggressive behaviour). Signs of cannibalism appeared in three (3/22) cases of 22 cases were cannibalism was scored.

Location of residence characteristics

Where the type of location was reported (n=16), most locations (10/16) were located in the city centre; six (6/16) were detached houses, four (4/16) were apartments or flats, four (4/16) were plots of land, and three (3/16) were semi-detached houses. There was only one case of each of other types of location: field (1/16), first floor of a house (1/16), haystack (1/16), industrial premises (1/16), camping site equipment (tents or caravans) (1/16).

Five (5/10) of the city-centre cases were in a middle class neighbourhood and four (4/10) were in a working class neighbourhood. In those cases outside cities (n=6), three (3/6) were in a small village (less than 20000 inhabitants), two (2/6) cases were in a middle-sized village (from 20000 to 200000 inhabitants) and one (1/6) case was in an area that was unfit for, and not legally permitted for, inhabitation.

In 11 cases information was available about the sanitary conditions of the location. In most of these cases (7/11) the location was described as very untidy, with accumulated garbage, generally unsanitary conditions (including in cooking areas), and the presence of animal faeces and/or urine in areas occupied by people.

When information about the type of space occupied by the animals was reported (n=18), it was found that in seven (7/18) cases both indoor and outdoor areas were completely occupied by animals. In three (3/18) cases animals were kept exclusively outdoors, in three (3/18) cases were exclusively indoors, and in the rest of cases (seven/18) the animals had indoor and outdoor access. In six cases of the 24 (6/24) animals were kept in designated areas, such as cages or rooms.

With respect to the sanitary conditions of the places where the animals were kept, when information was reported (n=21), in 16 (16/21) cases the occupied place was described as very dirty and with animal faeces and urine present. In five (5/21) cases the location was described as untidy and mildly dirty.

In only one (1/11) out of the eleven cases for which information about the ambient temperature and humidity were available, were the conditions adequate. In six (6/11) cases the environment was reported to be cold and damp (even though only one intervention was in winter and two interventions in autumn). In four (4/11) cases the conditions were reported to be excessively hot and dry (despite only two interventions being in summer).

The smell within the location was documented in 11 cases; in nine (9/11) cases the smell was described as much stronger than would normally be expected in any location occupied by a large number of animals. Signs of eye irritation and difficulty to breathe were reported by the people attending the case. In two (2/11) other cases the smell was described as typical of a location that is usually occupied by a large number of animals.

Discussion

Whilst animal hoarding is under-described, object hoarding, a psychiatric condition potentially related to animal hoarding, is widespread throughout human populations in different countries and cultures, including westernized societies and is well represented in the literature (Frost et al 2000; Pertusa et al. 2010; Frost & Steketee 2011). So, it would be expected that animal hoarding would exhibit a similar pattern of distribution throughout nations and cultures. In the present study, the signs of object hoarding were present in 44% (8/18) of cases where information about such hoarder behaviour was available. This is aligned with percentages reported in other studies in USA, where the range of animal and object hoarding simultaneous presence was from 30% to 85% of the studied cases, depending on the study (Frost et al 2011).

General case characteristics

The animal hoarding cases in this study were mainly from the area of Madrid. This could suggest that this part of Spain is more affected by animal hoarding, but it is equally likely that the location of the humane society ANAA

(Madrid) created a bias in reporting. Further studies involving humane societies from the whole country are needed to clarify this point.

In the present study a large number of animals (1218 animals in total; from 12 to 159 animals per case) were accumulated by a small number of people, but there is no simple threshold value for number of animals kept at a given location that can distinguish normal pet ownership from hoarding it. In fact, some studies are trying to define the boundary between normal pet-keeping with a high number of animals and an animal hoarding case (Ramos et al 2013).

In the present study, only 27 hoarders were able to accumulate 1218 animals, with a mean of 50 animals per case . This average of animals kept is similar to that found in previous studies, even though different studies had different strategies of recruitment of cases or came from different areas of the world, such as USA or Australia (Patronek 1999; Berry et al 2005; Lawrie 2005; Reinisch 2009). The accumulation of a large number of animals appears to be a common feature of reported cases of animal hoarding, which probably indicates that, as previous studies have concluded, a situation must reach a certain level of severity in order to be detected as a problem (Frost & Steketee 2011). It seems that the threshold for detection of cases is similar between the present Spanish study and those in the USA.

In the present study most cases had a long course (one to five years) from the time of first report to the humane society, to the seizure of the animals. Again, this is similar to previous studies (Patronek 1999; HARC 2002). This could mean that only extreme cases are detected and/or that detection is delayed until the situation is so serious that it is impossible to ignore.

The cases in the present study were provided by a single humane society, which could be considered a source of bias. However, cases were mostly reported to the humane society by either other humane societies or the hoarders' neighbours, and the main reason for intervention seems to be concerns about animal welfare. This is in accordance with the accepted view, which suggests that there is low level of concern about animal hoarding within state authorities and the human health system. In fact, in our study there wasn't

any intervention focused on the person and human health and this fact could really mean that there is low concern about human and community health implications of animal hoarding, and low recognition of animal hoarding as having a human cost as previous research has pointed out (Patronek 1999; HARC 2002). Hence, there is no public recognition of animal hoarding and it is likely to be an under-reported problem. This study represents data from a single humane society in Spain (ANAA). Given that there are hundreds of similar humane societies in Spain, we can infer that animal hoarding is an important public issue with high societal costs.

Hoarders' characteristics

According to previous research, most animal hoarders are middle aged or older and 75% or more are single women (including widowed or divorced) (Patronek 1999; Edsell-Vetter & Patronek 2011; Frost & Steketee 2011). In the present study, hoarders were also middle aged or older people who usually live alone, which implies a cross-cultural similarity in hoarder characteristics.

However, compared to previous studies in North America in which animal hoarders were mainly women, in the present study, men and women were almost equally involved, with women only marginally more represented. This could reflect either a cross-cultural difference or just the effect of a small sample (Patronek 1999; Berry et al 2005; Edsell-Vetter & Patronek 2011; Frost & Steketee 2011).

In our population, most of the animal hoarders were elderly, lived alone and showed signs of concurrent inanimate object hoarding. This finding is consistent with previous studies, which have also suggested a potential underlying effect of dementia and/or other medical and psychiatric conditions (Patronek 1999; HARC 2002; Berry et al 2005; Edsell-Vetter & Patronek 2011; Frost & Steketee 2011). The animal hoarders in this study also often faced financial problems and received little help to overcome their situation. This suggests a level of social exclusion that has also been recognised by other authors (HARC 2002; Arluke 2006; Patronek & Nathanson 2009; Steketee et al 2010). The nature of the relationship between social exclusion and animal

hoarding remains unanswered (Pertusa et al 2010; Frost & Steketee 2011). In any case, it should be remembered that object hoarding, which is a closely related problem, is also linked to social isolation.

