An exploration of puppy development research and the puppy raising experience



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School of Animal and Veterinary Sciences
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Declaration

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Abstract

Prioritising the positive development of puppies we breed and nurture is crucial as it directly influences the health, behaviour and outcomes of both animal and human involved. While the link between dog breeding, raising practices and their impact on welfare is widely recognized, literature concentrates primarily on two aspects: 1) development factors relevant to puppies in the care of the breeder, and 2) socialization. This underscores a lack of comprehensive understanding and appreciation for the complexity of puppy development. Addressing the significant gap in existing literature, this thesis employs a combination of research methods and study design over six Chapters including a proposed conceptual model for researching puppy development, and three research Chapters, all of which have been published (or accepted for publication). Chapter 2 offers a modified Bronfenbrenner bioecological theory of human development ready for application in puppies. This Chapter includes a detailed description of the Bronfenbrenner theory for researchers unfamiliar with the ecological model, as well as an example of appropriate study design for puppies as a guide for its application. Further to this discussion, Chapter 3 uses the Bronfenbrenner model to emphasise the potential benefits of its use and identifies three key gaps in current literature on puppy development and guardian experience: the dangers of using individuals as representatives of their household, the role of relationships in learning, and the impact puppies have on others in the household. Chapter 4 dives into the guardian experience of puppy raising until 6 months of age, with guardians reporting they most enjoyed getting to know and bonding with their puppy and celebrating milestones along the way. Managing their puppy's training and behaviour, and managing their internal struggle to feel like an adequate guardian for their puppy, were the biggest reported challenges for guardians. Access to resources and communities, training and socialising their puppy and shifting their mindset to include realistic

expectations of themselves and their puppies were reported by guardians as the most helpful during their puppy-raising journey. Chapter 5 expands on the challenges of puppy raising by investigating stress levels in guardians and introducing a new tool, the modified Parental Stress Scale, for use in puppy research. Guardians who were satisfied with their puppy's behaviour, lived in Australia, scored higher in self-esteem, were happy with the division of puppy responsibilities in their household and were raising puppies scoring higher in trainability were all associated with lower stress scores. Opposite to this, first-time puppy guardians, guardians who worked from home some or all of the time, guardians raising puppies scoring higher in extraversion or neuroticism, and guardians who agreed that managing more than one dog in the household took up a lot of their time and energy, were all associated with higher stress scores. Chapter 6 offers a summary of research findings within the previous chapters and offers discussion on their implications, applications, and potential pathways for future research. Ultimately, this thesis advances our understanding of puppy development, providing insights and offering new tools for researchers and guardians alike. It serves as a foundational guide for future research, presenting a conceptual model and aiding in comprehending the complexities of puppy development. Additionally, it explores the guardian experience with the aim of enhancing the well-being of guardians and puppies.

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First and foremost, I would like to acknowledge and thank my supervisory team, Associate Professor Susan Hazel, Dr. Torben Nielsen, and Dr. Robert Christley. Turns out doing a PhD is hard (who would have thought!), and I have no doubt I would not have completed this mammoth task without your kind, thoughtful, and never-ending empathetic support. Thank you for hanging in there through divorce, a pandemic and, let's be honest, my personal talent in over-thinking and spiralling downwards with impressive consistency over the last three and a half years.

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This thesis is dedicated to:

Nervous Nina

Your arrival into my life gifted me my passion for behaviour and canine welfare. Everything I learned, I learned for you. I hope my dedication helped you lead the best life you could and kept you feeling safe and happy in our home. Thank you for sitting with me every day for the first two years of this PhD mess while I typed, cried, and struggled my way through one of the worst and best times of my life. I will always be sad we couldn't finish this journey together. I miss you, and I still love you.



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Thesis Aims

This thesis had two primary Aims:

1) To understand how we can better capture the complexity of puppy development in research, particularly whilst in guardian care.

2) To investigate the experience of guardians as they raise their puppies in the present day.

List of work produced during candidature

0.1. Research articles incorporated into thesis in which the candidate is the first author

Goncalves Costa, A., Nielsen, T., Christley, R., & Hazel, S. (2023). Bronfenbrenner's bioecological theory applied to puppy development: A new approach to understanding and researching puppy raising. *Journal of Veterinary Behavior*, *61*, 1-7. https://doi.org/https://doi.org/10.1016/j.jveb.2022.12.007, Chapter 2

Goncalves Costa, A., Nielsen, T., Christley, R., & Hazel, S. (2023). Highlighting gaps in puppy research using Bronfenbrenner's bioecological theory of human development. *Human-Animal Interactions*. https://doi.org/10.1079/hai.2023.0014, Chapter 3

Costa, A. G., Nielsen, T., Christley, R., & Hazel, S. (2023). The Good, the Bad, the Helpful: Qualitative Exploration of the Australian Puppy-Raising Experience Through Longitudinal Surveys. *Anthrozoös*, 1-22. https://doi.org/10.1080/08927936.2023.2238435, Chapter 4

Costa, A. G., Nielsen, T., Christley, R., Tuke, J., & Hazel, S. (In Press). When things get ruff: Investigating factors associated with stress in guardians of dogs udner 12 months of age. *Anthrozoös*, Chapter 5

0.2. Additional publications during the PhD period not incorporated into thesis in which the candidate is a co-author

Henning, J. S. L., Costa, A. G., & Fernandez, E. J. (2023). Shifting attitudes on animal 'ownership': Ethical implications for welfare research and practice terminology. *Research Ethics*, https://doi.org/10.1177/1747016123118606.

Hazel, S., Goncalves Costa, A., & Henning, J. (2023). Why do cats and dogs get the zoomies? The Conversation. Retrieved 11/05/2023, from https://theconversation.com/why-do-cats-and-dogs-get-the-zoomies-197790.

0.3. Conference/Symposium presentations arising from this PhD project

Goncalves Costa, A. (2021). What to expect when you're expecting (a puppy). Oral presentation. Pet Professional Guild Geek Week (Industry). 13th to 17h November 2021, Online Conference.

Goncalves Costa, A. (2022). The good, the bad, the helpful: the lived experience of raising a puppy. Oral presentation. Universities Federation of Animal Welfare. Controversies and Collaboration: Moving Toward Consensus in Animal Welfare, 6th to 8th December 2022, online conference.

Goncalves Costa, A. (2023). Puppy raising for companionship. Oral presentation. Dogs Trust UK, London, online seminar.

0.4. Supervisory roles during candidature

2020: Amy Judith Dohrmann (DVM 1).

2022: Kelly Tiffney Errera & Xinyi Chen (DVM 1, principal supervisor).

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Chapter 1

Introduction to thesis

1. Introduction

With almost half of households in the Global North home to at least one, dogs are unequivocally part of the modern human experience (American Veterinary Medical Association, 2020; Animal Medicines Australia, 2022; Pet Food Manufacturers Association, 2021). Though dogs have a shared history with humans dating back thousands of years, their relationship, and role in societies within the Global North has evolved alongside the many shifts in human society. In just a few (human) generations dogs have almost en masse become "man's best friend', and more recently, further upgraded their status to "family member" (Carlisle-Frank & Frank, 2006; Carr & Cohen, 2009; McConnell et al., 2016) and even at times, granted honorary personhood (Shir-Vertesh, 2012).

As a result of these changes, dogs now enjoy privileges such as accompanying guardians on holidays, sleeping on their guardians' bed and given access to expensive health care (Brockman et al., 2008; Carr & Cohen, 2009; Hoffman et al., 2021). Even the lexicon relating to dogs has followed. In the Global North the term 'pet' is slowly decreasing in use (Carlisle-Frank & Frank, 2006), and even 'owner' – highlighting 'ownership' is being set aside due to discomfort in regarding dogs as property, in favour of phrases such as 'animal companion', and 'guardian' (Henning et al., 2023). While some may dismiss these linguistic changes as purely cosmetic, they are a signpost of the evolving roles assigned to dogs in our communities and their use is tied to tangible improvements in in the consideration of animal welfare (Henning et al., 2023).

1.1 The expectations of a modern dog

Even though dogs may have been elevated to "family member", the current period of history may, paradoxically, represent a time where dogs find themselves with the least autonomy on a

day-to-day basis. Unlike their ancestors, companion dogs in Australia (and much of the Global North) have no legal freedom to roam beyond their caretakers' fenced properties and are confined to backyards (of varied conditions and sizes) and/or live a predominantly indoor lifestyle (Animal Medicines Australia, 2022; Meyer et al., 2022; Schuurman & Syrjämaa, 2022). Within these confinements many dogs are expected to spend significant amounts of time alone and avoid causing inappropriate levels of destruction or noise (Norling & Keeling, 2010; Sherman & Mills, 2008).

In addition to requiring an ability to cope with this modern limitation in movement, guardians also want dogs to be friendly with known and unknown humans, have a high tolerance of children, as well as enjoy receiving, and be willing to offer, affection to the humans around them (King et al., 2009). Overall, modern humans want a dog who is: calm, compliant, healthy, sociable, energetic, faithful, protective, socially acceptable and non-aggressive (King et al., 2009). While not all dogs need to fulfil each of these requirements at all times (Bradley & Patronek, 2022; Lord et al., 2020; Pirrone et al., 2015; Yamada et al., 2019) these do represent common human preferences that help to decrease friction in dog-human relationships (Anderson et al. 2024; Patronek et al., 1996).

1.2 How to build a dog

It is well accepted that breeding and raising practices of companion dogs influence their ability to live within human expectations with minimal friction. This literature includes substantial information on the effect of genetics for both physical and behavioural traits (Ilska et al., 2017; Rimbault & Ostrander, 2012), explores effects of puppy handling (Gazzano et al., 2008), the best environments for the developing young pups (Gazzano et al 2008; Majecka et al., 2020), as well the effects of other factors occurring in the breeder's care– such as litter size and level of maternal care received (Santos et al., 2020; Wilsson & Sundgren, 1998) (Figure 1). There is

no doubt all these factors play a significant role in puppy development. However, once puppies are acquired by their new family, research attention tends to focus on two factors to the exclusion of all others: socialisation and puppy classes. Puppy classes in particular are an interesting topic, with researchers often hypothesising the socialisation benefits of puppy classes but finding no strong evidence for positive impacts (Batt et al., 2008; Howell et al., 2015; Kutsumi et al., 2013; Seksel et al., 1999). The age from 12 weeks to 12 months also includes the transition from pre-adolescence to adolescence (Asher et al., 2020) and the onset of sexual development represents one of the most poorly studies periods of development (Serpell et al., 2016). Overall, there are multitude of developmental factors occurring in a puppy's first year of life that have been neglected within the literature. While some researchers have acknowledged this gap in recent years (Murray et al., 2021), especially in the years during the completion of this thesis, research in this area remains limited.

The current lack of understanding regarding the complexity of puppy development may be helped by the use of an ecological model. Ecological models are designed to capture complex and multifactorial systems such as child development and offer researchers a way to approach them (Müller et al., 2011) The benefits of including an ecological model have already been seen in complex systems such as medicine (Richard et al., 2011; Woodland et al., 2021), child development (Bronfenbrenner et al., 1998; Gal, 2017), and as a conceptual model in animal welfare (Ryan et al., 2019) and may offer puppy researchers a tool to encompass the complexity of puppy development.

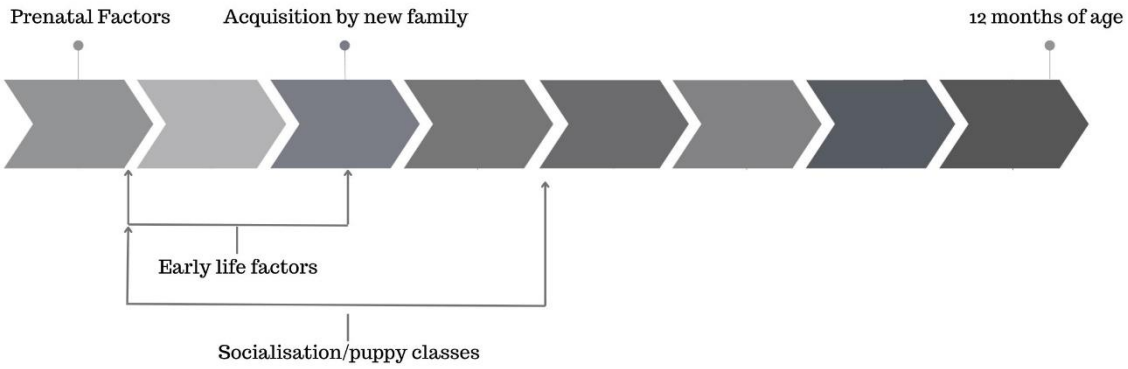

Figure 1.1: The current landscape of puppy development research primarily concentrates on factors preceding puppy acquisition by a guardian, with minimal attention given to post-acquisition aspects. This perspective paints a reductionist view of puppy development, downplaying the complexity of development.

1.3 Highlighting the gap

Existing literature on puppy development places a strong focus on the puppies themselves (Duxbury et al., 2003; González-Martínez et al., 2019; Howell et al., 2015; Kutsumi et al., 2013) while overlooking the 'other end of the leash'. Guardians play a pivotal role in shaping almost every aspect of a puppy's life, from the resources they can access to the food they consume, and overall exercising considerable control over the nature of their puppy's experience. As guardians control every aspect of the puppy's life, if the guardian's experience is negative this may also impact the puppy. This is similar to the impact of parent/child dynamics in human literature (Crnic et al., 2005; Deater-Deckard, 1998; Maccoby, 2000; Tharner et al., 2012). Parental stress, for example, has direct effects on the wellbeing of parents, the outcomes of children, and impacts child-parent relationships (Crnic & Low, 2002; Crnic et al., 2005). Stress in parents is linked to poorer child social-cognitive development, (Guajardo et al., 2009), higher risk of child mistreatment (Curenton et al., 2009), decrease in parental satisfaction (Winstone et al., 2021), and an increase in child behaviour problems (Neece et al., 2012; Winstone et al., 2021). This highlights that parental role experiences can have significant

effects on dependents (and caretakers), yet very little research currently exists on understanding the puppy guardian experience – either positive or negative –despite that raising puppies may be a significant source of stress for guardians, which would in turn affect puppy developmental outcomes (Furtado et al., 2023).

Breeding and raising a puppy for human companionship requires us to understand the ecology of puppy development, with all the complex interactions it entails. This brings us to the two Aims at the core of this thesis:

1) To understand how we can better capture the complexity of puppy development in research, particularly whilst in guardian care.

2) To investigate the experience of guardians as they raise their puppies in the present day.

Increased understanding of these two questions will guide us on what dogs and humans need to flourish in their ecosystems and maximise welfare for both.

1.4 Thesis structure

This thesis argues that the current literature is often an oversimplification of a complex and important topic and seeks to encourage future research into puppy development to be more holistic. This thesis contains six Chapters comprised of an introduction (Chapter 1), a proposed new conceptual model for researching puppy development (Chapter 2), three research Chapters, all of which are either currently published (Chapters 2 – 4) or have been accepted for publication (Chapter 5), and a final discussion Chapter (Chapter 6). A schematic overview of the thesis structure is presented in Figure 2.