A particularly remarkable characteristic of the hoarders of this study was their apparent lack of awareness of either the highly compromised welfare of their animals or their own compromised living conditions. Thus, the animal hoarder's lack of insight reported in previous studies (HARC 2000) was also found in our collection of cases. This denial of the reality of the situation is characteristic of animal hoarding, and animal hoarders will employ a range of justifications and excuses to try to normalize their behaviour (Patronek 1999; Vaca-Guzman & Arluke 2005; Nathanson & Patronek 2012). In fact, most of the hoarders were reluctant to surrender their animals to local authorities or shelters although they were in a critical condition. In only one case in our study (two women who had accumulated 53 dogs), did the hoarders show any recognition of the inadequateness of their situation. This reported insight could be understood as a true indication of a partial awareness of the situation or as a strategy to deal with external criticism, as it has been reported in other studies (Arluke 2006; Arluke & Killeen 2009). Interestingly, this case was also one of only three cases in our study in which more than one resident person was involved in the act of hoarding. This could reflect a less severe degree of social isolation and distorted perception.

Men tended to hoard only dogs, whilst women didn't show a clear species preference, indicating that there are potential gender differences in the pattern of animal hoarding. A tendency to hoard dogs by men has been reported in one study (Lockwood et al 2005) and a tendency to hoard cats by women has been reported in several studies (Edsell-Vetter J and Patronek G 2011). The elucidation of potential cross-cultural similarities in gender-related patterns of hoarding requires further investigation.

In the present study the source of hoarded animals was mostly the collection of stray animals and uncontrolled breeding. These results, again, are similar to those of previous studies (Patronek 1999; HARC 2002; Edsell-Vetter & Patronek 2011; Frost & Steketee 2011). These patterns of animal

accumulation are consistent with the two proposed most common types of animal hoarders: the overwhelmed caregiver, who starts as responsible pet owners who passively increases their amount of pets, maybe through uncontrolled breeding; and the rescuer, who actively acquires animals, by picking them up from the street (Patronek et al 2006; Edsell-Vetter & Patronek 2011).

Animals' characteristics

In our population, people tended to hoard either dogs or cats (separately) and dogs were hoarded in larger numbers than cats. Dog cases were more often reported in the present study, which is different from findings in some of the previous studies; these found that cats were the predominant species in animal hoarding cases (HARC 2002; Lawrie 2005; Reinisch 2009). This difference could be due to a bias in reporting, the easier detection of dog cases (due to the noise and disruption they cause in neighbourhoods), but it could also indicate that there is greater public, and official, concern for the welfare of dogs in the regions of Spain covered by the present study. It is also possible that the increased representation of dog hoarding cases in this study does reflect a genuine species preference among the hoarders that may be related to underlying differences in attachment behaviour and attachment disorders in those that hoard dogs (Topal et al 1998; Arluke & Killeen 2009; Nathanson 2009; Edsell-Vetter J and Patronek G 2011;). However, there is some previous research which presented dogs as the predominantly hoarded species (Berry et al 2005). Thus, further research is required to elucidate whether there are cross-cultural differences in the type of species hoarded.

In most cases in the present study, the welfare of animals had been seriously impaired; in almost all reported cases a high proportion of animals were sick. The physical conditions of the animals were very poor, with mutilation or cannibalism being present. However, dead animals were only present in 4 cases. This contrasts with previous research in which dead animals were found in most cases. For example, in one study, Patronek found dead animals in 80% of cases (Patronek 1999). As seen in previous studies (Arluke & Killeen 2009)

the environment was totally inadequate and unhealthy for the animals, with water and food being unavailable in most cases.

The animals showed serious behavioural problems, mainly fearfulness and aggression, which reflects a chronic lack of contact with people, a subsequent lack of socialization and the effect of chronic stress.

The concept of the Five Freedoms can be used as a guide for the evaluation animal welfare, and is applied in many situations in which animals are subject to human management (Brambell 1965). It has also been adapted to evaluate the welfare of companion animals in cases of hoarding (http://vet.tufts.edu/hoarding/picts/fivefreedoms.jpg). In most of the cases included within the present study none of the Five Freedoms was met for the animals. From the present study and the current published literature, animal hoarding appears inextricably linked with neglect in taking care of the animals, even though the hoarder's perception is that they keep the animals to protect them. The denial of the serious impairment in the welfare of the animals seems again a key feature of the condition of animal hoarding not only as a mental condition but also as an accepted form of animal abuse (Patronek 1999; Arluke 2006; Mataix-Cols et al 2010; Edsell-Vetter & Patronek 2011; Frost & Steketee 2011).

Location of residence characteristics

There was no characteristic type of location associated with hoarding, and there was a high degree of diversity in area and location types.

However, the impact of having so many hoarded animals in a confined space made the environment filthy, unhygienic, malodorous and humid. In all cases where information about the conditions of the location was available, a sub-optimal environment was reported, which is consistent with previous studies (Patronek 1999; Edsell-Vetter & Patronek 2011; Frost & Steketee 2011).

In contrast to previous studies, the present study featured a type of location that has not been recorded previously; an apartment in the city centre. In previous studies single-family houses in urban areas predominated (Patronek 1999). This could be related to a number of factors. Firstly, most of the Spanish

city population live in apartments. Secondly, in an urban area it is more difficult to hide the accumulation of animals and the disruption created from neighbours.

Ammonia levels are of concern in hoarding cases, both for human and animal health. The National Institute for Occupational Safety and Health (NIOSH) in the USA lists 300 parts per million as a concentration immediately dangerous to life or health, and 25 parts per million as the maximum average occupational exposure during the workday (NIOSH 2007). In one hoarding case, the air ammonia level reached 152 parts per million, which was very high (Arluke & Killeen 2009). Ammonia levels can be related to the urine odor present in the location. In the present study, in nine cases the smell was described as much stronger than in any location usually occupied by a large number of animals, and signs of eye irritation and breathing difficulty were reported. This could be an indication that ammonia levels had reached a toxic level, potential becoming a cause of health problems.

The limitations of this study are similar to those of previous studies. Due to the uncooperative nature of hoarders it is very difficult to collect detailed, accurate information about cases. This obstructiveness is a common feature between animal hoarders (Patronek 1999) and object hoarders (Frost and Steketee 2011), with animal hoarders being even more difficult to manage than object hoarders (Frost 2000). Other limitations are related to the retrospective nature of the study, the lack of public awareness of this kind of problem and the lack of a standardized reporting system (Patronek 1999; Berry et al 2005). This means that the only accessible information was the non-standardized information that was already available on the ANAA database. Another source of bias was lack of recall: the technicians who completed the online standardized form did so using the information in the database and from their own memories.

Animal welfare implications

Our study supports the idea that animal hoarding should be considered and recognised as a genuine form of animal abuse and incompetent pet ownership.

Animals coming from cases of animal hoarding sometimes must be euthanized, due to their severely affected state. The remaining animals rescued in hoarding cases usually need a lot of veterinary care and exhibit difficult-to-solve behaviour problems. This means they won't turn easily or ever into an adoptable animal. Therefore, animal hoarding becomes a significant economical and emotional problem for those working with the seized animals, such as humane societies or city council officers, and, as a consequence, for the community.

To conclude, further research into animal hoarding is necessary to assist in the effective avoidance, detection and assistance in resolving this important and under recognized form of animal cruelty.

Conclusion

To our knowledge, the present study is the first analysis of cases of animal hoarding in Spain and in Europe and that could help to increase awareness about this condition. The need to increase recognition of animal hoarding to develop multidisciplinary protocols for detection and intervention has been already stressed by different authors (Nathanson 2009; Edsell-Vetter & Patronek 2011).

Our stdy supports the view that animal hoarding is a multidimensional problem with implications for public health, animal welfare and human health.

Despite some differences, our results agree with studies in other countries and suggest some cross-cultural similarities in animal hoarding cases, leading to a similar hoarding profile even among different countries and cultures.

Hence, further research on animal hoarding in Spain and in other countries should be expanded in several aspects. First, increasing number of analysed case reports from several sources (other humane societies and public health agencies) could help to obtain a broader geographical and demographic picture. Second, it may be useful to focus research on studying the hoarder's psychological profile, as this could help to improve detection and prevention of

animal hoarding cases. Third, very different approaches of resolution appear when a new animal hoarding case is detected, because several organizations (public health, humane societies and social services) are implicated and in many countries and regions there isn't any standard protocol to proceed in this situations. So, getting more data on the actions that are performed when an animal hoarding case arises could help to understand which are the most effective. Finally, more research to elucidate the boundary between animal hoarding and other forms of pet ownership could be also useful, particularly for early detection and prevention.

We must also consider the serious consequences of keeping animals in such compromised conditions, preventing them from being adopted and becoming a high cost for the community.

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DISCUSIÓN GENERAL

El objetivo general de esta tesis doctoral ha consistido en profundizar en el conocimiento de la relación que existe entre los seres humanos y los animales de compañía, puesto que, aunque las interacciones entre el ser humano y el resto de animales son atávicas (Wilson 1984; Serpell 1996; Braje 2011; Julius et al. 2013), la ciencia dedicada al estudio de las relaciones humano-animales, llamada Antrozoología, apareció como tal hacia finales del siglo XX (Hurn 2010; Irvine 2012; York and Mancus 2013).

En esta tesis se ha pretendido estudiar la relación humano-animal desde tres ángulos diferentes, aunque complementarios: la tenencia y la convivencia cotidianas con un animal de compañía; el aprovechamiento de la relación humano-animal en las llamadas intervenciones asistidas con animales llevadas a cabo para ayudar en el tratamiento y soporte de colectivos especiales ; y las psicopatologías humanas asociadas a la interacción con animales de compañía. Estos tres aspectos estudiados en esta tesis pretenden ofrecer una visión desde tres ángulos muy diferentes y muy concretos de la relación humano-animal, fundamentalmente desde el punto de vista de la percepción de la persona y los efectos en la misma. Por ello, a continuación, en esta discusión aparecen bien diferenciados en varios apartados los tres temas que se han estudiado y desarrollado a través de esta tesis.

1. El vínculo humano-animal en la convivencia con los animales de compañía

En el ámbito de la convivencia con los animales de compañía nos centramos en explorar la relación percibida que los propietarios de perros tienen con este animal de compañía.

Este estudio, aunque fuera con una muestra de conveniencia (participantes voluntarios) nos ha permitido establecer una metodología que se puede aplicar en futuras ocasiones con diferentes objetivos:

a. Para reconocer otros perfiles de propietarios de perro o de otras especies. Nuestro estudio sobre la relación perro-propietario nos permitió establecer la existencia de dos perfiles diferentes de propietarios en función de su percepción de la relación con su perro en términos de costes y beneficios percibidos de esa convivencia, a través de la aplicación de la teoría del intercambio social (Emerson 1976) mediante la escala MDORS (Dwyer, Bennett, and Coleman 2006). Por tanto, aplicando la misma metodología (análisis de componentes principales seguido de clustering jerárquico que permitió establecer dos grupos o perfiles de propietario de perro) a datos recogidos mediante la escala MDORS en otras poblaciones de propietarios de perros, se pueden llegar a discernir otros posibles perfiles de propietarios de perro. Por otro lado, se podría aplicar esta misma metodología para establecer perfiles de propietarios de otras especies, eso sí, creando primero una escala similar a la MDORS para dicha especie. Así, por ejemplo, a día de hoy ya existe una escala validada para medir la relación propietario-gato, llamada CORS (Cat Owner Relationship Scale)(Howell et al 2017), con la cual se podría aplicar la metodología utilizada en nuestro estudio con la escala MDORS, para identificar posibles diferentes perfiles de propietarios de gato.
b. Para establecer otros factores, del animal o del propietario, que afecten al tipo de perfil de propietario que se establece, puesto que nuestro estudio ayudó a identificar ciertas características del propietario (como el género y el nivel educativo) que guardan relación con el tipo de patrón de relación propietario-perro que se establece. Por tanto, si la misma metodología (un modelo de regresión logística binaria) utilizada para analizar la contribución de factores socio-demográficos (del propietario y del perro), en cada uno de los dos perfiles de propietarios identificados en nuestro estudio, se aplicara en otras poblaciones diferentes de propietarios de perro se podrían llegar a identificar otros factores (edad del propietario, tamaño del

perro, edad del perro, raza del perro, etc.) que podrían estar contribuyendo a que una relación propietario-perro siguiera un patrón determinado u otro.

c. Para explorar perfiles de otros tipos de relación entre individuos, es decir, para aplicar en diferentes ámbitos de estudio de relaciones en psicología social. En general, en psicología social, los estudios sobre la teoría del intercambio social, en diferentes ámbitos, como las relaciones laborales entre superiores y empleados, se han llevado a cabo principalmente en ámbito experimental en pruebas de laboratorio, con muchos elementos restringidos, en lugar de en el mundo real (Cropanzano and Mitchell 2005; Cook et al 2013). Actualmente se aboga por estudiar la aplicación de la teoría del intercambio social en el mundo real aprovechando datos que ofrecen las redes sociales, por ejemplo, para estudiar cómo funciona la teoría del intercambio social en las redes de búsqueda de pareja emocional. Y en estos estudios se busca más establecer cuáles son los factores que afectan a las relaciones que no establecer perfiles. Así pues, por ejemplo, al encontrar en nuestro estudio un sistema para establecer grupos de perfiles dentro de poblaciones concretas, podría ayudar a establecer perfiles de relaciones laborales o emocionales, y, así, poder estudiar las implicaciones a largo plazo de cada uno de los perfiles.

Además, hay que tener en cuenta que la teoría del intercambio social, aunque está ampliamente aceptada para abordar una relación entre 2 o más individuos y, por tanto, se puede aplicar a la relación entre un propietario y su animal de compañía, no deja de tener sus complicaciones y diferentes puntos de vista al aplicarla, sobre todo en 3 aspectos: a) las normas y reglas del intercambio, b) los recursos intercambiados, y c) el tipo de relaciones que emergen (Cropanzano and Mitchell 2005). Por tanto, los resultados podrían variar según la aproximación teórica desde la que se aplique esta teoría de intercambio social (Skvoretz and Willer 1993). En nuestro caso hemos utilizado

la escala MDORS (Dwyer, Bennett, and Coleman 2006), una herramienta ya validada para medir la relación del propietario con su perro (MDORS), que evalúa la relación según costes y beneficios de la misma, considerando como costes no sólo los económicos, sino también las renuncias en el estilo de vida, y considerando como beneficios tanto los niveles de interacción propietario-perro como la vinculación emocional. Quizá sería también adecuado, crear y utilizar otros instrumentos, a partir de otras aproximaciones de la teoría del intercambio social, para medir la relación propietario-animal de compañía. Aún así, es cierto que la aproximación realizada por Dwyer et al (2006) ha dado lugar a una herramienta que se ha podido validar y que, además, con los resultados de nuestro estudio, se demuestra su aplicabilidad para determinar perfiles.