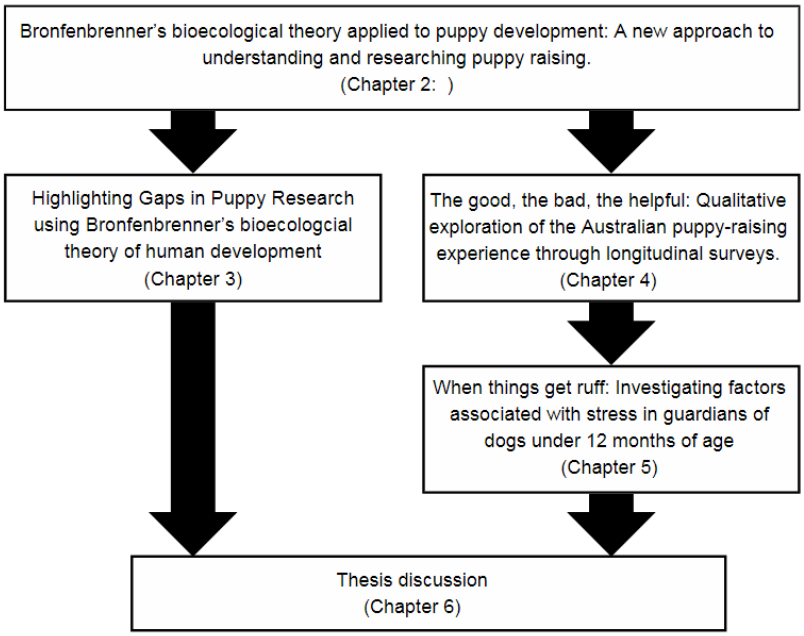

Figure 1.2: Structure of thesis: An exploration of puppy development research and the puppy raising experience.

Chapter 2 aims to introduce the reader to the current field of puppy development, highlighting the limitations of the current system of research, as well as propose a new conceptual model to add to the puppy researchers' toolkit. The primary focus of this Chapter lies in advocating for a holistic perspective of puppy development and underlining the potential complexity that is currently lacking in the literature. This Chapter details a modified Bronfenbrenner bioecological model (for puppies), aiming to equip researchers with the necessary insight to leverage its benefits. To facilitate this, a study design example is presented, offering researchers a practical application of the proposed framework.

Chapter 3 aims to evaluate the efficacy of the modified Bronfenbrenner's bioecological model presented in Chapter 2, by using it to shed light on potential gaps in the current literature. The discussion in this Chapter centres around the complexity of input factors, such as relationships. Additionally, this paper illustrates the advantages of employing Bronfenbrenner's model,

emphasising that its benefits can be harnessed without necessitating the utilization of its complete form.

Having highlighted the importance of the human experience, Chapter 4 narrows in on the guardian within the microsystem (a term within the Bronfenbrenner model)– an area currently neglected in current literature. This Chapter explores the human perspective of interactions between puppies and guardians. Specifically, it explores what guardians identify as the positive aspects of puppy raising, the challenges they face, and the elements they find most beneficial during this time-period. The overarching objective of this Chapter is to provide a comprehensive longitudinal perspective on the overall experience of puppy raising from the guardian point of view.

Expanding on findings of Chapter 4 - given the link between guardian experience and potential outcomes, as suggested in Chapter 2 – Chapter 5 seeks to investigate the potential stressors associated with raising a puppy as a guardian. This study aims to explore whether factors such as puppy or guardian personality contribute more significantly to guardian stress, and whether certain factors can help alleviate it – such as social support. The focus of this Chapter is understanding the nuances of the guardian experience and identifying potential factors that are associated with the stress levels during puppy raising. This Chapter also introduces the modified Parental Stress Scale for measuring puppy guardian stress.

The ideas presented in this thesis encourage a broader ecological approach to comprehending and researching puppy development. This thesis proposes a novel framework for future puppy research and highlights the importance of understanding 'the other end of the leash' – the guardian experience. By promoting a holistic understanding of the factors influencing puppy

development, this thesis aims to contribute to a more nuanced and inclusive approach in the field of puppy research.

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Chapter 2

Bronfenbrenner's bioecological theory applied to puppy development: A new approach to understanding and researching puppy raising.

Context statement

This Chapter addresses Aim 1: To understand how we can better capture the complexity of puppy development in research, particularly whilst in guardian care. Advocating for a paradigm shift in puppy development research, this Chapter recognises the conventional approach tends to oversimplify and overlook the real-world complexities of puppy development. To address this limitation, an ecological model is proposed as a more comprehensive and effective framework for understanding and capturing the multifaceted influences on puppy outcomes. The Chapter emphasizes the necessity of such a model in research and introduces a modified version of an existing model that is readily applicable to study design and data analysis. Ultimately, this Chapter offers a practical guide to a more holistic and improved approach to researching puppy development and effects of puppy raising practices.

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Bronfenbrenner's bioecological theory applied to puppy development: A new approach to understanding and researching puppy raising ☆

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ABSTRACT

Puppy development, much like child development, is almost unlimited in its potential complexity. Puppies are not raised in a vacuum; their development depends on their unique personality, physical characteristics, previous experience, different environments they have access to, individuals they interact with, as well larger forces, such as local laws and culture. While capturing every puppy development factor in a single study is impossible, use of an ecological model can help researchers be more mindful of this complexity during study design and data analysis. Authors of this paper recommend that puppy development researchers apply an ecological model such as Bronfenbrenner's bioecological human development theory to guide future research.

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Introduction

Dogs are one of the world's most popular animal companions, 33% of households in the U.K. (Pet Food Manufacturers Association, 2021), 38.4% of U.S. households (American Veterinary Medical Association, 2018) and 39.9% of Australian households (Animal Medicines Australia, 2019) include at least one resident dog. Australia's need for canine companionship alone requires 480,000 puppies yearly to meet demand (Australian National Kennel Council Ltd, 2017) meaning hundreds of thousands of Australian households undergo the shared experience of acquiring and subsequently raising a puppy each year. These puppies are expected to eventually fulfil the role of "good canine citizen," including amiability with a range of species and choosing behaviors analogous with good manners. Australians want to share their homes with dogs who are safe with children, housetrained, healthy, obedient, do not show destructive behaviors and have a friendly disposition (King et al., 2009). Increasing the chances of raising a good canine citizen such as this requires the influence of a multitude of complex factors and environments such as appropriate breeding, raising practices and environments, followed by training, and guidance by new owners to achieve (Appleby et al., 2002; Freedman et al., 1961; Bennett and Rohlf, 2007; Gazzano et al., 2008a,b; McMillan et al., 2011; Foyer et al., 2013; Foyer et al., 2016).

A conceptual model helps researchers work systematically when addressing a highly complex topic such as puppy development and an ecological conceptual model helps to avoid the risks of missing important elements. While no study can capture puppy development in its whole form, as the complexity, much like child development, is almost unlimited, a conceptual model enables researchers to make conscientious decisions on which areas they will and will not focus on, while still being fully aware of those factors' place within a wider and more complex system. Currently, research tends to look at effects of single factors (neuter status or outcomes of puppy class attendance for example) and often fails to appreciate the complexity of puppy raising. Puppies are not raised in a vacuum: they both influence, and are influenced by, many environments simultaneously. Puppy raising occurs in owners' homes, puppy sitter's homes, a puppy school classroom, and in the public arena (e.g., local dog parks, beaches, and urban landscapes). Ad-

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ditionally, an owner may attain knowledge on puppy raising from puppy class attendance (if they have access and resources to do so) while also concurrently collect supporting or contradictory information from their veterinarian, breeder, friends, or online communities. A puppy's development will also be affected by indirect factors such as local government (dictating regulations surrounding dog ownership and access to public amenities) or the owner's workplace (dictating owner time away from the puppy). Again, assessing these factors in isolation misses the complexity of how these systems interact between and within each other and portrays a limited picture of puppy raising. Missing these complex interactions may lead to incomplete or misleading conclusions.

Urie Bronfenbrenner's bioecological human development theory was developed for research in child development and its success comes primarily from its ability to reveal environments which influence individuals while also accounting for the interactions that occur between them. It is the adage, "it takes a village," in theory form. While several versions of the theory exist, the final, mature theory is guided by 4 elements, Process, Person, Context, Time (PPCT) (Rosa and Tudge, 2013). This model, while developed for children, may also allow exploration of the overlapping effects of different factors in puppy development. This may include the owner's access to suitable training, the puppy's relationship with other household animals, and the overarching influence of culture and time on puppy raising, among many others. In this model, these are seen as live, ever-changing effects, each interacting with, and being interacted on, other factors, and when put together, reveal a puppy and owner's journey through puppy development.

Understanding the factors and systems surrounding puppy raising in its true complexity can help identify how communities and industry can better support owners to raise a happy, healthy, community-appropriate dog. This model may also present a way to better understand the experience for owners, and therefore better analyze the effects that lead to better/lesser outcomes for puppy and guardian. Future use of this model in puppy raising research may also increase the quality of recommendations for interventions, compared to current research methods (Eriksson et al., 2018).

This paper will set out how Bronfenbrenner's bioecological model can be used as a framework for future research in understanding puppy development and the owner puppy-raising experience. It also seeks to explain the concepts of PPCT and how they can be applied as well as provide guidance on a modified version of Bronfenbrenner's work for easier application for developing dogs.

Application of Bronfenbrenner Bioecological Model

Bronfenbrenner's theory allows researchers to look at an individual's development: a complex area operating within multiple environments, being acted upon by multiple factors simultaneously, without losing that complexity through reductionism. Children for example are influenced by more than just their parents and schools. Children both have *influence on*, and are *influenced by*, their peers, teachers, neighbors, other family members, local laws, online and offline culture as well as a multitude of other environments, effects of which, importantly, may be multiplicative (Tudge et al., 2022). Like children, puppies do not exist in a vacuum with their owners and their development is affected by multiple factors and environments ultimately leading to their ability to assimilate into the community, avoid relinquishment, and achieve good welfare outcomes. Additionally, Bronfenbrenner's theory can also be used with both quantitative and qualitative data (Navarro et al., 2022; Tudge et al., 2022), offering researchers a wide range of methodological options.

Although Bronfenbrenner originally created his ecological theory for human development (Bronfenbrenner, 1977), this theory (which continued to evolve until his death in 2005 (Tudge et al., 2009; Rosa and Tudge, 2013)) has been commonly used as a framework in varying research areas including public policies, health and education (Moran et al., 2016; Eriksson et al., 2018; Crawford et al., 2020; Kim et al., 2020). Bringing this theory into puppy development may offer policy makers, researchers, trainers, breeders, veterinarians and owners, a useful framework with which to map out the complexities and interactions in puppy raising. This may offer better answers to research questions previously plagued with inconsistent data. Research into benefits puppy classes provide offers an example; with studies unable to distinguish actual benefits from confounding factors (Howell et al., 2015). Cutler et al. (2017), Kutsumi et al. (2013) and González-Martínez et al. (2019) found puppies who attended puppy classes for training and socialization were less likely to present fearful and aggressive behaviors, while Batt et al. (2008), and Seksel et al. (1999) found no changes in puppy behavior following puppy class attendance. Factors such as owner demographics are likely confounding these results (Howell et al., 2015). Furthermore, (Gazzano et al., 2008a) found that increased owner knowledge influenced puppy outcomes; decreased risk of aggressive behavior, higher rates of friendliness towards other dogs, and decreased risk of some undesirable behaviors. Puppy classes often provide information on how to raise puppies, adding further complexity to factor influence – do puppy classes directly change puppy behavior, or is owner guidance provided during classes confounding results? Given that puppy classes may represent four in almost 700 hours available during a 4-week period, accounting for the other impacts in a puppy's life is crucial when untangling the complexities of development and puppy classes. Bringing in Bronfenbrenner's bioecological model may provide a better way to capture this complexity of outcomes.

Using a human-based model for canine research is not without precedent and a range of theories traditionally used for human relationships and development are used with success. Asher et al. (2020) for example used attachment theory and adolescent-phase behavior found in teenage humans to find comparative behavior in teenage dogs. Indeed, the authors go on to suggest that the similarities are close enough that dogs may be used a model species for future research into human adolescence behavior (Asher et al., 2020). Furthermore, Arluke and Rowan (2020) highlight the parallels between factors influencing approaches to parenting and the dynamics with animals in the household, such as social class. Low-income families tend to have more distinctive boundaries between both parent/child and human/animal dynamics, while still expecting all to contribute to the household (children through chores, and companion animals as pest control, security, or additional income through breeding). Additionally, similar forces which prevent low-income families seeking professional services for their children, can also lead to lower levels of veterinary care for animals in the household. A mistrust of professionals and institutions, perceived ability to diagnose and self-manage health concerns, cultural differences, and even a perception that cheap or free care comes with safety concerns all factor into both a child and an animal's likelihood to access healthcare services (Arluke and Rowan, 2020), and show that barriers to care are more complex than simple affordability. These parallels also highlight the mirrored experiences of children and dogs living in human households.

The biggest concern when using Bronfenbrenner's theory is ensuring its correct application; this model is frequently misunderstood, and therefore commonly misused (Tudge et al., 2009; Tudge et al., 2016). Scholars often focus on the contextual systems, and forget about proximal processes, which are the driving forces of development. This can be seen in Yu and Stiffman (2007) who

explores different factors across systems but fails to look at (or even mention) any proximal processes, versus Adamsons et al. (2007) who acknowledges and measures fathering behaviors/child-father interactions.

Since Bronfenbrenner did not test the theory himself, a task he left to other researchers, common misapplications mean the theory is still relatively untested (Tudge et al., 2022). However, as Tudge et al. (2022) points out when speaking of child development, "[Bronfenbrenner's] theory is on the cutting edge of scholarship dealing with the complexity that is human development…and although this theory may have its limitations it deserves to be evaluated appropriately …[and] to be taken seriously if our field is to advance," an opinion which authors of this paper feel can be applied to the field of puppy development.

Understanding and Adapting the PPCT

Bronfenbrenner's model incorporates processes – interactions that facilitate development (Proximal process), elements linked to the individual – such as previous experience (Person), different environments (Context), and the effect of time (Time).

Proximal processes

Proximal processes must meet set criteria that ultimately facilitates the individual's development. Bronfenbrenner (1999) sets guidelines to distinguish proximal processes from interactions: Development activities must occur regularly over extended periods of time, one-off activities do not qualify; And these activities must become increasingly complex over time and include feedback between individual and those with which they interact. Proximal processes may also occur with objects and symbols so long as they invite attention, exploration, manipulation, elaboration, and imagination. For puppies, common objects would include those related to socialization or enrichment products, though symbols are likely less to apply to puppy development.

Proximal processes are not merely interactions between an individual and an object, another individual or organization. This oversimplification of concept easily leads to error and contributes to common misuse of the theory (Merçon-Vargas et al., 2020). Proximal processes are sometimes referred to as the primary engines of development as they facilitate development through steady interactions between individual and environment. Proximal processes can be either individual-individual, group or solo activities, for example a child interacting with a parent, reading alone or playing with other children. They are the common occurring interactions that drive development.

When looking at puppy raising and development a great deal of the proximal processes a puppy will experience early in life have been labelled "socialization" and "training." These include activities such as playing with other dogs or members of other species (including humans) (Freedman et al., 1961; Pal, 2008) as well as interactions relating to training with owners and other members of the household (Howell et al., 2015). While this may be particularly crucial between the ages of 2 and a half to 13 weeks of age (Freedman et al., 1961) research suggests dogs may regress in their sociability if "periodic social reinforcement" ceases prior to 6-8 months (Serpell et al., 2016), suggesting that these proximal processes continue to be vital throughout puppyhood and into adolescence.

Bronfenbrenner originally only considered proximal processes as a precursor for positive effect on individual development, however, Merçon-Vargas et al. (2020) make a strong argument that inverse proximal processes, such as the experiences of conflictual communication, and aggressive or hostile interactions, would be negatively related to healthy development (Merçon-Vargas et al., 2020). An example of inverse proximal processes for puppy development would be the use of punishment as a training tool. A review of 17 studies reporting dogs trained with the use of aversive training (either exclusively or in conjunction with positive reinforcement) had higher rates of undesirable behaviors, including fear, aggression toward family members and unfamiliar people, and were less able to learn novel tasks (Ziv, 2017).

Person

The Person part of Bronfenbrenner's PPCT represents the personality, resource, and genetic factors that an individual brings to their environment. Elements within Person are divided into 3 sections, Force, Demand and Resource. These affect how an individual both approaches an interaction with an object, animal, or person, as well as how others will approach and interact with the individual. For puppy development we would modify this label from Person, to Dog, for ease of understanding. This would modify the acronym PPCT, to PDCT. Definitions of Force, Demand and Resource can be found in Table 1, however, due to the complexity of these, further detail is provided below.

Force

This subcomponent of the Person/Dog includes the personality of the individual. For humans this includes characteristics such as introvert versus extrovert tendencies and neuroticism. Dogs, like humans, also have individual personalities, which affect how an individual responds to their environment (Barnard et al., 2018). Svartberg and Forkman (2002) identified 5 canine personality traits affecting a dog's response to stimuli; playfulness, curiosity/fearlessness, chase-proneness, sociability, and aggressiveness.

Level of trainability, a dog's readiness to learn and follow direction with high tolerance to distraction is another potential force. Serpell and Hsu (2005) used the C-BARQ questionnaire to investigate the trainability of different breeds and found that for some breeds, show-bred lines scored significantly lower in trainability than those bred for fieldwork, suggesting different breeds, and lines within breeds, may be more prone to certain personality traits. Meanwhile Pal (2008)'s work, found differing levels of aggression amongst individuals in a single litter, and Morrill et al. (2022) who sequenced the DNA of over 2000 dogs and surveyed their owners found breed a poor predictor of individual behavior. These studies suggest that dogs, much like humans, are individuals, therefore breed is unlikely to be a good indicator or substitute for Force characteristics (which is commonly assumed). According to Bronfenbrenner's theory, dog breed is likely a better indicator of Demand (e.g., physical characteristics) than Force characteristics and studies that can incorporate individual force characteristics in study design can circumvent misleading assumptions based on breed alone.

Demand

Demand captures the physical characteristics of an individual that serve as a stimulus for others, often due to cultural expectations. In human society characteristics such as gender and ethnicity are common examples; how we look serves as a (sometimes unconscious) trigger for how others approach us. In puppies, breed would be the most prominent determinant of demand, as this has considerable influence on a dog's physical appearance. These characteristics are likely to garner different responses from the individuals/environment interacting with the dog. For example, dogs of certain physical appearance, such as pit bulls, experience discrimination in their interactions with humans (Hoffman et al., 2014)

Table 1
Dog/Person characteristics and how they influence proximal processes in developing dogs using Bronfenbrenner's bioecological theory of human development as modified from Tudge et al. (2022).

Dog/Person Characteristics	Definition	Positive	Negative
Force	Internal characteristics, like personality traits, affecting how an individual responds to their environment.	Motivation, sociability, curiosity, trainability, et cetera.	Impulsivity, fearfulness, distractibility, et cetera.
Resource	Lessons and capabilities an individual brings to interactions.	Rich experiences, prior appropriate and adequate levels of socialization, good physical and/or mental health et cetera.	Limited experiences, limited or inadequate levels of socialization, physical and/or mental problems (such as anxiety disorders, separation distress), et cetera.
Demand	Physical characteristics that can influence how others interact with the individual.	Sex, physical characteristics such as size, degree of neoteny and "cuteness," et cetera, serving to invite interactions with others.	Sex, physical characteristics such as size, degree of similarity to stigmatized breeds, for example, pit bull types, and "aggressive-looking," et cetera, serving to discourage interactions with others.

Table 2
Context systems and how they influence proximal processes in developing dogs using Bronfenbrenner's bioecological theory of human development as modified from Tudge et al. (2022).

Contextual Systems	
Microsystem	Any setting in which the developing puppy of interest is situated, in which they have face-to-face interactions with other individuals and objects. Proximal processes occur here. For a puppy, this would include the household - with their human and non-human inhabitants –and other areas in which the puppy is directly interacting, such as puppy classes and dog parks.
Mesosystem	This deals with the linkages between microsystems - the interconnectedness and influence of the microsystems on each other, outside of direct contact with the puppy. For example, a poor or conflict-ridden relationship between owners and puppy class instructors. Despite the puppy not being directly involved in the relationship between the two, the interactions between owner and instructor will ultimately affect the puppy's own experience.
Exosystem	This is a microsystem for someone other than the developing puppy of interest (e.g., the owner's microsystem) but which has an indirect effect on one or more of the developing puppy's microsystems. For example, an owner's workplace experiences have an influence on subsequent interactions with their puppy despite the puppy not being present at work. Similarly, online communities exist in a puppy's exosystem, puppies do not engage with these communities directly however their influence can be felt through others (e.g., an owner seeking advice on behavior issues).
Macrosystem	Any sociocultural group sharing values, beliefs, access to resources, a sense of identity, et cetera. Macrosystems can be coterminous with an entire society or with racial or ethnic or socioeconomic groups (subcultures) within that society. This may include beliefs relating to the value and status of dogs (dogs as family versus dogs as utility), what the definitions are of "a good dog" and the ethics and beliefs around how our dogs should be treated. Expectations are a large factor in creating a positive dog/owner relationship and relationship issues may occur when there is misalignment between dog behavior and human expectations (Furtado, 2020). These expectations are likely being influenced by the owner's own person characteristics, but also from the beliefs and culture in which the owner lives.

and may even have to navigate a different set of laws. In a study of over a thousand dog owners in the UK and Republic of Ireland, owners of small dogs were more likely not to report a behavior as problematic even when observed by the owner (Lord et al., 2020). Larger dogs also appear more likely to receive training than smaller breeds (Kobelt et al., 2003; Masters and McGreevy, 2008) possibly due to the perceived increased risk of difficulty in managing untrained larger dogs. People may also believe certain breeds are less sensitive to pain (Gruen et al., 2020) which likely changes how owners and veterinarians manage health conditions and pain in dogs, in turn affecting the individual's behavior and development.

Resource

Resource includes an individual's experience, knowledge and skill and access to developmentally helpful activities. As mentioned earlier, adequate and appropriate socialization is vitally important in puppy development (Freedman et al., 1961; Gazzano et al., 2008b; Howell et al., 2015), and while ongoing socialization would be defined as a proximal process, a puppy's previous socialization experience (or lack thereof) provides a resource which sets the puppy's ability and skill to appropriately navigate their environment. For example, a puppy raised by a breeder within a household would be provided many socialization opportunities and therefore be better able to navigate the move to their new home, versus a puppy raised in outdoor kennels with limited opportunities to socialize (Majecka et al., 2020).

It is important to remember that these Person/Dog characteristics apply not only to the individuals' whose development we are observing, but also to those who interact with the puppy on a regular basis (Bronfenbrenner and Morris, 2006). Meaning, when we look at others involved in a puppy's life – for example, other members of the household – we also need to consider their Force, Demand and Resource characteristics and how that might affect their interactions with a puppy. For example, women and individuals with higher levels of emotional stability are less likely to be bitten when interacting with dogs (Westgarth et al., 2018), and previous dog owners may be quicker to relinquish dogs, likely due to their previous experiences with dogs (Mondelli et al., 2004).

Context

Context encapsulates the different types of environments that both *influence* and are *influenced by* the individual (the puppy). These systems are considered interrelated, rather than individual systems working in a vacuum, and are made up of the *Microsystem*, *Mesosystem*, *Exosystem*, and *Macrosystem*. The microsystem environment directly interacts with the developing individual, while the other systems will affect the puppy's development and

Table 3
Time and how it influences proximal processes in developing dogs using Bronfenbrenner's bioecological theory of human development as modified from Tudge et al. (2022).

Time	
Microtime	The manner in which proximal processes proceed during specific episodes. For example, how focused/distracted a puppy and owner is during puppy training. Puppies and owners who are equally focused and engaged are likely to have different outcomes during a training session than those where one or both participants are distracted and unfocussed.
Mesotime	The extent to which proximal processes occur (e.g., frequently or infrequently). For example, training that occurs weekly, vs. daily is likely to affect outcomes. socialization is also a good example, we currently presume there is a minimum amount of socialization required to avoid negative outcomes, and a maximum amount of socialization where increased impact ceases, but do not yet know what either of these amounts might be (Howell et al., 2015). Taking mesotime into account in future study designs may help.
Macrotime	Current social, political, and economic conditions of society, and changes in those conditions, for example, how society views dogs' role within it.

Table 4
Elements of Adamsons et al. (2007), and their use of Bronfenbrenner's model, modified to investigate puppy development.

Adamsons et al. (2007)	Bronfenbrenner PPCT/DPCT	Proposed puppy version
Outcomes		**Outcomes**
Relative time father/stepfather spent in child rearing activities	Proximal process	Relative time owner/co-owner spent in puppy raising activities (training and shared activities)
Quality of engagement during father/stepfather interactions with child	Proximal process	Observing 10-minute play interaction between puppy and person, recording number of positive and negative interactions during that time.
Variables		**Variables**
Gender of child (p)	Person/Dog	Small/medium/large breed
Father race/ethnicity, and age (p)	Person	Co-owner Race/ethnicity, age
Parenting beliefs (p)	Person	Parenting style owner to puppy Potential measure: Parenting Styles and Dimensions Questionnaire (32-PSDQ) (Herwijnen et al., 2018)
Marital satisfaction (p)	Person /Mesosystem	Perceived support between co-owners Potential measure: Personal Assessment of Intimacy in Relationships (Schaefer and Olson, 1981)
Presence of a step or bio father (micro)	Microsystem	Presence of a co-owner
Family type (biological vs. step) (meso)	Mesosystem	Household arrangement (is co-owner living in the same or separate household, e.g., shared custody)
Maternal employment (meso)	Mesosystem	Owner employment status
Parental work hours (exo)	Exosystem	Work hours of owner and co-owner
Gendered experiences (macro)	Macrosystem	Breed experiences (how different breeds are treated in the community)
Societal expectations for families and stepfamilies (macro)	Macrosystem	Societal expectations on puppy raising

care without direct interaction. Definition of these systems can be found in Table 2.

Time

Bronfenbrenner broke time into 3 types, micro, meso, and macro-time. Micro and meso-time both relate directly to proximal processes, and macrotime incorporates the broader scale time period, including the events, expectations and culture in society at the time the proximal processes occur. (Bronfenbrenner and Morris, 2006). See Table 3 for further details.

Using Bronfenbrenner's Bioecological Theory of Development

All the factors discussed above in PDCT work together toward a developmental outcome. The interconnectedness of these factors was labelled by Bronfenbrenner as "synergism" to describe the force of these factors interacting simultaneously to provide cumulative effects on development (Navarro et al., 2022). It is for this reason using an ecological model like Bronfenbrenner's is important. Development is complex, and we need to capture these complexities in our research if we are to better understand how factors work together to raise a good canine citizen.

Researchers can choose to specifically follow Bronfenbrenner rules of study design, Johnathon Tudge and co-authors have provided several resources to guide researchers on how to do this (Tudge et al., 2009; Tudge et al., 2016; Navarro et al., 2022; Tudge et al., 2022). However, authors of this paper suggest that puppy researchers would benefit from the PDCT approach even if they choose not to adhere to a Bronfenbrenner-specific study design. Researchers can model their study design, analysis, discussion (and limitations) on the synergistic effects of the factors within the Bronfenbrenner bioecological theory of development. Doing so can help create a more complete model of puppy development.

For those who want to create a Bronfenbrenner-led puppy development study but are unsure how to start, we have taken an existing child development study (Adamsons et al., 2007) and demonstrated how it can be modified to fit puppies. The main aim of the Adamsons et al. (2007) study was to use an ecological perspective to explain the potential similarities and differences in the quantity and quality of interactions with children in families consisting of biological fathers or stepfathers. Puppies often live in multi-person households of different types, but there has been little research into how family structures may impact puppy development. For example, the research question asked could be if the quantity and quality of interactions with a puppy varies according to the family structure. A similar study design to Adamsons et al. (2007) could give us valuable insight into this question. Table 4 gives an example of how the original study might be modified to accommodate puppy-specific variables and outcomes.

Conclusion

Most puppy research focuses on understanding how to raise a puppy into a good canine citizen by studying how the way in which we breed and raise our dogs changes the outcome in the short and long term. Although research reveals crucial elements required to raise a healthy, and happy dog, the complexity of puppy

development means that our knowledge still has gaps. Although no study can account for *all* factors contributing to an individual's development, a modified version of Bronfenbrenner's bioecological theory (PDCT) may provide a helpful base for researchers looking to capture that complexity. Bronfenbrenner's PDCT can consider the individual characteristics, multitude of environments and pressures that influence and are influenced on, by the puppy in question, the effect of time, and observes proximal processes – activities and interactions which facilitate positive (or negative) development in the individual. Capturing, or at minimum, acknowledging the synergistic effects of PDCT, may help researchers create a more complete picture of puppy development.

Conflict of Interest

The authors declare no conflict of interest.

CRediT authorship contribution statement

Ana Goncalves Costa: Conceptualization, Investigation, Visualization, Writing – original draft. **Torben Nielsen:** Conceptualization, Supervision, Writing – review & editing. **Robert Christley:** Supervision, Writing – review & editing. **Susan Hazel:** Conceptualization, Supervision, Writing – review & editing.

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Ethics approval was not required.

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Chapter 3

Highlighting gaps in puppy research using Bronfenbrenner's bioecological theory of human development

Context statement

Continuing to explore Aim 1, this Chapter takes Bronfenbrenner's ecological model, as modified in Chapter 1, and uses its application to highlight how the model may help researchers identify gaps in current knowledge as well better understand limitations of certain study designs in puppy development research. To achieve this, we followed 20 Australian puppy guardians from prior to puppy acquisition until puppies reached six months of age. Semi-structured interviews were conducted, and the transcripts were analysed deductively using the newly modified Bronfenbrenner model presented in Chapter 2. The findings revealed three problematic and intriguing gaps in previous research, which are presented as cautionary insights for other researchers to consider in their own study designs and limitations. These gaps were: the dangers of using individuals as representatives of entire households, the role of relationship in learning, and the impact puppies have on others. Overall, this Chapter emphasizes the importance of considering an ecological model in future puppy research to avoid these gaps in future study design and gain a comprehensive understanding of the complex factors influencing puppy development.