Además, en referencia a la escala MDORS (Dwyer, Bennett, and Coleman 2006) utilizada para medir la relación percibida de su propietario para con su perro, hay que tener en cuenta que, en el proceso de validación de la escala, se llegó a un análisis factorial que dividía la MDORS en tres subescalas que miden tres áreas de la relación propietario perro: vínculo emocional, nivel de interacción y coste percibido. Y justamente los dos patrones de propietario encontrados en nuestro estudio se diferencian mucho más en cuanto a las variables de MDORS de vínculo emocional y de interacción, que no en cuanto a las variables de coste percibido). La metodología estadística aplicada (análisis de clusters o grupos seguida de análisis de componentes principales) nos ha permitido encontrar qué ítems contribuyen más para distinguir los dos perfiles de propietario de perro que aparecieron en nuestro estudio. Esto no sería posible si aplicáramos otra metodología estadística más tradicional.

Por otro lado, el hecho de que encontremos que los aspectos más relevantes, vínculo emocional y nivel de interacción, que determinan las diferencias entre grupos parecen guardar relación con el llamado comportamiento de cuidados a terceros intrínseco del ser humano (Levine 2002) y que se ha demostrado también su existencia en la relación entre humanos y sus animales de compañía (Daly and Morton 2006; Julius et al 2013). Con lo cual este aspecto del comportamiento de cuidar a los demás

según lo presente que esté en cada propietario podemos considerar que va a revertir en la relación con su perro.

Otro aspecto interesante a discutir en esta sección de esta tesis es la utilización de una muestra de conveniencia para obtener resultados, aunque no sean poblacionales. En este estudio, estamos aplicando las bases de la llamada "Citizen science" (Lewenstein 2016) y de la investigación comportamental online (Gosling and Johnson 2010), es decir, se consiguen datos gracias a la participación voluntaria de la población y, además, se obtienen estos datos gracias al aprovechamiento de las nuevas tecnologías y de las redes sociales. A día de hoy estas estrategias para obtener datos están muy aceptadas, ya que, aunque se acabe utilizando una muestra sesgada de voluntarios, se logran resultados relevantes e interesantes sobre una parte importante de la población (las muestras suelen ser de número elevado) que permiten establecer metodologías y conclusiones interesantes igualmente. De todas formas, siempre hemos de recordar también las limitaciones de este tipo de estudios basados en "citizen science", sobretodo en cuanto al sesgo de la muestra, ya que existen colectivos que tienen mayor tendencia a participar en encuestas, como, por ejemplo, las mujeres cuando la temática es de tipo social o familiar (Smith 2008a), o existen diferencias en la participación en redes sociales según características socio-demográficas (Joinson 2008; Duggan and Brenner 2013) o según motivaciones personales de los participantes (Bosnjak, Metzger, and Gräf 2010).

Otro punto a tratar sobre esta parte del estudio de la relación propietario-animal de compañía, es el nexo existente entre la convivencia con un animal de compañía y el nivel de satisfacción del propietario con su vida (calidad de vida, salud, etc.). Esta relación o nexo no están claramente definidos en cuanto a su sentido, ya que en estudios previos se observan tanto efectos positivos como negativos en la calidad de vida de las personas correlacionados con la tenencia de animales de compañía. Así, existen varios estudios previos que indican un impacto positivo en la salud y el bienestar de las personas, aunque la mayoría de estos estudios se basan en tipos de poblaciones muy determinadas, como personas de la tercera

edad (Raina et al 1999). Y estudios longitudinales a nivel de población general en Alemania y Australia determinaron que la tenencia de un animal de compañía reducía el número de visitas al médico de los propietarios de mascotas, pudiendo incluso llevar también esa tenencia de animales de compañía a un menor consumo de medicamentos y, por tanto, podría suponer un ahorro en salud pública (Headey and Grabka 2007). Pero hay estudios que indican relaciones negativas entre tenencia de animales de compañía y aspectos de salud o de bienestar de las personas. Así, un estudio poblacional realizado en Suecia mostraba que los propietarios de cualquier tipo de animal de compañía percibían su salud física como buena, pero mostraban una peor salud mental que los no propietarios, por ejemplo. Igualmente en este estudio poblacional en Suecia sufrían ciertas dolencias físicas (en la cabeza, el cuello, los hombros o los brazos) más frecuentemente que los no propietarios (Müllersdorf et al 2010). Queda claro que es todavía controvertido el tema de la relación positiva o negativa entre determinados aspectos de la salud y bienestar de las personas y la convivencia con un animal de compañía.

En el estudio llevado a cabo en esta tesis con propietarios de perros, utilizamos la escala Cantril, en su versión española validada (Vázquez, Duque, and Hervás 2012), para medir el nivel de satisfacción con la vida de los propietarios de perros participantes en el estudio. Por un lado, en el estudio se comprobó que los participantes mostraban en general un nivel de satisfacción con la vida un 11,23% mayor que la media de la población española. Esto podría estar indicando que las personas que deciden convivir con un perro están más satisfechas con su vida que la población general y eso les lleva a tomar la decisión de tener un perro, o quizás tener un perro marca la diferencia cuando una persona considera su satisfacción con la vida en general, ya que algunos estudios han mostrado que la tenencia de animales de compañía se correlaciona con una mayor calidad de vida (Raina et al 1999; Lewis, Krägeloh, and Shepherd 2009) y con beneficios psicológicos (McConnell et al 2011). Aunque, evidentemente, con nuestro estudio de tipo observacional transversal no se pueden establecer

relaciones de causalidad entre convivencia con un perro y la felicidad de sus propietarios, sino que sería necesario un estudio prospectivo longitudinal de seguimiento de cohortes de personas que no tienen animal de compañía e ir comprobando a lo largo del tiempo cómo cambia la felicidad, la satisfacción con la vida y/o la calidad de vida de las personas que incorporan un perro en su vida, en comparación con el resto.

Hay que tener en cuenta en este aspecto de evaluación de la satisfacción con la vida que estamos hablando de una muestra de conveniencia y quizás de un perfil alto de propietarios muy comprometidos con sus perros y, por tanto, posiblemente muy satisfechos con su vida. Así tendríamos un sesgo en los participantes del estudio en cuanto a perfil socio-económico, como comprobamos, por ejemplo, al ver que son los hombres con alto nivel educativo y alto nivel de vinculación emocional con sus perros los que decidieron participar junto a una mayoría de mujeres. Hay que considerar que la escala Cantril utilizada en nuestro estudio sólo mide la satisfacción con la vida a nivel material y no a nivel de bienestar emocional (Kahneman and Deaton 2010). Por ello, debido a que parece que ambos aspectos de medida de satisfacción con la vida no se pueden evaluar de una misma forma, existen herramientas específicas para medir el bienestar emocional (*OECD Guidelines on Measuring Subjective Well-Being* 2013). Se ha demostrado también que altos niveles de satisfacción con la vida guardan relación con mayores niveles educativos y/o de ingresos económicos (Diener, Tay, and Oishi 2013). Y se ha visto en investigaciones previas que las personas con mayor nivel educativo y económico suelen participar más en las encuestas (Smith 2008b). Por tanto, los altos niveles de satisfacción con la vida en nuestra muestra de propietarios de perros en comparación con la población general simplemente podrían estar indicando que aquellas personas que tienen mayor poder adquisitivo y, por ello, están más satisfechas con su vida son las que están más motivadas para participar en encuestas y, además, son las que se pueden permitir ocuparse de un animal de compañía, ya que, eso sí, previamente también se ha demostrado cierta relación entre el nivel socio-económico y la tenencia de

animales de compañía (Downes, Canty, and More 2009; Murray et al 2010; Westgarth et al 2007).

De hecho, en este estudio de la tesis obtuvimos también como resultado que a menor satisfacción con la vida puntuada por los participantes (medida por la escala Cantril), mayor vínculo emocional mostraban con su perro. Nuevamente, teniendo en cuenta que la escala Cantril no mide la vertiente emocional de la satisfacción con la vida, sino la material (Kahneman and Deaton 2010), esto nos podría indicar que aquellos propietarios de perros que están más insatisfechos, materialmente, con su vida, buscan más refugio social y emocional en sus animales de compañía (Pierce and Sarason 1990). Lo que sí queda de relieve es que aquí tenemos dos aspectos importantes que conviene seguir estudiando:

1) ¿Cuál es la relación causal entre la tenencia de animales de compañía y la satisfacción con la vida y/o calidad de vida y/o el bienestar emocional de las personas?

2) ¿Es esta relación positiva o negativa y qué factores pueden determinar que sean en un sentido o en otro?

En definitiva, hay que tener en cuenta que este primer estudio, donde hemos podido establecer como mínimo dos patrones diferentes de propietarios de perros y factores relacionados con cada uno de ambos perfiles, abre las puertas a poder en un futuro avanzar en la investigación para establecer, predecir y prevenir aquellos perfiles que puedan llevar a una convivencia de riesgo entre propietario y animal de compañía. Es decir, se podrían ir dilucidando diferentes perfiles de propietarios, y aquéllos cuyo balance general de la relación saliera negativa (con más costes que beneficios), constituirían posibles escenarios de riesgo con consecuencias negativas en el ámbito de la tenencia responsable, como el abandono o el maltrato por omisión hacia los animales, cuestiones que tienen un elevado impacto social (Arluke 2001; Arluke and Madfis 2013; Fatjó et al 2015). Y, siguiendo la metodología establecida por nuestro estudio, se podrían identificar factores relacionados con los perfiles de riesgo. Así, en un futuro, podríamos llegar a tener un listado de factores que comprometen la

tenencia responsable de un perro, debido a que se hayan podido relacionar esos factores con perfiles concretos donde el balance coste-beneficios de convivir con un perro fuera negativo.

2. Aplicación terapéutica del vínculo humano-animal

Tal como se comentó en la introducción, en el ámbito del aprovechamiento consciente y con objetivos terapéuticos del vínculo humano-animal, con esta tesis se ha pretendido añadir evidencia científica a los estudios previos sobre intervenciones asistidas con animales (IAA), puesto que queda patente que en la investigación previa todavía hay muchas incógnitas por resolver en cuanto a las IAA, desde los beneficios que realmente proporcionan, las tipologías de usuarios que pueden ser las mejores dianas para este tipo de intervenciones, y la dosis (frecuencia y temporalidad) adecuada de las IAA según tipología de usuario para obtener el mayor beneficio posible (Kamioka et al 2014; Nimer and Lundahl 2007).

Por todo ello, en el caso de nuestro estudio planteado, en el frecuente ámbito de la aplicación de las IAA que es la salud mental, hemos intentado aportar datos que puedan servir para avanzar en la aplicación y el estudio de las IAA en el ámbito de la rehabilitación psicosocial en pacientes con esquizofrenia, ya que hemos propuesto medidas fisiológicas (como la de cortisol en saliva, como medida de estrés)(Granger et al. 2007) y psicométricas (como la escala PANSS) (Peralta and Cuesta 1994; Kay, Opler, and Lindenmayer 1989) que han demostrado ser suficientemente sensibles para medir los efectos de las IAA en pacientes con esquizofrenia; mientras que otras herramientas de medida han mostrado simplemente una tendencia a la mejoría (alfa-amilasa en saliva, como medida de activación del SNS)(Granger et al 2007; Fortunato et al 2008) o no han mostrado un efecto claro en el caso de las IAA (medida de calidad de vida según EuroQol-5D)(König, Roick, and Angermeyer 2007).

Uno de los resultados importantes de nuestro estudio fue la alta adherencia al tratamiento en el grupo de terapia con perros (93% de asistencia de los pacientes a las sesiones de terapia con perros) en comparación con la adherencia al tratamiento del grupo control (61% de asistencia en otro tipo de sesiones de rehabilitación psicosocial), siendo en todo momento voluntaria la asistencia de los pacientes a cualquiera de las sesiones. Un factor que podría explicar esta alta adherencia a la TAA podría ser el efecto de la novedad, puesto que el resto de actividades de rehabilitación psicosocial los pacientes ya las habían practicado anteriormente. De todas formas, la adherencia a la TAA se mantuvo alta durante todo el programa, que duró 6 meses, cosa que podría indicar que el efecto novedad no sería la principal causa de esta alta asistencia a las sesiones con perros. Otro factor que podríamos considerar como relevante para justificar la alta adherencia a la TAA sería que la ya mencionada y demostrada existencia de la relación mutua y fuerte humano-perro (Nagasawa et al 2015) se construyera entre los pacientes con esquizofrenia y los perros asistentes a las sesiones. Sabemos que fácil y rápidamente se establece un vínculo entre una persona y un perro, y que este vínculo tiene un fuerte componente emocional (Dwyer, Bennett, and Coleman 2006; Fine 2010; Beetz et al. 2012), que conlleva el desarrollo de un apego hacia el perro (Zasloff 1996). Este apego podría ser la explicación del interés sostenido en la participación de sesiones de TAA de un paciente con esquizofrenia.

Es interesante también tener en cuenta que, tal como ocurre en el estudio presentado en esta tesis, a veces, medidas tan simples como la tasa de asistencia a las sesiones de IAA (adherencia al tratamiento) pueden ser de gran valor y, por tanto, aunque actualmente no es una medida que se tome habitualmente en este tipo de estudios (Kamioka et al 2014), sería recomendable tenerla en cuenta en futuras investigaciones.Eso sí, en definitiva, si tomamos en conjunto todos los resultados significativos encontrados en nuestro estudio de IAA con pacientes con esquizofrenia (reducción de la sintomatología negativa, alta adherencia al programa de IAA, y la reducción de los niveles de estrés después de una sesión de IAA), se pueden explicar como efecto de la biología de las interacciones humano-animales y que podríamos