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By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);

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RESEARCH

Highlighting gaps in puppy research using Bronfenbrenner's bioecological theory of human development

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Abstract

The use of an ecological model in puppy development research can help to capture the real-world complexity of development factors and outcomes. Using a modified version of Bronfenbrenner's bioecological model, we explored the real-world experiences of 20 Australian adults who had acquired and were subsequently raising a puppy in their home for companionship purposes. Our participants' experiences offered insights into several gaps in the current literature and potential opportunities for future research. These insights included: (1) researchers should be wary of viewing a puppy's household as uniform, or static. Each individual within a household provides unique interactions and development opportunities and therefore cannot be a reliable representative of the household at large; (2) knowledge is unlikely to be uni-directional, or deriving from only a single source, even in environments such as puppy classes. How knowledge is transferred, trusted, interpreted, and applied is likely affected by the individual's own ecological system (such as biases), as well as the characteristics of the relationship between the individuals involved; and (3) puppies are affected by, and have an effect on, those around them. The arrival of a puppy into a household is likely to change the existing dynamics of that household. These changes may be positive or negative in nature, or both simultaneously. Further research into these findings may help researchers better understand the complex nature of puppy development.

Keywords: Bronfenbrenner bioecological theory of human development, puppy, puppy raising, puppy development, owner experience, guardian experience

Introduction

Dogs are a ubiquitous part of human life. Almost half of the Australian households, and 34% of U.S. and U.K. households report at least one canine resident as a companion, and many families have had the joy (and stress!) of raising a puppy (American Veterinary Medical Association, 2018; Animal Medicines Australia, 2019; UK Pet Food, 2021). To fit into human society puppies should develop into social, calm, faithful, and non-aggressive adult dogs (King *et al*., 2009). Dogs who fit well with these expectations increase their chances of experiencing good welfare outcomes, while dogs who do not learn, or are unsuited to fulfilling these roles risk poor welfare outcomes and may even be rehomed (Diesel *et al*., 2008; Diesel *et al*., 2010; Sonntag and Overall, 2014; Pegram *et al*., 2021). Raising good canine citizens is not a matter of chance. How we breed and subsequently raise our dogs in our households affects their future ability to fulfil these roles and adapt to human communities and households (Cushing and Kramer, 2005; Gazzano *et al*., 2008b; Howell *et al*., 2015; Wormald *et al*., 2016; Majecka *et al*., 2020). If we want to increase the chances of good welfare outcomes for our dogs and live with them happily and safely, we need to understand the different factors that affect these outcomes.

Puppy development has been of particular interest to researchers, most commonly concentrating on the impact of breeding practices, socialisation and puppy school/classes (Gazzano *et al*., 2008a; Howell *et al*., 2015; Wormald *et al*., 2016; McMillan, 2017; González-Martínez *et al*., 2019; Majecka *et al*., 2020). The push to understand the link between developmental inputs and future behaviour is strong and seeks to answer: "what is the best way to raise a puppy for human companionship and dog welfare?" Puppy development, much like child development, is impacted by a wide range of factors, and the use of an ecological model is advised to grasp the complexity of these relationships (Goncalves Costa *et al*., 2023). The use of an ecological model such as Bronfenbrenner's bioecological model can help highlight gaps in our understanding of puppy development and highlight areas of future research to improve the human-dog bond and welfare in dogs. Puppies are affected by environments they interact with directly (microsystems), and indirectly (exosystems), as well as the relationships between

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those around them (mesosystems), culture (macrosystems), time, and their own social and physical abilities and appearance (Person/Dog). Understanding puppy development requires an ecological outlook which is currently lacking in puppy research (Goncalves Costa *et al*., 2023).

The purpose of this paper is to use the Bronfenbrenner bioecological model to interpret the lived experiences of 20 puppy guardians and highlight key areas that may be of interest for future research. This paper will specifically explore development factors that may affect puppy learning. This paper is not intended to capture all factors within all Bronfenbrenner systems that appeared within our interviews, but rather its goal is to present examples of how a bioecological model can help reveal the complexity of development and allow researchers to better design future studies of puppy development and human-dog interactions.

Methods

RECRUITMENT OF STUDY PARTICIPANTS

Participants for this study were recruited primarily using social media between January and May 2021. Facebook dog-centered groups such as "Dog Lovers of Australia" were the primary method of communication used to promote our recruitment drive, and group members were encouraged to share and tag friends and families who were in the process of acquiring a new puppy.

All participants were Australian residents, over 18 years of age, and had committed to bringing a new puppy into their household for companionship purposes prior to recruitment. A total of 20 participants were engaged and recruited for three interviews; once prior to the acquisition of their new puppy, then again 1 week after their puppy was brought into the household, and finally when the puppy turned 6 months of age. All 20 participants identified as female, 80% were between 30 and 60 years of age, and 60% lived in South Australia. Most participants (70%) sourced their puppies from breeders registered with the Australian National Kennel Council and brought home their puppies between 8 and 10 weeks of age. Further demographic details of participants and their puppies are provided in Tables 1 and 2. This study also included survey check-ins between interviews two and three, the results of which can be found at Goncalves Costa *et al*. (2023). This study was approved by the Human Ethics Committee of the University of Adelaide (H-2020-253).

Data collection

A total of 59 interviews were completed between January and September 2021, with only one (six-month) interview unable to be completed. As this paper is concerned only with the experiences of owner and puppy, 20 interviews relating to pre-puppy acquisition have been removed for the purposes of this paper, leaving 39 interviews for analysis which will be referred to

Table 1. Demographics of 20 Australian puppy guardian participants interviewed 1 week into puppy acquisition, and again when their puppy turned 6 months of age between January and September 2021.

Puppy guardian characteristics	Number	Percentage (%)
Gender		
Female	20	100
Age (years)		
18–29	2	10
30–45	8	40
46–60	8	40
> 60	2	10
State		
South Australia	12	60
New South Wales	5	25
Tasmania	2	10
Victoria	1	5
Number of residents in household (including participant)		
1	2	10
2	14	70
3	2	10
4	2	10
Previous puppy raising experience		
Yes	7	35
No	13	65
Other pets in household		
Yes	13	65
No	7	35

Table 2. Demographics of 20 Australian puppies of guardian participants interviewed 1 week into puppy acquisition, and again when their puppy turned 6 months of age between January and September 2021.

Puppy characteristics	Number	Percentage (%)
Sex		
Male	12	60
Female	8	40
Sourced from		
ANKC*	14	70
Non-ANKC*	4	20
Friends/neighbours	2	10
Age acquired		
<8 weeks	1	5
8–10 weeks	18	90
>10 weeks	1	5
Breeds		
Pure breed	19	95
Cross breed	1	5
Number of breeds/cross breeds represented	15	N/A

*ANKC = Australian National Kennel Council.

from now onwards as interview 1 (1 week into puppy acquisition), and interview 2 (puppy turning 6 months of age) (interview schedules are provided in Supplementary Material: Appendix 1). Interviews were qualitative, semi-structured and conducted by the principal investigator (AGC). To allow for interstate and rural participants, and to adhere to COVID-19 safety precautions, all interviews were completed over the phone and digitally recorded. Interviews were then transcribed verbatim.

The early-acquisition interview sought to explore the experiences of the participant's interactions with their puppy, changes in lifestyle and dynamics between members of the household, access to resources and support, decision-making factors, feelings towards their puppy and how participants reacted to puppy challenges. The six-month interview explored the overall experience of puppy raising, the evolving dynamics of members of the household, the fit of the puppy within the household, undesirable behaviours and participant responses to them, as well as negative and positive effects of the puppy on the participant and household.

Analysis

Systems of Bronfenbrenner's bioecological theory of puppy development (Table 3) as set out by Goncalves Costa *et al.* (2023) were used as the conceptual framework for analysis. Braun and Clarke's (2013) 6-phase reflexive thematic analysis process was conducted on the interview transcripts using Microsoft Excel™ to code answers and develop themes deductively. These included references to dog characteristics (either form, demand or resource), contexts (environments that influenced, and/or were influenced by the puppy), and time systems. Further details on the Bronfenbrenner systems and how they relate to puppy development can be found in Table 3. (Readers who wish more in-depth detail on the Bronfenbrenner bioecological model can find it at Goncalves Costa *et al.*, 2023). The authors chose examples of ideas or gaps in the literature that are highlighted when development is viewed through an ecological model which have, so far, been absent from current puppy research. To reiterate, this paper is not designed to be an exhaustive list of Bronfenbrenner systems in puppy learning and training development, but an explorative one for aid in future research, therefore, not all Bronfenbrenner systems will be represented in our chosen topics.

Due to their background in animal welfare and training, the principal investigator may have been predisposed towards interpreting data through the lens of applied behaviour.

Results and discussion

The following is an exploration of three of the key research topics we found that may impact a puppy's learning development using Bronfenbrenner's bioecological theory as modified for puppies (Goncalves Costa *et al.*, 2023).

HOUSEHOLDS ARE NOT A UNIFORM, STATIC ENTITY

Studies exploring factors influencing puppy development that work with, or gather data from, a single guardian acting as a representative of the household may be subject to a major limitation. Looking at the puppy raising experiences of our participants through an ecological lens revealed that within the mesosystem, household interactions are neither static nor uniform. The challenge of *training consistency* reported by our participants offers us a glimpse of real-world complexity.

When we think of consistency in training, we may think of the issue of time. We imagine guardians, or households, struggling to regularly attend classes, keep up at-home training, and overall, not training *consistently over time* to avoid unwanted behavioural outcomes. When we look at a puppy's learning and training through the lens of the Bronfenbrenner model, we have the opportunity to look at a different challenge of consistency. Here, we look at interactions between individuals when everyone brings their own personality, previous experiences, and skills into an interaction with their puppy (Fig. 1).

Table 3. Definitions of Bronfenbrenner's bioecological theory of human development systems applied to puppies as modified from (Goncalves Costa *et al.*, 2023).

System	Definition
Dog/Person	Force: Internal characteristics, like personality traits, affecting how an individual responds to their environment. Resource: Lessons and capabilities an individual brings to interactions Demand: Physical characteristics that can influence how others interact with the individual.
Microsystem	Any setting in which the developing puppy of interest is situated, in which they have face-to-face interactions with other individuals and objects. Proximal processes occur here. For a puppy, this would include the household – with their human and non-human inhabitants – and other areas in which the puppy is directly interacting, such as puppy classes and dog parks.
Mesosystem	This deals with the linkages between microsystems – the interconnectedness and influence of the microsystems on each other, outside of direct contact with the puppy. For example, a poor or conflict-ridden relationship between owners and puppy class instructors. Despite the puppy not being directly involved in the relationship between the two, the interactions between the owner and instructor will ultimately affect the puppy's own experience.
Exosystem	This is a microsystem for someone other than the developing puppy of interest (e.g., the owner's microsystem) but which has an indirect effect on one or more of the developing puppy's microsystems. For example, an owner's workplace experiences have an influence on subsequent interactions with their puppy despite the puppy not being present at work. Similarly, online communities exist in a puppy's exosystem, puppies do not engage with these communities directly but their influence can be felt through others (e.g., an owner seeking advice on behavioural issues).
Macrosystem	Any sociocultural group sharing values, beliefs, access to resources, a sense of identity, etc. Macrosystems can be coterminous with an entire society or with racial or ethnic or socioeconomic groups (subcultures) within that society. This may include beliefs relating to the value and status of dogs (dogs as family versus dogs as utility), what the definitions are of "a good dog" and the ethics and beliefs around how our dogs should be treated. Expectations are a large factor in creating a positive dog/owner relationship and relationship issues may occur when there is a misalignment between dog behaviour and human expectations. These expectations are likely being influenced by the owner's own personal characteristics, but also by the beliefs and culture in which the owner lives.
Time	Microtime: The manner in which proximal processes proceed during specific episodes. For example, how focused/distracted a puppy and owner is during puppy training. Puppies and owners who are equally focused and engaged are likely to have different outcomes during a training session than those where one or both participants are distracted and unfocused. Mesotime: The extent to which proximal processes occur (e.g., frequently or infrequently). For example, training that occurs weekly, vs. daily is likely to affect outcomes. Socialisation is also a good example, we currently presume there is a minimum amount of socialisation required to avoid negative outcomes, and a maximum amount of socialisation where increased impact ceases, but do not yet know what either of these amounts might be. Taking mesotime into account in future study designs may help. Macrotime: Current social, political and economic conditions of society, and changes in those conditions, for example, how society views dogs' role within it.

This new perspective allows us to see consistency as something that also occurs *between* members of a household. Our participants reported ongoing battles as they navigated conflicting training opinions, techniques, and abilities between different members of the household:

> p15-1 [When my partner is teaching our puppy in a new behaviour, he says] "Let's give him a treat." [and] I'm like, "We don't need to give him a treat. He's done it" …Then we go the opposite. When I'm training [something else] …I'll be like, "Let's do treats." Where [my partner's] like, "We don't need to do treats," and I'm like, "You want treats, you don't want treats. I don't understand."

> P15-1 [Co-guardian] and I… have very different approaches to the biting. We're not being consistent with that yet …. I'm definitely more like, I'll be like, "Bad dog [growls]," and then take him off my ankle, pry his jaws away for me and be like, "Bad dog." I will be physically like "I'm grumpy, and you've made me sad" kind of attitude. Then [co-guardian will say]… "Don't take it out on him", [but] He just bit my ankle, he needs to know that it made me grumpy or sad. Then [co-guardian] will be like, "Bad dog. Come give me a cuddle." [and I'm] like, "No, you're rewarding him for biting you."

Young children also impacted consistency of training:

> P2-1 the only issue we're having, which was probably expected, is just she's jumping up on the kids, which she's not doing to us as much. We can stop it quite quickly. But kids sort of wave their hands around and step back and so we're just working on that. So, my five-year old's sort of got it sorted…but my three-year-old, you pretty much have to be right there holding her.

This lack of consistency between household members is likely to lead to slower learning or undesirable behaviour outcomes:

> P11-1 she has had a couple of accidents [toileting indoors] but having said that she only has accidents inside when [other household member is] on the watch, and I'm not home. It's just like well you weren't watching her enough were you, or you didn't take her out soon enough…

Participants also had to ensure any new training techniques learned by one individual was passed on to others in the household:

> P2- [prior to puppy classes] 1 would have thought that you just, like, maybe, you know, if they jump up on you, you tap them on the nose or, like, I wouldn't hit her but, like, you know, a tap on the nose or a no. Like, I think [co-guardian] still does that a bit because that's what [he's done in the past]. But I'm just trying to show him that [there are] other ways

Even when two individuals received the same information delivered in the same way, interpretations of advice differed, adding to training inconsistency within a household:

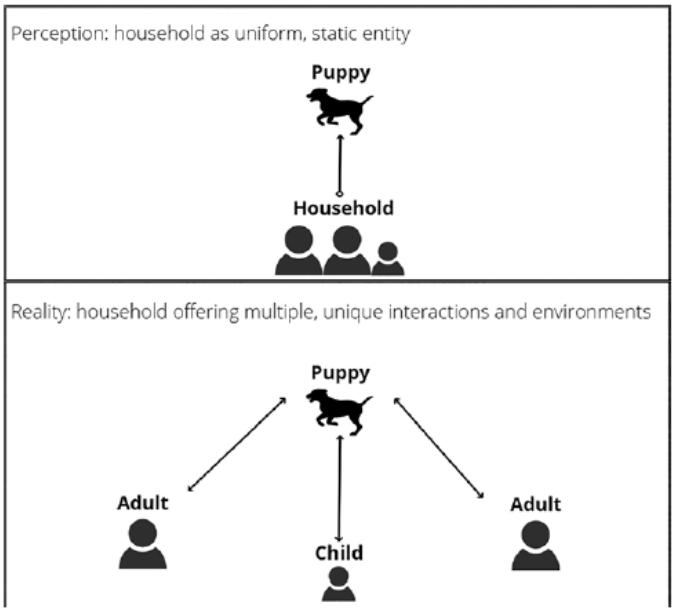

Fig. 1. An example of puppy's household as viewed with a Bronfenbrenner microsystem lens: Households are neither uniform nor a static entities and viewing them as such ignores the unique interactions offered by individuals.