bien llamar “efecto de la interacción humano-animal” (Beetz et al 2012; Nagasawa et al 2015). Cuando una persona tiene un contacto agradable con un perro, se produce una liberación de oxitocina, dopamina y endorfinas, a la vez que una reducción de los niveles de cortisol (Beetz et al 2012; Julius et al 2013). Esta reacción global, principalmente atribuida al sistema de la oxitocina, parece promover el comportamiento pro-social y reducir los niveles de ansiedad y estrés, mayoritariamente vía el eje hipotalámico-pituitario (HPA) (Neumann et al 2000). La administración de oxitocina se ha propuesto anteriormente como tratamiento de pacientes psiquiátricos debido a sus amplios efectos pro-sociales tanto a nivel de comportamiento como cognitivo (Zik and Roberts 2014). Y más recientemente se ha observado que su aplicación intranasal reduce algunos de los síntomas de este trastorno, sobretodo en cuanto a los síntomas negativos y de déficit cognitivo social. E incluso se ha comprobado que, en modelos animales no humanos, la alteración genética o mediante fármacos del sistema de la oxitocina lleva a producir sintomatología asociada a los síntomas negativos de la esquizofrenia. Aunque, además, parece que la oxitocina también tendría algún papel en los síntomas positivos y de déficit cognitivo general. Por tanto, se propone estudiar en mayor profundidad los mecanismos del sistema de la oxitocina en la esquizofrenia, para poder ofrecer posibles opciones terapéuticas a los pacientes con dicho trastorno (Rich and Caldwell 2015). Así, el efecto positivo de las TAA en pacientes con esquizofrenia podría llegarse a explicar por la liberación de oxitocina debida al contacto positivo con animales, que, de esta forma, podría estar produciendo beneficios psicosociales y psicofisiológicos. Por ello, también sería una línea de investigación a seguir en IAA el estudio de las variaciones de los niveles de oxitocina de los participantes en estas intervenciones.

El objetivo final de aumentar y mejorar la investigación en IAA es poder lograr mediante medicina basada en la evidencia demostrar los beneficios que las IAA aportan, debido al anteriormente mencionado *efecto de la interacción humano-animal*, y que, finalmente, puedan ser consideradas una estrategia terapéutica adecuada para ser integrada habitualmente en el tratamiento de diferentes tipologías de usuarios.

Otro aspecto que convendría añadir en el futuro son medidas de bienestar de los animales participantes en las IAA, puesto que es un aspecto que cada vez preocupa más en el ámbito de las IAA (Rooney, Gaines, and Hiby 2009; Sonntag and Overall 2014). En nuestro estudio, se intentaron tomar medidas fisiológicas, como cortisol en saliva (Cooper et al 2014) o variabilidad de frecuencia cardíaca (Fallani, Prato Previde, and Valsecchi 2007), pero no se obtuvieron suficientes muestras válidas como para lograr resultados concluyentes. Por un lado resultó muy difícil obtener suficiente muestra de saliva de los perros como para poder conseguir resultados en el laboratorio de medidas fisiológicas. Por otro lado, los dispositivos usados para medir la variabilidad de frecuencia cardíaca, que ya se han utilizado en otras ocasiones en perros (Fallani, Prato Previde, and Valsecchi 2007), no fueron eficientes en el caso de los perros de terapia, ya que era difícil mantener el dispositivo en su lugar (teniendo en cuenta que estos perros normalmente desarrollan muchos ejercicios que implican movilidad durante las sesiones de terapia) y mantener la conductibilidad de los sensores eléctricos: los perros no sudan, por lo que era necesario añadir gel conductor a los sensores varias veces durante cada sesión de terapia, cuestión que provocaba discontinuidades en la medida de frecuencia cardíaca durante una sesión. Por tanto, convendría seguir buscando metodologías para poder medir de forma válida y fiable el bienestar de los animales, perros en nuestro caso, para asegurarnos de que éticamente los animales están participando de las IAA sin efectos negativos para ellos. Así, sería muy útil disponer de algún tipo de escala validada de detección de signos de estrés en los animales participantes, que aplicarían los mismos guías caninos (Fine et al 2013). Otro punto sería intentar mejorar la metodología de obtención de saliva de los perros. Y, finalmente, puesto que parece una medida muy fiable de los niveles de estrés en los animales, hay que seguir investigando para encontrar un dispositivo que permita medir la variabilidad de frecuencia cardíaca de forma fiable en perros de trabajo, que están en constante movimiento, sin interferir en sus tareas.

3. Formas disfuncionales de tenencia de animales de compañía: Trastorno de acumulación de animales

En la antrozoología, evidentemente, no todo lo estudiado son aspectos positivos de la interacción humano-animal. Por tanto, en esta tesis también queríamos reflejar algún elemento del espectro negativo de la interacción entre humanos y animales de compañía, teniendo en cuenta la posibilidad de la existencia de un vínculo inadecuado y/o perjudicial entre la persona y el animal.

Así pues, nos centramos en un trastorno que actualmente está muy poco estudiado, aunque está ya reconocido internacionalmente como tal: el trastorno de acumulación de animales (American Psychiatric Association 2013), conocido popularmente como "Síndrome de Noé". Otro trastorno parecido, el de acumulación de objetos, tiene amplia representación en la literatura científica y se ha demostrado que está ampliamente distribuido en todo tipo de poblaciones, culturas y países (Frost, Steketee, and Williams 2000; Pertusa et al 2010; Frost, Patronek, and Rosenfield 2011). Por tanto, sería esperable que el trastorno de acumulación de animales también presentara un patrón ampliamente distribuido a nivel internacional. De hecho, en el tercer estudio presentado en esta tesis, donde caracterizamos 24 casos de acumulación de animales en España, encontramos que en una gran proporción de los casos (44%) se produce comorbilidad de acumulación de animales y objetos, como se mostraba ya en previos estudios de EUA (Frost, Patronek, and Rosenfield 2011; Slyne et al 2013). Parece que la comorbilidad podría explicarse porque se trata de dos perfiles, el de acumulador de objetos y el de acumulador de animales, que tienen muchos elementos en común, como que sus hogares y espacios vitales están abarrotados, desorganizados y son disfuncionales, es decir, por ejemplo, no se puede utilizar ni el baño ni la cocina en la mayoría de casos. Otros elementos en común son que suelen ser personas aisladas socialmente, con curso crónico de los casos, que han padecido traumas sobretodo en la etapa infantil y que tienen una baja o nula percepción de la existencia de un problema. Y en ciertos aspectos de procesamiento cognitivo y emocional existen similitudes entre ambos tipos de trastorno. Así, tanto en los

casos de acumulación de animales como de objetos se da una alta necesidad de sentir control, unas creencias distorsionadas sobre el sentido de la responsabilidad, un exceso de apego emocional y la atribución de características humanas, ya sea a animales o a objetos. Pero existen también diferencias entre ambos trastornos de acumulación basadas principalmente en los tipos de desórdenes mentales asociados a ellos, ya que, aunque ambos tipos de trastorno suelen ir relacionados con trastornos de la personalidad, los acumuladores de animales parece que van asociados a también a trastornos disociativos, del apego y delirantes; mientras que los acumuladores de objetos se identificarían con depresiones mayores, con desórdenes de ansiedad, con fobias sociales, con trastornos obsesivos compulsivos y con déficit de atención e hiperactividad (Mataix-Cols et al 2010). Y hay una diferencia fundamental en cuanto al procesamiento emocional y cognitivo entre ambos tipos de trastornos de acumulación: en el caso de los acumuladores de objetos existen dificultades para tomar decisiones, y problemas de memoria, de organización y de atención, cuestión que lleva a no saber descartar los objetos que no tienen valor de los que sí lo tienen; y en el caso de acumuladores de animales podría ser que la motivación principal fuera la necesidad de cubrir una carencia emocional, debida a un trastorno del apego (Frost, Patronek, and Rosenfield 2011; Slyne et al 2013). Todas las similitudes comentadas harían posible que una misma persona, finalmente, padezca ambos tipos de trastornos de acumulación, de objetos y de animales, aunque existan diferencias etiológicas entre ellos.

Sobre las características generales de los casos de trastorno de acumulación de animales encontramos en nuestro estudio unas características comunes internacionalmente. Por ejemplo, el número medio de animales encontrados (media de 50 animales por caso en nuestro estudio) es similar al de otros estudios previos en otros países (Patronek 1999; Berry, Patronek, and Lockwood 2005; Lawrie and Nsw 2005; Reinisch 2009). Parece que el número de animales por caso es uno de los factores que guardan relación con el hecho de que se lleguen a detectar los casos finalmente debido a la severidad en número de animales presentes (Steketee and Frost 2010), y que, por tanto, se

trata de un trastorno del que seguramente se está informando por debajo de las cifras reales. Y definir la frontera entre tenencia responsable y trastorno de acumulación de animales cuando hay un elevado número de animales implicados sigue siendo un importante aspecto no resuelto (Ramos and Cruz 2013). Así, parece que existe una frontera entre la tenencia responsable de un número elevado de animales y el trastorno por acumulación de animales con consecuencias nefastas para su bienestar. La cuestión no estaría tanto en el número concreto de animales, sino en que la persona sea capaz de discernir cuál es el número máximo de animales que es capaz de cuidar ofreciéndoles el máximo bienestar posible. Hemos de recordar que los criterios establecidos por el Hoarding of Animals Research Consortium para considerar que la persona es un acumulador de animales son tres: 1) tener un número elevado de animales; 2) incapacidad para ofrecer los cuidados requeridos para cubrir las necesidades del animal, y 3) falta de percepción del problema de bienestar de los animales o negación del mismo por parte de la persona implicada (HARC 2000). Así, cuando una persona empieza a estar desbordada por el número de animales a su cargo y se inician ciertas faltas en sus cuidados, ahí situaría el caso de acumulación de animales incipiente. Desgraciadamente, tal como nuestro estudio demuestra, sólo se suelen detectar los casos cuando ya llevan un largo tiempo de desarrollo y no en su punto de inicio, porque es entonces cuando son tan evidentes y molestos en su entorno, que provocan denuncias de vecinos, familiares u organizaciones de protección animal. Por ello, es importante la concienciación pública de la existencia del trastorno de acumulación de animales, para llegar a detectar cuanto antes los casos incipientes y poder actuar sobre ellos antes de que las consecuencias en el bienestar tanto de la persona implicada como de los animales sean severas.

Además, la mayoría de las otras características de los casos resultantes de nuestro estudio guardaban también similitudes con las de estudios previos tanto en el método principal de detección de casos (a través de entidades protectoras de animales), en el hecho de que los casos son de largo recorrido temporal (más de 5 años), en que son casos habitualmente recurrentes y en que sobretodo se detecta acumulación de perros y gatos (Patronek 1999;

Hoarding of Animals Research Consortium 2002; Ockenden, De Groef, and Marston 2014). Y en cuanto al perfil habitual del acumulador también encontramos numerosas similitudes entre nuestros resultados y los anteriores (Patronek 1999; Bratiotis et al 2011). Por tanto, todo indica que este tipo de trastorno, y sus características, se podría considerar un fenómeno transversal en todas las culturas y países, sin grandes diferencias interculturales.

En general, podemos decir que este primer estudio en España y Europa sobre el trastorno de acumulación de animales, parece mostrar que el perfil de acumulador de animales y las características de los casos parecen similares a las de otros lugares donde se ha estudiado (G. Patronek 1999; Papazian et al. 2002; Lawrie and Nsw 2005; Arnold. Arluke and Killeen 2009; Frost, Patronek, and Rosenfield 2011; Ockenden, De Groef, and Marston 2014), indicando una transversalidad y globalidad de este tipo de trastorno a nivel internacional.

Sobre el bienestar animal de los animales involucrados en casos de acumulación, en el estudio presentado en esta tesis queda claramente reflejado que existen efectos totalmente perjudiciales, con una mayoría de animales, en todos los casos, enfermos, heridos, malnutridos, con deficiencias de higiene y exceso de parásitos, igual que se demostraba en investigaciones anteriores en otros países (Patronek 1999; Kuehn 2002; Nathanson 2009). Si tomamos como definiciones de maltrato cualquiera de las dos siguientes más utilizadas, podemos aplicarlas al trastorno de acumulación de animales:

a) “Conducta socialmente inaceptable que de forma intencionada causa dolor innecesario, sufrimiento, malestar o la muerte a un animal.” (Ascione 1993; Ascione and Maruyama 2011).

b) “El maltrato animal se considera cualquier comportamiento que contribuye al dolor o la muerte del animal o que amenaza el bienestar de un animal de compañía.” (Vermeulen and Odendaal 1993).

Así pues, según la definición de Ascione, en algunos casos de acumulación de animales podríamos considerar que no hay maltrato, puesto que no hay intencionalidad clara de infringir daño al animal, pero si tenemos en cuenta la definición de Vermeulen y Odendaal, quedaría patente que cualquier caso de trastorno de acumulación de animales entraría en la categoría de

maltrato. Al final, hay que tener en cuenta que definir qué es maltrato hacia los animales continúa siendo un tema de mucha controversia, aunque, eso sí, en general, a día de hoy, se suelen incluir en el maltrato de animales aquellos casos donde, ya sea por acción (tortura o violencia) o por omisión (negligencia), se infringen daños a un animal (dolor innecesario, sufrimiento, malestar o la muerte a un animal) (Solot 1997). Por tanto, esto incluiría claramente el trastorno de acumulación de animales como un tipo de maltrato, aunque sea por negligencia en los cuidados de los animales. Entonces, al considerar los resultados de nuestro estudio, se respalda la idea de que el trastorno de acumulación de animales debería ser considerada como una forma genuina de maltrato, abuso e incompetencia en el ámbito de la tenencia de animales de compañía.

Por otro lado, el maltrato debe definirse desde la perspectiva de la víctima, es decir, los animales en los casos de acumulación de animales, pero debe estudiarse desde la perspectiva del maltratador, que sería el mismo acumulador de animales. Por ello, vemos nuevamente que, poniéndonos en el lugar de los animales afectados por casos de acumulación, debido al daño que sufren, en este tipo de trastorno existe maltrato (Arluke and Killeen 2009). Ahora, desde la perspectiva de la persona, a menudo el acumulador se considera a sí mismo un salvador y un gran cuidador de los animales, y, por tanto, según su punto de vista, no habría maltrato, sino altruismo. En estos casos, que parecen ser la mayoría de los casos de acumulación de animales, estaríamos hablando de *altruismo patológico*, que es aquella forma de altruismo que en su intento de promover el bienestar en otros sólo consigue provocar un daño inesperado (Nathanson and Patronek 2012; Oakley 2013).

Pero no sólo nos debemos quedar en este punto de las consecuencias negativas para los animales, sino que se debe añadir que el trastorno de acumulación de animales es también un problema de negligencia sobre la propia persona y de salud pública, ya que tanto en nuestro estudio como en los anteriores queda patente que las condiciones de insalubridad en las que vive el acumulador le afectan y pueden tener consecuencias a nivel de su comunidad (HARC 2002; Kuehn 2002; Nathanson 2009).