> P16-1 [my partner] was snapping at me saying, "Oh, you shouldn't be doing that. You should try this technique." I was like, "Well, I want to try this because I think this will be better." … I think we've both extracted different pieces of information from the [same] training videos that we've watched.

The mixture of training techniques in our multi-household participants may present issues in puppy development: specifically, the inclusion of force in training by either one or more members of the household. For clarity, the use of *positive reinforcement only* will be termed "force-free", and training/interactions that include any other training methods (e.g., positive punishment, negative reinforcement and including those that also claim to include positive reinforcement as part of their mixed methods) will be termed "force" in this paper.

The use of force in training is correlated with an increase in problem behaviours, even when used in conjunction with positive reinforcement (Hiby *et al*., 2004). This type of training may also create a pessimistic, more negative mood state in dogs and compromise welfare (Vieira de Castro *et al*., 2020; Casey *et al*., 2021). Deldalle and Gaunet (2014) found that dogs trained with force-free methods, without the use of punishment, showed fewer signs of stress when given cues for behaviours and were more likely to gaze towards their guardians (interpreted as a positive sign of a stable relationship between human and canine). A review in 2017 concluded that the use of force in training negatively risks the dog's physical or mental health, while force-free training was just as effective, or possibly even more effective, than training with aversive methods (Ziv, 2017). Use of force, even in conjunction with positive reinforcement increases the likelihood of undesirable behaviours such as fear, aggression and decreases the ability to learn novel tasks (Rooney and Cowan, 2011; Casey *et al*., 2014). Essentially, the use of force in training, even by a single individual involved in a puppy's training regimen risks "inverse proximal processes" – interactions negatively related to healthy and positive development (Merçon-Vargas *et al*., 2020). These types of risks and negative development outcomes are also seen in children. The use of physical punishment (such as spanking) is strongly and consistently linked to deceased moral internalization, increased aggressive, antisocial, criminal behaviour (from the child, and from the child as an adult), worse mental health outcomes and poorer child-parent relationships (Gershoff, 2002; Fortier *et al*., 2022). And much like puppies, these negative effects can be seen even if the physical punishment is received by only one parent (Bender *et al*., 2007).

Our participant experiences highlight the importance of avoiding treating households as uniform or a static entities when exploring puppy development. Households are inhabited by one or more individuals who each have their own ecological systems that they bring to their interactions with a puppy. A household with several individuals is likely to offer several different learning and training environments, rather than one "household" environment. Studies looking at the influence of learning and training must consider all guardians involved in the puppy's microsystem, not just those who either attend interventions or fill out a survey.

THE ROLE OF RELATIONSHIPS IN LEARNING

When discussing why people choose training techniques outside of positive reinforcement, Todd (2018) cites a lack of access to good information and a lack of knowledge of risks as the culprits. Gazzano *et al*. (2008a) reported that access to appropriate behavioural

advice modifies how guardians train their puppies, decreases the use of force in training, and possibly even mitigates factors associated with a higher risk of behavioural disorders. Information provided by Gazzano *et al.* (2008a) included basics on canine ethology such as how to socialise a puppy, forming canine-human bonds, understanding canine body language, the fundamentals of force-free training and risks associated with choosing training that includes force. As puppy classes are not regulated (Howell *et al.*, 2015), it is likely there is variation in content, instructor expertise and class management (e.g. numbers and ages of puppies). Personal opinions, experience and conflicting advice will also affect puppy class education effectiveness. If education and knowledge are important factors in positive puppy development, then positive puppy development relies on understanding how knowledge is accessed, transferred, trusted, interpreted and applied between individuals.

Accessing information and guidance on puppy raising was not reported as an issue for our participants. Their sources varied from puppy classes (microsystem), friends and family (microsystem and exosystem), online forums and social media (exosystem), and their own personal past experiences (guardian's Person system) to name a few. The challenge for our participants lay with the almost limitless, often contradictory, information available to them:

> P7-1 … Google…was the worst thing I could do. Because you just… It's a can of worms, and you just get all of these answers of like, "Do this", "No, do this", or "Oh no, don't feed them in a bowl; feed them like this", or scatter feed them, or throw it in the lawn, and all these other things … I guess when you get too many options, you're like, "What the heck do I do, then?"

How our participants navigated the abundance of advice appeared to depend heavily on two Bronfenbrenner systems – the Person (*how does this advice sit with my previous knowledge of this topic?*), and the mesosystem (*how do I feel/what is my relationship like with this source?*).

Puppy classes are environments designed to provide guidance and education to new puppy guardians. However, to our knowledge, no studies exist investigating how effectively the knowledge is transferred from instructors to guardians in a puppy class environment. Our participants' experiences highlighted that both the mesosystem (relationships) and the participants' own person system (previous experience, etc.) were strong influences on how much value they placed in the information imparted by puppy class trainers.

Although somewhat counterintuitive, puppy class instructors were not automatically considered definitive experts on puppy training by our participants. When asked if the puppy class instructor was likely to be their "go-to" for help, one participant answered:

> P4-1 [I would use my puppy instructor as my main resource if I thought] *yup, you're a guru and you know exactly what you're talking about.* [In that case] I would have faith in them and go with them. … but normally…I would use a range of resources to find answers to things rather than just taking one person's opinion.

This indicates that the mesosystem – the relationships *between* people – is a factor in how guardians choose which advice to take, and which to ignore.

One participant, a veterinary nurse, found her own knowledge (guardian Person system) contradicted with advice given by the puppy class instructor. She voiced her disagreement openly in class, creating a ripple effect on other attendants (and their mesosystems). She reported:

> P14-2 Sometimes we'd be walking back to the car [after puppy class] and the other people that were in our class would come and ask me things [about their puppy] and I'm just like, "No, I'm not saying what she did was incorrect but–," and, "I'm not saying she's wrong but--," and I would answer things for them.

These relationships and their consequences are captured in the mesosystem and highlights that environments like puppy classes are not unidirectional sources of influence (Fig. 2). These relationships between individuals within a puppy class appeared to influence whose advice was deemed valuable.

The interactions between puppy, guardians and sources of advice (mesosystem) were not the only factors affecting trust. Participants also reported personal and cultural biases affecting their behaviour (Macrosystem and guardian's Person system). Breed-bias was a particularly interesting issue for our participants. Breed-bias affects several aspects of canine life with studies suggesting breed (and size) may dictate how much training a dog receives, how often they are engaged with in play activities (Arhant *et al.*, 2010), and even affect an owner and veterinarian's perception of sensitivity and pain tolerance – no doubt affecting health care decisions (Gruen *et al.*, 2020). Our participants also appeared to be influenced by breed-bias when it came to seeking advice, with some reporting feeling more comfortable if the advice was breed specific.

When choosing between returning to the puppy class instructor for advice post-classes, or finding a new trainer to address some of the behaviour challenges presented by their German Shepherd puppy, one participant explained:

> P15-2 [Interviewer: what was it about the new trainer that you liked over the puppy class instructor?] I think it's very much that [the new trainers] have German Shepherds. You go into it knowing that they've got experience.

The participant went on to explain that breed-specific advice/ knowledge may be more important than their own personal feelings on dog raising:

> P15-2 [the German Shepherd trainer]…He's like a full-on dog trainer. When he commands a dog, he speaks German to it. Then that's where I get hesitant …you know in your brain you know the way to do something, but it's like, your heart doesn't want to go that way. To me, I want [my puppy] to just have this beautiful, fun, lovely life with us. I don't want him to be like-- I don't know how to put it, but I don't want… a strict dog that feels like he can't– he needs my permission to breathe. [but] then I do know that it's better for them to be– He needs that training and that education. I just love him the way he is. I don't want to break him down and stuff.

The above quote touches on several systems at once, mesosystem (her perceived trust – relationship) with a trainer, and what is likely a mixture of personal experience and cultural bias (Person and Macrosystem).

Puppy guardians have a range of sources available to them for information and guidance on puppy raising. An abundance of contradictory, as well as overwhelming amounts of information is a challenge for modern puppy guardians. We cannot assume that information provided to guardians, either in puppy classes, or other interventions, has automatic uptake. It is possible that it is simply not enough for researchers to consider puppy classes as 'attended/not attended'. For our participants, all information was filtered through their Person system, their relationship with the information source, and likely through a range of other factors such as current cultural ideas (macrosystem and time).

EFFECT OF NEW PUPPY ON HOUSEHOLD DYNAMICS

Bronfenbrenner was clear in his work that development should not be viewed as a single-direction effect (Bronfenbrenner and Evans, 2000). Children are both affected *by* their environments and in turn, place an effect on their environments. Our interviews revealed this is just as true for puppies. While the effect a new puppy has on existing relationship dynamics within a household is often overlooked in the literature, we found a pattern of both positive and negative impacts when interviewing our participants (mesosystem). Unsurprisingly, the added responsibility of a new puppy can add tension to existing household relationships:

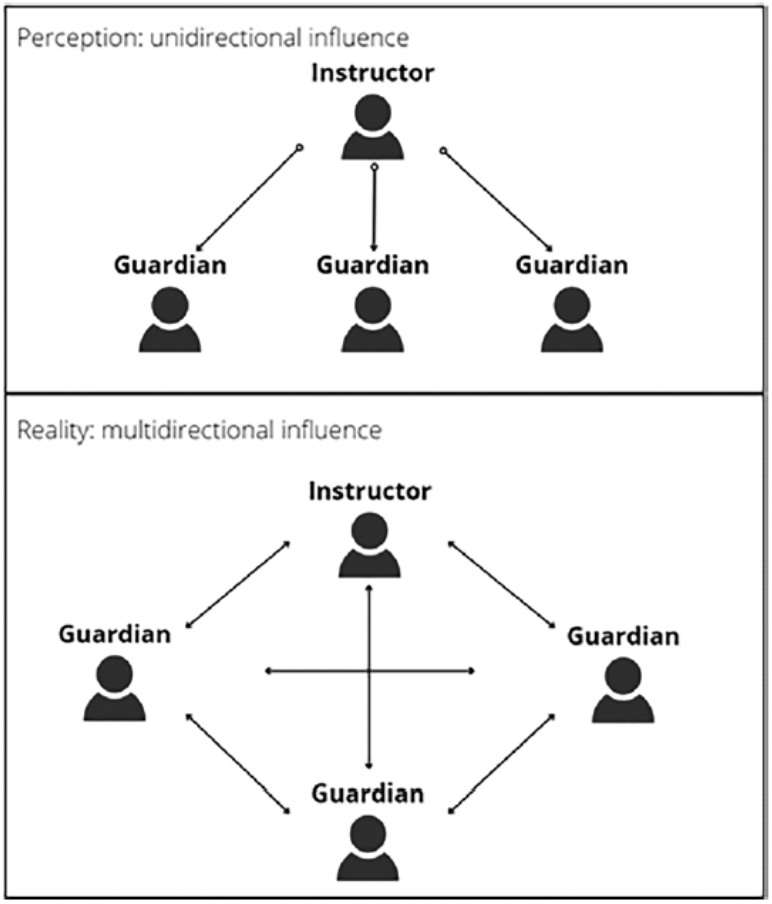

Fig. 2. The complexity of multidirectional impacts on puppy class learning can be captured when viewed through a Bronfenbrenner lens.

> p4 … there was a bit of tension in the house with my partner because of just my crankiness from not sleeping. There's also a little bit of tension in the house because we have different ideas about [how to raise the puppy]…

It is well-documented in child development literature that relationships between parents (marital satisfaction, conflict, etc.) affect child development and behaviour (Wang and Crane, 2001; Cummings and Davies, 2002). Parents with high levels of stress are also at higher risk of impaired parenting, and ultimately, poorer child outcomes (Lovejoy *et al*., 2000; Helgeson *et al*., 2012), therefore the relationships between guardians, and the impact the puppy has on these, matter. As none of our participants reported experiencing high levels of conflict in the household, our study was not able to explore the impacts of the full spectrum of these factors. Future studies would benefit from exploring the changes to social support within the household during puppy raising.

It is important to also note that tension in the household was not limited to human residents:

> P4-1 Normally, [our older dog would] hop on the bed, give us a cuddle. And you can tell [our older dog] was annoyed with us because maybe the first three days she came up on the bed but lay down at the end of the bed, and when you called her up, she would just look at us, but she wouldn't come up and give us a cuddle I think she had her nose out of joint. She was a bit annoyed with us for getting a puppy I think…

Some household dynamic shifts were positive. Our participants also reported that their puppy facilitated closer bonds between themselves and others in the family, often creating an environment primed for social support through shared responsibility and activities:

> P15-2 I think [my partner and I have] spent a lot more time together than we normally would because we have that time outside with [the puppy]. [My partner and I are] out there together where our normal routine would have been to … go our separate ways for the night, like I'll either go off and do work or… I'll watch some TV and he would just watch TV out here in the lounge room. It's a lot more cohesive and "what can I do for you, what can you do for me" conversations, which has been really nice.

> P7-2 ….There's definitely less arguments between us with silly things because we're just concentrating on him. [chuckles]

And much like the increased risk for negative interactions, increased positive interactions and change are also seen in the other household animal companions:

> P4-2 [The puppy has] actually made the other dog a lot more affectionate, because the other dog was very elusive [before the arrival of the puppy]. [Before, the older dog] wouldn't give you a cuddle and she'd just go and-- She'd say hello and then just go and sit by herself. She was very independent, but she sees how cuddly [the puppy] is, and how affectionate he is, and I think she doesn't want to miss out on that affection… When he comes in, sits on our laps to give us a cuddle, she'll actually come along and start cuddling us. [The puppy has] actually, probably, enhanced my older dog's behaviour and life.

It is likely that a puppy, much like an addition of a child, increases both positive and negative effects in the household (Nomaguchi and Milkie, 2003). Increased workload and responsibility may lead to increased tension or stresses between individuals, but also provide increased opportunities for positive experiences. These, in turn, influence existing relationships within the household (mesosystem) and ultimately possibly affecting development through similar mechanisms seen in parent and child relationships. Given the many parallels between the parent-child and the human-canine relationship (Goncalves Costa *et al.*, 2023), factors such as relationship satisfaction and conflict within a family and their effects on puppy development are worth further exploration.

Limitations

This paper acknowledges its limitations as the findings are based on a small sample size of self-selected puppy guardians, therefore, caution must be exercised when generalising the results to the wider population. Future research with a larger and more diverse cohort is required to validate our findings. Additionally, exploring the puppy's experience (not just the guardian's) and extending the study beyond 6 months could provide a more comprehensive understanding of the topic. It should also be noted that this study only focused on the experiences of women who were the puppy's primary caregivers, and the experiences of other gender identities and of other individuals in a puppy's household may differ. However, this paper provides valuable insights into the complexities of puppy-raising, offering potentially new pathways for future investigations.

Conclusion

While puppy development occurs in direct interactions (microsystem), this study shows this is not the only system working to affect interactions and their effects on puppy development. Given our findings, researchers should be wary of treating puppy households as uniform, static environments and instead assume each individual within a household presents unique learning experiences and developmental pressures – especially when exploring the use of training techniques. Relationships and previous experiences also appear to affect how likely an individual is to accept guidance and advice on puppy raising. Finally, puppies are not only affected *by*, but also have an effect *on*, others. Puppies can disrupt or enhance existing relationship dynamics within a household, how this further affects puppy development is still unknown but child development studies suggest there may be some long-term effects to increased stress and tension in households.

A similar lack of research hinders our understanding of the other systems within the Bronfenbrenner model, not all of which were explored in this paper. This paper did not seek to identify all gaps found in puppy development research, but rather, we aimed to use the Bronfenbrenner model to highlight key ideas that warrant future exploration. Future researchers may also benefit from using an ecological model when exploring factors affecting puppy development.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

ETHICS STATEMENT

The authors confirm that the research meets any required ethical guidelines, including adherence to the legal requirements of the study country.

AUTHOR CONTRIBUTIONS

AGC, SH and TN conceived and designed this study; AGC undertook data curation and visualization. SH, TN and RC supervised this project; AGC wrote this paper and SH, TN and RC edited the final version. All authors have read and agreed to the published version of the manuscript.

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Chapter 4

The good, the bad, the helpful: Qualitative exploration of the Australian puppy raising experience through longitudinal surveys.

Context statement

This Chapter moves to fulfil Aim 2 of this thesis: investigating the experience of guardians as they raise their puppies in the present day. Introducing novel research that dives into the everyday life of puppy guardians, Chapter 4 broadly examined the positive, negative, and supportive aspects of their journey. In this longitudinal study, participants' experiences were explored through 2-weekly surveys, starting from 3-weeks after puppy acquisition until their puppy turned six months old. The survey included free-text responses to uncover the most enjoyable, challenging, and helpful aspects of the previous fortnight, as well as quantitative questions assessing levels of regret and enjoyment. Guardians derived their joy from bonding with their puppies and celebrating milestones along their journey together. Conversely, they identified puppy training and behaviour as the most daunting challenge. Participants further expressed internal struggles regarding their perceived adequacy as guardians, however, they found solace in various places, including training and socialising their puppy, access to supportive communities, resources, and adopting realistic expectations of their puppy. Furthermore, quantitative data within this study demonstrated that most (but not all) participants did *not* have strong feelings of regret towards their puppy raising experience and all but one rated their enjoyment levels of puppy raising between 95 and 100 throughout the study. Even so, answers to "caring for my puppy took more time and energy than I have to give" varied greatly between participants and no clear pattern found between these scores and participants' qualitative answers. This study provides an overview of the puppy raising experience for companionship, laying the groundwork for a more in-depth examination into guardian stress in Chapter 5.

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The Good, the Bad, the Helpful: Qualitative Exploration of the Australian Puppy-Raising Experience Through Longitudinal Surveys

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ABSTRACT

Dogs living in Western countries today are more likely to be considered a member of the family compared with those in previous generations. This shift in human–dog dynamics also affects how dogs are raised, the benefits perceived, and the challenges faced by guardians. To provide appropriate support to modern dog guardians, canine professionals need to understand their experience. This study aimed to better understand the lived experience of guardians who acquire and raise puppies for companionship. This longitudinal study surveyed 19 Australian puppy guardians every two weeks, from 3 weeks after puppy acquisition, through to their puppy turning 6 months of age. By undertaking analysis of free-text responses, we developed themes describing what guardians found most rewarding/enjoyable, most challenging, and most helpful. These themes were closely interconnected and suggest that puppy raising is complex, and sequential factors may have cumulative effects. Forming an attachment with their puppy, training, eudaimonic happiness, creating social networks, and having sufficient time to dedicate to puppy raising were major positive factors in a guardian's experience. Training appears to have multi-faceted benefits as it likely provided opportunity for shared activity, increased positive states, eudaimonic happiness, attachment, and decreased challenges. Social networks may help decrease the time guardians require to raise their puppy (as burden is shared) as well as mitigate challenges, decrease negative states, and increase feelings of eudaimonic happiness. Challenges revolved around navigating puppy training and behavior, and the emotional and physical struggle of striving to be a "good guardian." Understanding the puppy-raising experience better may help key stakeholders provide guardian-appropriate guidance, support, and resources to increase enjoyment and decrease stress in puppies and their guardians.

KEYWORDS

Benefits; challenges; dog; human–animal interaction; owner; qualitative; training

Dogs are one of the world's most popular companion animals. Between 30% and 50% of households in the UK, USA, and Australia include at least one canine resident, making it one of the most common companion animals in the Western world (American Veterinary

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Medical Association, 2020; Animal Medicines Australia, 2021; Australian National Kennel Council Ltd, 2017; Pet Food Manufacturers Association, 2021). In the last few decades, dogs' roles in Western society have shifted away from serving utilitarian functions to being regarded as members of the family (Franklin, 2006; Owens & Grauerholz, 2019; Power, 2008; Shir-Vertesh, 2012). Dogs increasingly partake in family activities (Carr & Cohen, 2009) and the shift away from historical to modern lexicon (from "pet" and "owner" to "animal companion" and "guardian"), and the decrease in use of typical canine names ("Fido," "Rover") in favor of human names ("Lucy," "Toby"), also provide examples of the psychological shift in the human–canine relationship (Franklin, 2006; Horowitz, 2019).

Changing our dogs' role within our society means our experiences and expectations of them, and also of us as guardians, shift. A modern guardian may feel the pressure to train for desirable behaviors, navigate the challenges of indoor access, provide adequate socialization and health care, develop a relationship, and fulfill the role of "responsible" or "good" guardian, while still managing existing responsibilities (Furtado et al., in press). Given the acknowledgement of the importance of the puppy-raising phase (Serpell et al., 2016), modern guardians may be under more pressure than previous generations to be a "responsible owner."

Puppy classes aim to support guardians and are commonly designed to facilitate socialization and training, as well as provide a source of support and knowledge in the early weeks post acquisition. The impact of puppy schools on puppy behavior and guardian experience is still debated, in part due to the lack of research on the puppy-raising experience and needs (Duxbury et al., 2003; González-Martínez et al., 2019; Howell et al., 2015; Seksel et al., 1999).

There is some evidence that puppy raising places significant pressure on the human guardian (Chur-Hansen et al., 2015; Furtado et al., in press), with emerging evidence puppy guardian's may experience "puppy blues"; the experience of providing care for a puppy and emotional pressure to raise the puppy correctly may lead to depression, grief, and anxiety in guardians, in some cases to the point of returning the puppy back to the breeder (Furtado et al., in press). Factors that may cause these "puppy blues" are still unknown. Studies to date investigating puppy raising have primarily concentrated on those raised for non-companionship purposes, such as guide dogs, where a clear economic and utility function exists (and whose dyad is temporary in nature) (Mai et al., 2021). Other studies have focused on the puppy's experience rather than the guardian's (Cannas et al., 2010).

To support puppy guardians, it is necessary to understand their lived experience. This study aimed to explore the enjoyable, challenging, and helpful elements of puppy raising for companionship. Understanding what helps and hinders puppy raising is one step in the quest to understand factors at play when discussing puppy raising and, potentially, puppy blues. This qualitative research was designed to be exploratory and seek out points of pressure and conflict, as well as mitigate factors to these challenges when raising a puppy for companionship in a home environment. Results discussed in this paper are part of a wider, longitudinal study, following puppy guardians' experiences as they prepare for their puppy's arrival in the home, through to their puppy turning 6 months of age. Open-ended written and sliding-scale questions were collected as a mix of qualitative and quantitative data to capture individual experiences. The qualitative aspect of this study allowed the authors to capture nuances and complexities that may have otherwise been lost within quantitative-only research, while quantitative data

added to the richness of data and offered an opportunity for a more comprehensive understanding of puppy raising that allowed easier comparison between participants.

Methods

This study was approved by the Human Ethics Committee of the University of Adelaide as part of a larger study studying the experiences of puppy raising. Our ethics approval number is H-2020-253 and informed written and audio-recorded verbal consent was obtained prior to study commencement.

Recruitment of Participants

Surveys analyzed in this study were part of a wider study monitoring 20 participants from pre-puppy acquisition to the puppy turning 6 months of age and included three in-depth interviews (pre-acquisition, one-week post-acquisition, and an end-of-study interview). One participant was unable to be surveyed due to extenuating circumstances, resulting in 19 participant survey results to analyze. Participants were required to be Australian residents, a minimum of 18 years of age, and who had committed to puppy acquisition but had not yet brought their puppy home. Participants were recruited through online social media from January throughout May 2021. Recruitment targeted dog-focused Facebook groups, such as "Dog Lovers of Australia," and breed specific groups, such as "Staffy lovers in Tasmania." Eligible participants were registered in the order they agreed to participate, and demographic details were collected upon study registration. Participant numbers were based on the needs of our wider study, and given its longitudinal nature and the mixed-methods approach (see Table 1), our 19 participants provided 141 survey responses rich enough for analysis (Braun & Clarke, 2013). The decision to stop data collection at 6 months of age allowed focus on the juvenile developmental period, whilst avoiding the onset of sexual-development behaviors which may begin as early as 6 months for puppies (Serpell et al., 2016).

Participants were asked to fill out an online questionnaire, sent via email, every two weeks after their post-acquisition interview through to when their puppy turned 6 months of age (Table 1). Participants were given eight days to complete their surveys, though most were filled out within 48 h.

All identifying details were changed or removed to preserve the anonymity of participants, including names and other identifying factors such as veterinary clinics and other local businesses. Quotes are prefixed with the participant code (Px) and suffixed with the survey number (Sx) and age of puppy in weeks when the survey was completed (Xw).

Analyses

Analysis of Qualitative Data

Although "puppy blues" may present an extreme side of puppy raising, this study looked to gain broad information on what kind of challenges guardians face while raising their puppies, as well as what might serve to mitigate those challenges and what aspects they find enjoyable. The questions presented in the survey were similar to the overall themes explored in the semi-structured interviews within our wider study. We asked

Table 1. Qualitative and quantitative questions asked fortnightly of 19 Australian puppy-guardian participants, from 3 weeks into puppy acquisition until puppy turned 6 months of age. All questions required an answer unless specified otherwise.

Type of question	Question
Open-ended	• What is your puppy's name? • How old is your puppy? • How many times has your puppy toileted inside in what you would consider an inappropriate area (either urine or feces) in the last 3 days? • What has been the most enjoyable/rewarding part of living with your puppy in the last fortnight (please list as many as you would like) • What have been the biggest challenges with your puppy in the last fortnight (please list as many as you would like) • What has been the most helpful in raising your puppy in the last fortnight? • Is there anything else you'd like to share with us?*
Sliding scale	• I am enjoying raising my puppy (1–100) • Caring for my puppy sometimes takes more time and energy than I have to give (1–100) • I sometimes regret getting my puppy (1–100)

*Answer not required.

guardians (in open-ended questions) to discuss what they found the most enjoyable, helpful, and challenging in puppy raising. Inductive thematic analysis was then performed within each of these topics.

Braun and Clarke's (2013) 6-phase reflexive thematic analysis process was conducted on the open-ended answers using Microsoft Excel™ to code answers and develop themes. All coding and theme development were conducted by the principal investigator (AGC), with assumptions and rationale agreed by the other authors. Themes developed within groups of what participants found most enjoyable, most challenging, and most helpful and can be viewed in Figure 1. Codes were grouped based on the semantic meanings of the data, leading to subthemes, and then revised into latent, higher-order themes where possible. Where appropriate, the same unit of code was placed into more than one theme.

The principal investigator leaned on her personal judgements and experience when analyzing participant answers and may have been predisposed to view data from an applied behavior standpoint with a focus on human–animal relationships due to her strong background in animal welfare and animal training. Other authors involved in theme development had veterinary backgrounds with expertise in animal welfare and public health, which assisted in reducing the possibility of bias.

The question "Is there anything else you'd like to share with us?" did not require a response from participants, and not all participants offered further comments. For this reason, answers from this section were used only to enrich our understanding of the puppy-raising experience in the general sense and are discussed separately.

Analysis of Quantitative Data

Sliding-scale quantitative data were plotted onto a longitudinal graph to follow the participants' feelings toward their puppies from acquisition to 6 months of age. One participant was removed from the "I am enjoying raising my puppy" graph as their answers appeared to be outliers and the participant confirmed the numbers were in error, leaving a total of 18 participants for this specific question, and 19 participants for the remaining questions.

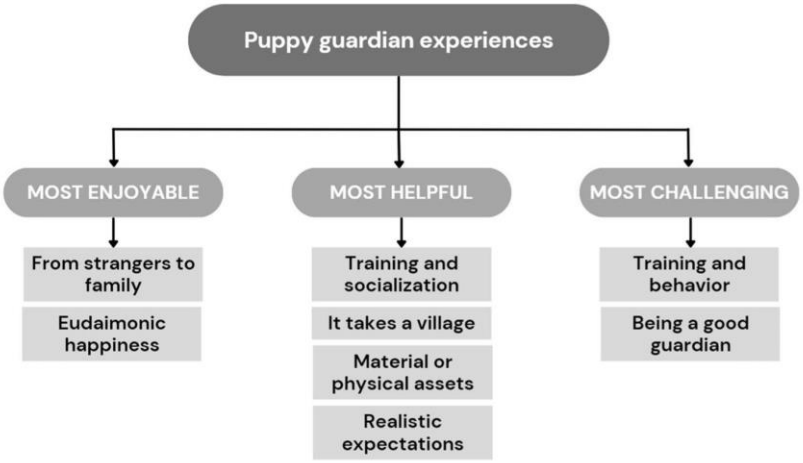

Figure 1. Themes developed regarding enjoyable, challenging, and helpful experiences of 19 Australian puppy guardians surveyed every two weeks between 3 weeks after puppy acquisition and puppy turning 6 months of age.

Results

Data Collection

A total of 141 out of 142 possible surveys were collected over 8 weeks from 19 participants between April and September, 2021. Demographic details on guardians and puppies are provided in Tables 2 and 3, respectively. Due to the variation of puppy ages at acquisition in the cohort, there was a little variability in number of surveys. Most participants (17) completed at least seven surveys during this period. Of the 19 participants, all were female, and the majority resided in South Australia. Puppy breeds varied, only one was identified by the guardian as a mixed breed, and 35% of participants had never previously raised a puppy as an adult.