Por todo lo anteriormente mencionado, es decir, las implicaciones negativas del trastorno de acumulación de animales en tres ámbitos (bienestar animal, salud pública y salud humana) el objetivo final de las investigaciones es sensibilizar ante la importancia del problema, para poder acabar en la creación de protocolos de prevención, detección precoz y actuación multidisciplinar (salud humana, salud animal y salud pública) para este tipo de trastorno, ya que, lamentablemente, existen sólo algunas propuestas de protocolos de actuación en EUA y Australia (Lawrie and Nsw 2005; Patronek, Loar, and Nathanson 2006; Castrodale and Bellay 2010; Bratiotis et al 2011)

Tal como se ha explicado anteriormente, parece inminente la necesidad de estudiar en profundidad, tanto a nivel epidemiológico como a nivel etiológico, este tipo de trastorno, que parece frecuente y con graves consecuencias para los animales, las personas y la comunidad. De todas formas, existen grandes dificultades para llevar a cabo este tipo de investigación puesto que los casos son de difícil detección (y generalmente sólo salen a la luz aquéllos más extremos) y los acumuladores implicados suelen negarse a colaborar (Arluke et al 2002). Por ello, se propone como siguiente paso la recopilación prospectiva de casos con informe de entrevista psiquiátrica. Las ventajas que aporta la participación activa de un psiquiatra son varias. En primer lugar, la entrevista psiquiátrica permitiría recoger datos clínicos que ayudarían a conocer En segundo lugar, el psiquiatra podría actuar como mediador y, por tanto, facilitar que el acumulador permitiera la cesión de sus animales, que permitiera iniciar un tratamiento, donde por el momento la medicación parece ser la estrategia de primera elección, y que permitiera un seguimiento para evitar las frecuentes recidivas (Patronek and Nathanson 2009).

Trastornos como el de acumulación de animales nos llevan a la reflexión de que la salud de las personas y de los animales no humanos están totalmente relacionadas e interconectadas y, por ello, a día de hoy se insiste en el concepto de *One Health* (Rock, Buntain, and Hatfield 2009; Hodgson and Darling 2011). Este concepto implica que para que tanto animales como personas estemos bien a nivel de salud, debemos preocuparnos de que todos

estén cubiertos sanitariamente, puesto que los problemas de salud de los animales no humanos tienen efectos adversos en los humanos y viceversa.

4. Futura investigación: conclusiones y perspectivas de futuro

En cuanto al futuro de la investigación a partir de esta tesis, queda claro que se pueden derivar varias líneas de investigación dentro de la antrozoología.

Así, en el ámbito de la convivencia de los animales de compañía, se ha logrado empezar a definir perfiles de propietarios de perro, pero sería recomendable realizar un estudio poblacional para poder determinar todos los posibles perfiles existentes. Además, se puede aplicar esta metodología utilizada en el estudio presentado en esta tesis para establecer patrones de relación con otros tipos de animales de compañía, como el gato; para comparar patrones entre diferentes países, y para buscar otras posibles variables, no sólo del propietario, sino del animal, que puedan afectar a la relación propietario-animal de compañía. De esta manera, se podrían identificar perfiles de riesgo de propietarios con sus animales de compañía que pudieran llevar a abandono o crueldad hacia estos animales. Otro aspecto en el que también convendría profundizar en el futuro, ya que nuestros resultados vislumbran este hecho, sería la posible relación que hemos entre el vínculo del propietario hacia su animal de compañía y el nivel de desarrollo que tiene esta persona en cuanto a su comportamiento cuidador de terceros, rasgo innato en el ser humano (Brown, Penner, and Brown 2012).

En el campo de las intervenciones asistidas con animales mediante esta tesis hemos conseguido añadir algo más de evidencia científica a los beneficios que las IAA pueden aportar en la rehabilitación de pacientes con esquizofrenia, pero conviene seguir con esta línea de investigación, añadiendo más datos, quizá a través de un estudio multicéntrico que ayude a tener una amplia muestra y en la que se puedan medir exactamente con la misma metodología tanto variables psicométricas como fisiológicas.

Finalmente, en materia de estudio del trastorno de acumulación de animales, en esta tesis se ha logrado una primera caracterización del trastorno en España y, de hecho, se ha tratado del primer estudio europeo sobre el tema. Pero aún quedan muchos puntos por estudiar en cuanto a epidemiología y etiología de este trastorno, no sólo en España, sino a nivel internacional.

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CONCLUSIONES

1. Se han identificado dos diferentes patrones generales de relación de las personas con sus perros, uno emocional y otro pragmático, desde el punto de vista del propietario, en el marco de la teoría del intercambio social.

2. Los dos patrones identificados de relación de las personas con sus perros se diferencian sistemáticamente en cuanto a la contribución relativa de las tres dimensiones (interacción, vínculo emocional y coste percibido) de esta relación. Y estas diferencias sistemáticas entre los dos patrones de relación de las personas con sus perros dependen en mayor medida de las dimensiones de vínculo emocional y de interacción, que del coste percibido. Así encontramos que el patrón de propietario emocional puntúa mejor en las tres dimensiones de la relación propietario-perro que el patrón de propietario pragmático, pero son las dimensiones de vínculo emocional e interacción las que muestran mayor diferencia entre ambos grupos.

3. Se identifican dos factores socio-demográficos dependientes del propietario de perro que determinan el patrón de relación de las personas con sus perros:

    a. El género del propietario: los hombres muestran mayor probabilidad de pertenecer al patrón de relación con mayor vínculo emocional y mayor interacción con el perro.
    b. El nivel educativo: un nivel educativo alto se asocia con una mayor probabilidad de pertenecer al patrón de relación con mayor vínculo emocional y mayor interacción con el perro.

4. Un menor nivel de satisfacción con la vida del propietario del perro (medida con la escala Cantril) se relaciona con una mayor probabilidad de pertenecer al patrón de relación que muestra un mayor vínculo emocional y una mayor interacción con el perro.

5. Un programa de terapia asistida con perros (TAA) como adyuvante en el tratamiento de la sintomatología de pacientes con esquizofrenia integrados en un proceso de rehabilitación psicosocial demostró un efecto de mayor mejoría (estadísticamente significativa) en la sintomatología negativa en los pacientes de este programa (grupo tratamiento) en comparación con el grupo control.

6. Se mostró una reducción significativa de los niveles de estrés, medidos a partir del cortisol salival, de los pacientes con esquizofrenia que participaron en una sesión de terapia asistida con animales.

7. Al recopilar casos de trastorno de acumulación de animales en España, encontramos que el perfil más habitual de acumulador corresponde a una persona (hombre o mujer) mayor de 65 años que vive sola, que acumula un promedio de 50 animales, pertenecientes a una sola especie (perros principalmente y gatos en menor medida), que presenta una gran comorbilidad con el trastorno de acumulación de objetos (44% de los casos) y con un curso crónico de más de 5 años de acumulación.

8. Se observó un grado de bienestar gravemente comprometido, compatible con un supuesto de maltrato animal, en todos los casos de trastorno de acumulación de animales recopilados en nuestro estudio.


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