Qualitative Findings

Most Enjoyable

Theme: From Strangers to Family. When asked what they most enjoyed about puppy raising, participants described the journey of relationship building between them and their puppy. They gained pleasure in getting to know, and liking, their puppy's personality:

> [P15] Seeing his personality come to life. [S3, 16w] … He is becoming such a character, it brings me so much joy. [S8, 26w]
>
> [P14] Seeing her blossom into a beautiful funny personality. [S7, 23w]

Participants also reported being able to offer (and share vicarious joy in) their puppy's fun and novel experiences. These joint experiences appeared to aid bond creation between family and puppy:

Table 2. Demographics of 19 Australian puppy-guardian participants surveyed each fortnight between 3 weeks after puppy acquisition and puppy turning 6 months of age (between February and September, 2021).

Participant (gender)	Age (years)	State	Residents in household	First time puppy raising	Other pets in household
1 (F)	30–45	SA	2	No	Yes
2 (F)	30–45	SA	4	Yes	No
3 (F)	30–45	NSW	2	Yes	No
4 (F)	46–60	NSW	2	No	Yes
5 (F)	> 60	SA	2	No	Yes
6 (F)	46–60	SA	2	No	No
7 (F)	18–29	SA	2	Yes	Yes
8 (F)	46–60	SA	4	Yes	No
9 (F)	> 60	SA	1	No	Yes
10 (F)	46–60	VIC	1	No	Yes
11 (F)	46–60	NSW	3	No	No
12 (F)	30–45	NSW	2	No	Yes
13 (F)	46–60	NSW	2	No	Yes
14 (F)	30–45	SA	2	No	Yes
15 (F)	30–45	SA	2	Yes	No
16 (F)	18–29	SA	2	Yes	No
17 (F)	46–60	SA	2	No	Yes
18 (F)	46–60	TAS	3	Yes	Yes
19 (F)	30–45	SA	2	No	Yes

Note: SA = South Australia, NSW = New South Wales, VIC = Victoria, TAS = Tasmania.

> [P15] … Getting to experience new things with him, like puppaccino's hehe. [S3, 16w]

> [P13] Getting out and seeing the world together – like it's through new eyes [S2, 13w] … Experiencing new things – beach, water, reflections. [S3, 15w]

Seeing the puppy integrate into the household was a source of pleasure for participants, some stating that the puppy was "fitting in," while others specified specific bond-building interactions between puppy and members of the household as a source of joy:

Table 3. Demographics of 19 Australian puppies of guardian participants surveyed each fortnight between 3 weeks after puppy acquisition and puppy turning 6 months of age.

Puppy (sex)	Sourced	Age acquired	Breed
1 (M)	Friend/neighbor	8–10 weeks	Koolie
2 (F)	Friend/neighbor	8–10 weeks	Koolie × Border Collie
3 (M)	ANKC	8–10 weeks	Japanese Spitz
4 (M)	ANKC	8–10 weeks	Border Collie
5 (F)	ANKC	8–10 weeks	Border Collie
6 (M)	ANKC	< 8 weeks	Labrador Retriever
7 (M)	ANKC	8–10 weeks	Golden Retriever
8 (M)	Non-ANKC	8–10 weeks	Cavalier King Charles Spaniel × Poodle
9 (M)	ANKC	>10 weeks	Toy Poodle
10 (F)	ANKC	8–10 weeks	French Bulldog
11 (F)	ANKC	8–10 weeks	Rottweiler
12 (M)	ANKC	8–10 weeks	Border Collie
13 (M)	ANKC	8–10 weeks	Kelpie
14 (F)	ANKC	8–10 weeks	Cocker Spaniel
15 (M)	ANKC	8–10 weeks	German Shepherd Dog
16 (M)	ANKC	8–10 weeks	Australian Cobber Dog
17 (F)	ANKC	8–10 weeks	Labrador Retriever
18 (F)	Non-ANKC	8–10 weeks	Cavalier King Charles Spaniel × Poodle
19 (M)	Non-ANKC	8–10 weeks	Border Collie

Note: ANKC = Australian National Kennel Club registered breeder.

> [P12] The most enjoyable part has been that the connection he has with us and the other animals in the household is growing stronger and stronger. [S7, 23W]

> [P11] [puppy] and my … daughter had a real great bonding weekend where [puppy] didn't mouth her or jump on her, they just hung out and played really nicely. [S5, 20w]

Participants also reported the puppy's presence bringing hedonic happiness to the household overall:

> [P16] He makes us laugh everyday and brings so much joy to our lives! [S3, 17w] … Just his presence makes the house so much happier! He is so clumsy and cheeky and makes us laugh every day. [S5, 21w]

The relationship also extended an element of stress relief:

> [P7] His bond with us is so lovely. When we have a crappy day, coming home to his wiggle bum makes it all better. [S3, 16w]

Some participants felt the connection they experienced was unique to them, compared with the interactions the puppy had with others outside the family:

> [P7] The way he looks at us is very different to how he looks at other people, he know's we are [his] mum and dad. [S2, 14w]

Theme: Eudaimonic Happiness. Alongside relationship building, participants reported achievements as their most enjoyable/rewarding aspect of puppy raising. These milestones ranged from development/behavioral (passive) achievements (e.g., teething stage complete) through to changes in behavior due to training (such as recall skills) and were often reported with a sense of pride or relief. Some achievements eliminated some of the challenges participants had previously been experiencing with their puppies:

> [P4] He runs to get into the car when we are going out whereas before we had to coax him into the car. He now sits up and looks out the car window. [S7, 23w]

> [P3] Finally potty trained. Teething phase is over. [S7, 24w]

Guardians appeared to take pride in helping their puppy reach these milestones through training, which takes time and commitment to achieve:

> [P7] … [helping puppy] develop to become a great dog through training and time spent with him [S1, 12w] … he is overcoming so many things every week, his walking on leads time is now up to 20 mins … [S4, 18w]

Participants stated watching their puppy go through the process of "growing up" and learning as one of the rewarding aspects of puppy raising:

> [P7] To see him grow tall and strong. [S3, 15w]

> [P13] Seeing him grow and learn and become a "real" dog. [S8, 25w]

Participants felt pride toward their puppies, in particular if their comparisons with other puppies were favorable:

> [P12] Proud puppy mother moment – he was by far the best behaved, most confident but not dominant, and smartest puppy at puppy school! If there was a winner, it definitely would have been [my puppy] by a mile [tongue out cheeky emoji]. [S6, 23w]

Most Challenging

Theme: Training and Behavior. Some undesirable puppy behaviors are directly linked to stages of development and therefore, largely unavoidable. Toilet training was a common example of this, as were other behaviors such as biting or chewing. Complaints about these types of behaviors were reported by participants as a challenge over several surveys:

> [P15] He is biting like crazy, I bought gumboots to wear outside but he has grown so much now his head is at my knee so he can bite over the gumboot [S1, 12w] … The biting – he is very mouthy … [S2, 14w] … Still the biting, my patience for the biting is low. [S3, 16w]

And some challenges appeared to diminish in intensity over time:

> [P19] Teething! He is chewing on everything [S6, 21w] … Chewing chewing chewing [S7, 23w] … chewing still but less. [S8, 25w]

Other behavioral challenges included discussion on incomplete training:

> [P15] Probably his lack of recall; we are working on it, but I get a bit frustrated when I'm calling him back and I just [get] attitude, haha. [S5, 20w]

Household integration also caused challenges, especially for those with existing pets. The management, supervision, and dynamics between puppy and existing pets was an ongoing challenge:

> [P9] The playing with [existing adult dog] … can turn quickly into fighting. Indicated by sound in the growling and nastiness [S1, 17w] … Their play sometimes turns nasty, still needing to monitor this. [S4, 23w]

> [P13] Still working on turning everyone into best friends (well, really tolerant housemates) [S2, 13w] … Managing my injured dog in the mix with pup. [S5, 19w]

Theme: Being a Good Guardian. Participants reported physically and emotionally struggling to manage conflicting demands of their time. Work and existing pets often featured in these conflicts:

> [P10] Feeling like with my work schedule I should be spending more time with her [S1, 13w] … Finding time between work and other commitments to spend time with her [S2, 15w] … Work schedule vs training schedule [S3, 17w] … Finding enough quality time to focus on 1:1 attention and training. [S7, 25w]

An issue was the need to leave their puppy alone in the household, a situation that led to feelings of guilt. Most participants managed the guilt and demands of puppy raising by seeking the help of puppy sitters (either through family and friends, or professional sitters, such as daycare):

> [P8] Going out and leaving him at home alone. Ensuring someone is able to check on him through day while I'm at work [S1, 11w] … Wanting to go out in evening and sorting

> someone to watch him [S2, 13w] … Going out in the evenings. Ensuring he has someone check up on him cos he is still little [S3, 15w] … Going out at night and leaving him alone [S4, 17w] … Had to leave him most evenings alone for a few hours. He was fine but mother guilt ++. [S8, 25w]

Participants also faced the challenge of monitoring their puppy's s health and safety and reported keeping their puppy healthy was not always easy. Some of these were basic such as monitoring food intake:

> [P18] Feeding is becoming a bit trickier – she'd rather eat anything other than her own food … She's very good at finding things she shouldn't eat [S5, 19w] … She has just recently got a bit funny about eating which is frustrating after her being so good. I'm not worried at this stage but I am keeping a close eye on her. [S8, 25w]

More serious health issues, when they did arise, were varied. In addition to recognizing and treating health issues, recovery management added new stressors and demands from the participant:

> [P1] We started off with gastrointestinal problems and had diarrhea for 5 to 6 days, and sometimes if we feed him something new he gets diarrhea again … [also a challenge, navigating] between my partner and I, who does what. For example, who wakes up in the middle of the night for him when he needs to go to the toilet. Most nights it's only 1 or 2 times, other is up to 5 when he has an upset tummy. [S1, 12w]

> [P12] We've had trying week with [puppy]. He ate some rat bait and had to be rushed to the vet … luckily we got him to the vet early enough that he only needed plasma and not a full blood transfusion … To save him from eating anything else I've been taking our dogs into our in-laws place in town during the day so that puppy isn't at home by himself … [S7, 23w]

> [P18] … we had to correct a hernia asap. At the same time she had to have 4 teeth pulled. The stress of managing her playing with our other dog has been huge! She thinks she's fine but of course I have to keep her quiet for 10 days. [S6, 21w]

Most Helpful

Theme: Training and Socialization. Participants reported training and socialization as helpful in raising their puppy. This included formal puppy classes, as well as less formal at-home training and socialization. Most (17 /19) participants reported attending formal training classes, 14 of these listed those classes under "most helpful" at least once in their surveys. Some participants listed "training" as helpful in multiple surveys.

Theme: It Takes a Village. Having access to a good support network was important. Support from the household, as well as having access to reliable puppy sitters, decreased the demand of time and energy from the guardian and the associated feelings of guilt. Access to knowledge and guidance, from either unpaid or paid sources, was also highly appreciated. This support from others is both physical and emotional in nature:

> [P7] Having a partner to be able to take turns in walks, feeding and play times around work, it would be harder to do it all by myself because of my shift working times. [S8, 26w]

> [P15] Having [my partner] to keep me "collected" when [the puppy] biting drives me crazy! [S1, 12w]

> [P16] [Dog training center] has been so helpful with force free training and not shaming us for not always getting it right but teaching new ways instead. Our vet has been amazing and very helpful, again not shaming us for not always knowing what the right thing is for [puppy]. I feel like we have a supportive team to help us and that makes all the difference. [S3, 17w]

Support was not only offered by other humans. Existing dogs in the household were also perceived as helpful by our participants in their puppy-raising duties via contributions to the puppy's training, company, or providing the puppy entertainment and allowing the participant "time off" from puppy duties:

> [P12] Our other dog … has been sleeping in the same room with him … and I think that seems to help keep him calm for longer. Also, [current dog] has been the biggest help when it comes to playing with [puppy] and wearing him out … and I swear she knows when my partner and I are tired or busy and she keeps [puppy] entertained. She's been teaching him mostly good habits too. [S1, 11w]

Theme: Material or Physical Assets. Participants reported finding extra time to spend with their puppy an invaluable resource. This took the form of extra days off work (either organized by the participant, fortuitous public holidays, or as a bonus to COVID-19 lockdowns) and allowed participants to spend extra time training and bonding, decreased the need for puppysitters, and even increased participants' capacity due to decreased demand on them:

> [P1] … having more days off so we can spend quality time together. [S3, 15w]

> [P16] Lockdown, having extra time at home together, being less stressed or tired from work meant that we had more patience and tolerance to stick to training and routines. [S7, 25w]

Some participants kept their puppy's movements limited to the household until they were fully vaccinated. For these participants, the freedom to take their puppy outdoors was a relief, both to allow for extra exercise, as well as to gain a chance to continue socialization:

> [P12] We've increased the outings he has since he's now fully vaccinated. This has really helped settle him down and [we can] get him used to different situations. [S4, 17w]

Finally, participants found the use of physical resources, such as equipment and treats, helpful in raising their puppy. Containment equipment appeared to make management and supervision of their puppy easier.

> [P4] His playpen to give him respite from the older dog and to give me respite when they start playing [chasey] at 1am. [S1, 11w]

Having treats and toys to occupy the puppy, both within and outside containment areas, were helpful for our participants when managing behavior:

> [P19] Toys/equipment that distract her and give her time to settle in her pen. [S8, 26w]

Theme: Realistic Expectations. Participants listed their own expectations and attitudes as helpful in navigating puppy raising. Participants seemed aware challenges were

inevitable, sometimes even recognizing feelings of being overwhelmed, and actively chose not to allow negative feelings.

> [P2] Patience and just being in the moment, not expecting perfection straight away and reminding myself she's still so young. [S2, 15w]

> [P15] Patience and love, he is a puppy and he loves to bite so a few deep breathes when he doesn't listen (because he is a puppy). The best thing I can do is take a deep breath and keep going, getting angry or frustrated won't help anyone. [S6, 22w]

> [P6] Toughen up and try to remember that the puppy stage will pass. [S6, 22w]

Once again, comparison with other experiences (their own, or other people's) proved helpful for some of our participants to put their own experience into perspective. Of course, this may have the opposite effect in some cases, but participants in this study found comparisons favorable when compared with other puppies:

> [P10] Remembering [current dog] used to be exactly the same, and the puppy will grow out of it … [S5, 21w]

> [P2] Hearing other people comment how good she is and say how their new puppy is much harder [S4, 19w]. Always hearing how much harder it is for someone else, [our puppy] seems like a dream dog. [S6, 23w]

Anything Else You'd Like to Share With Us?

For this section, participants were encouraged to leave any comment regarding their puppy-raising experience during the last fortnight that they felt worth sharing. Some participants took this opportunity to tell us how they felt about their puppy and the puppy-raising experience in general. Most comments on the overall experience were positive, none suggested any of our participants regretted or were considering relinquishing their puppy, even those who mentioned challenges in their comments. Most felt their puppy, despite the added responsibilities, brought more positives than negatives to their lives. First-time dog guardians found the depth of positives and emotions surprising:

> [P7] I have been absolutely loving having a dog. Now I'm officially a "dog mum" and wouldn't change it for the world. I now fully understand how amazing it is to have a dog as a companion, they are wonderful, and I feel so privileged. [S8, 26w]

> [P15] I have reached the level of dog obsession where I started an Instagram account for [puppy] … [S4, 18w]

Successful integration into the family also brought benefits to the puppy, with their needs becoming a priority for the household, even compelling participants to contemplate large lifestyle changes to accommodate:

> [P15] He has the best personality, he just makes me so happy seeing him, I think the biggest shock was the separation anxiety that I didn't see coming. Not saying it's bad or clinically diagnosed, I just miss him SO MUCH when I am at work. I am also looking for another job with a better work life balance because, at the moment, I just don't get much time with him during the week, and it is up to my partner to do a lot of the hard work during the week. [S7, 24w]

Quantitative Data

When asked if puppy raising was enjoyable, participants overwhelmingly answered positively (Figure 2). Several participants consistently rated their enjoyment levels between 95 and 100, and one participant reported 100 for the entirety of the study. The most common challenge reported by the participant who reported the lowest enjoyment rates (appearing in six out of their eight check-in surveys) was finding puppy sitters to allow the participant to pursue normal activities such as work and social outings. This challenge, however, was not unique to this participant, with two other participants also struggling with leaving their puppy alone on more than one check in.

When asked if caring for their puppy sometimes took more time and energy than they had to give, participant answers varied greatly, both from participant to participant and from week to week. No clear pattern was determined between what was likely to increase or decrease a participant's answer to this question when compared with the qualitative data from each survey (see Figure 3).

Most participants answered that they did not have strong feelings of regret toward their puppy; 11 reported no level of regret in at least one survey during their puppy-raising experience, five of which did so consistently each fortnight (Figure 4). The participant who reported the lowest enjoyment reported a higher level of regret than most other participants. The participant who reported the highest level of regret (75/100), stated in that survey their challenge was: "Not destroying things! He is at that very active stage, and I have to make sure he has enough to keep appropriately occupied. Demand and alert barking – both are increasing." This participant's high rating corresponded with the participants personal lowest ranking of enjoyment and highest personal rating for "takes more time and energy than I have to give."

Discussion

This study provides insight into the lived experience of guardians raising puppies for companion purposes in Australia. Our analysis found that participants enjoyed building relationships with their puppies and experiencing eudaimonic happiness, while finding training and behavior and "being a good guardian" the biggest challenges when raising a puppy. Training, socialization, having enough physical and emotional support, access to resources, and an appropriate perspective on puppy raising helped mitigate those challenges and increase the opportunity for enjoyment.

Most Enjoyable: From Strangers to Family

Participants consistently reported enjoying building a relationship with their puppy – shared activities, getting to know each other, increasing positive emotions, and feeling a mutual connection with their pup featured strongly. The theme of "From strangers to family" documents this journey of attachment creation between guardian and puppy. One participant specifically named themselves and their partner as "mum and dad" and reported that their puppy also recognized this unique relationship. The power of this relationship is particularly evident with a participant who reported wanting to

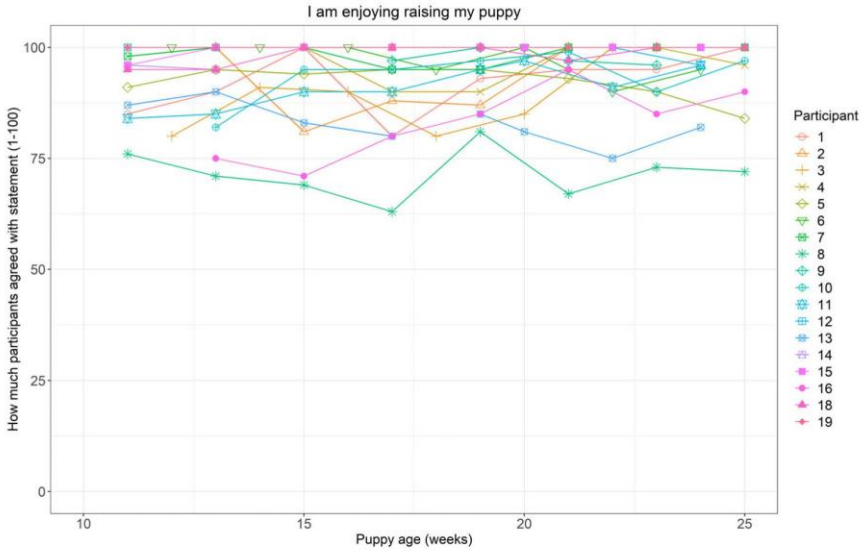

Figure 2. Answers to "I am enjoying raising my puppy" (scale 1–100, where 1 is "not enjoyable at all" and 100 is "pure enjoyment") during the puppy-raising experience of 18 Australian puppy-guardian participants every two weeks between 3 weeks after puppy acquisition and their puppy turning 6 months of age. Collected between February and September 2021.

change jobs to spend more time with her puppy. Dogs are commonly acquired for companionship purposes (Jagoe & Serpell, 1996) but this shift from pet to family has been taking place (Shir-Vertesh, 2012). Australians tend to consider dogs as members of the family (Franklin, 2006), so it was unsurprising that the feeling of puppy/guardian connection was strong within our cohort.

As part of building their attachment to their puppies, participants reported their puppies positively affected their overall happiness and mental health. Our findings support previous studies that suggest companion animals can increase human wellness by mitigating stress, depression, and anxiety, as well as increasing overall quality of life and physical health (Barker & Wolen, 2008; Brooks et al., 2018; Hughes et al., 2020; Schöberl et al., 2012; Westgarth et al., 2019). Training and other types of interactions may also temporarily reduce anxiety and increase positive emotions (Binfet, 2017; Crossman et al., 2015; Janssens et al., 2020). This may account for why training was one of the most consistently reported helpful factors for our participants. Attachment may also have benefits to the companion animal, including the level of care they will be provided by their guardian (Shore et al., 2005). However, the literature on benefits of animal companionship overall is inconclusive. A systematic review of handler–assistance dog dyads found that in approximately one-third of cases (30%) the presence of the dog did improve some aspect of psychosocial wellbeing; however, in over two-thirds of cases (68%), there was no association, and in 2% of cases there was a negative impact (Rodriguez et al., 2020). Given that assistance dogs are less likely to show undesirable behaviors and are trained

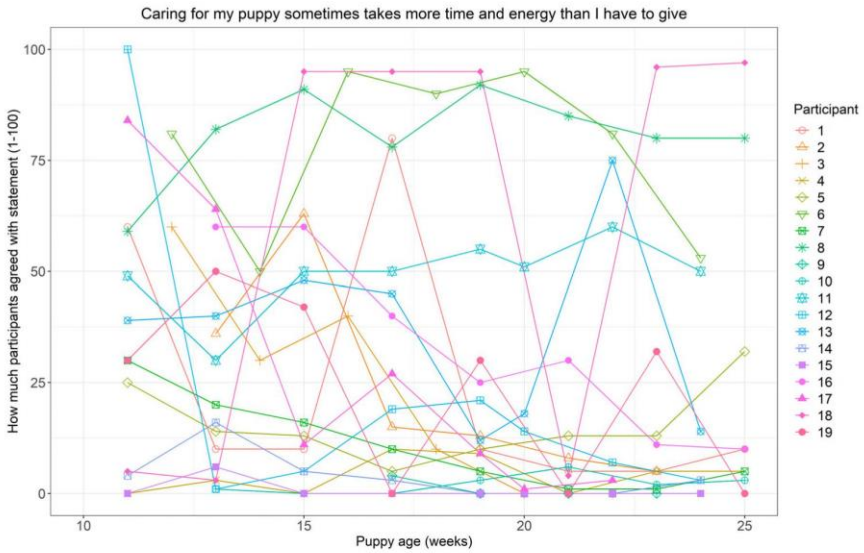

Figure 3. Answers to "Caring for my puppy sometimes takes more time and energy than I have to give" (scale: 1–100, where 1 is "I don't agree at all" and 100 is "I strongly agree") during the puppy-raising experience of 19 Australian puppy-guardian participants every two weeks between 3 weeks after puppy acquisition and their puppy turning 6 months of age. Collected between February and September 2021.

specifically to benefit their handlers, the percentage of benefit for your average companion animal guardian may be even lower. As "puppy blues" have also been described (Furtado et al., in press), increased wellness is not universally guaranteed. Still, some participants in our cohort reported noticing an increase in overall happiness and their puppy providing comfort or relief from external stressful events.

Most Helpful: Training and Socialization

Of our participants who attended formal training classes, the majority reported them as helpful. But whether formal or at-home, training appeared to have multi-faceted benefits contributing to our participants' experience. Training provides opportunity for shared activity and eudaimonic happiness, which previous studies suggest may increase a guardian's self-efficacy and attachment and increases a guardian's positive state. Bandura and Wessels (1994) define self-efficacy as a person's "belief about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives." An individual with a strong sense of self-efficacy has greater confidence in overcoming challenges, the will to commit to overcoming them, and feels personal control over situations, even when faced with difficulty. Individuals with low levels of self-efficacy are more likely to avoid or give up on challenges and often dwell on their own deficiencies and potential negative outcomes (Bandura & Wessels, 1994).

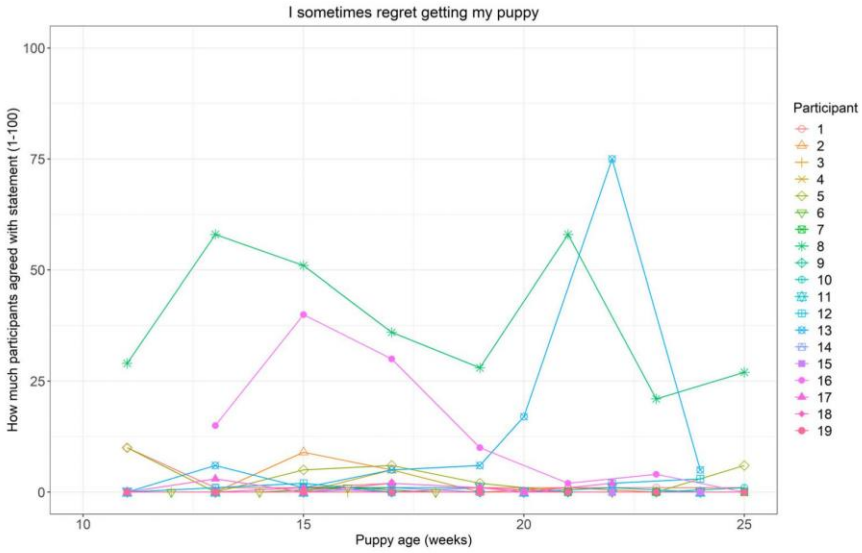

Figure 4. Answers to "I sometimes regret getting my puppy" (scale: 1–100, where 1 is "I don't agree at all" and 100 is "I strongly agree") during the puppy-raising experience of 19 Australian puppy-guardian participants every two weeks between 3 weeks after puppy acquisition and their puppy turning 6 months of age. Collected between February and September 2021.

Napier et al. (2022) looked at the effects of a single online-guided training session, finding that training interactions helped increase guardians' general self-efficacy scores. They suggest this was due to participants reaching set goals and seeing their dog act in a well-behaved way – both of which increase the sense of accomplishment, in line with Bandura (1977)'s framework. Our findings are consistent with this, with guardians feeling accomplishment in having not only attained personal goals relating to changes in their puppy but also seeing their puppy learn and grow up in an acceptable manner. Adding to this, most of our participants appeared to use positive reinforcement when training their puppies, which may contribute to a secure attachment relationship between the puppy and guardian (Vieira de Castro et al., 2019).

It was outside the scope of this study to explore what elements within training were most helpful, and since puppy class curriculum and policies can vary widely within the industry, it is difficult to draw further conclusions on puppy classes specifically without additional research (Howell et al., 2015). It is possible that as most studies of puppy classes focus on the effects on the puppy and not the guardian (González-Martínez et al., 2019; Kutsumi et al., 2013; Seksel et al., 1999), potential benefits to the guardian have been overlooked.

Most Challenging: Training and Behavior

Chewing, biting, and toilet training were some of the most reported challenges – often spanning several time points for the same puppy. Chewing is a normal behavior for puppies that can be attributed to either teething, natural investigative, and/or object

play behavior (Landsberg et al., 2013). This behavior appears to naturally decline as the puppy grows, although chewing is commonly seen up to one year of age, so it's occurrence in our study is unsurprising (Arhant et al., 2021). While biting (also commonly described as "mouthing") in puppies can be part of learning bite inhibition (limiting strength and force of bite) with littermates, however, it is not uncommon for guardians to have to continue the lesson themselves (Landsberg et al., 2013).

While chewing was the most common challenge between participants, the incidents of reported toilet-training challenges were greater overall, suggesting that some puppies may take longer to toilet train than others.

Most Helpful: It Takes a Village

Our findings suggest the saying "it takes a village to raise a child" may be generalized to raising pets. Participants leaned on and received support from their friends and family (within and outside the household), as well as from professionals. This is one of many areas in puppy raising which show clear parallels with child raising (Goncalves Costa et al., 2023). Both the size and the type of social network available to parents can influence a range of factors, including level of parental involvement with the child (Sheldon, 2002). A qualitative study on new mothers reported experiences similar to the ones found within our puppy-guardian cohort; reporting a decrease in stress and negative states with increased help and sharing of child-raising responsibilities with others (Barclay et al., 1997). Social support is a mediating factor influencing a woman's experience of new motherhood, which can be attained from partners, family, friends, other parents as well as professionals (Barclay et al., 1997). The fact many of our participants listed their close social circle as a major physical and emotional help may be an indicator that social persuasion (verbal support from others) may also be a factor.

However, social networks are not always positive. Some studies report that midwives can decrease women's self-confidence (Barclay et al., 1997). These findings remind us of our cohort, where one participant was clear that the type of support most appreciated was one that allowed them to learn and receive support in an environment without shame. Having received the same information, delivered inappropriately or without care, could have decreased the participants' confidence, while a safe, open environment allowed for a better positive state. Puppy classes may also be a factor contributing to the social network, helping guardians develop puppy-raising skills, find appropriate social networks, and increase confidence levels similar to parent groups (Hanna et al., 2002). It is important to note that companion animals themselves may be a factor in increasing social networks and providing social capital (Gómez et al., 2018; Graham & Glover, 2014; Westgarth et al., 2017; Wood et al., 2005).

Most Helpful: Managing Expectations

Our participants reported realistic expectations as a benefit in their puppy-raising journey, helping them navigate challenges and any subsequent negative emotions as they arose. This finding supports previous studies on the effect of dog guardianship and expectations (Bouma et al., 2020; New et al., 2000; O'Connor et al., 2016; Powell et al., 2022). Powell et al.

(2022) reported that shelter dogs were more likely to be returned if adopters held overall higher expectations prior to adoption. Furthermore, they theorized that high (and unrealistic) expectations may have detrimental effects on the development of the human–canine bond, while also creating less tolerance for undesirable behavior. Considering the current literature and the results from our study, realistic expectations may provide a degree of protection against stress in puppy guardians.

Participants reported using past experiences to remind themselves that they had either survived puppy parenthood before (and therefore had the skills to do so again) or had used the experience of others to anchor their own current experience. These may be indicative of elements of self-efficacy (Bandura & Wessels, 1994); however, our study was unable to confirm if this was the case.

Quantitative Results: Time, Energy, Enjoyment, and Regret

Shir-Vertesh (2012) offers the idea that dogs may be considered "flexible persons" by their guardians, and their incorporation into the family is contingent. The label "family member," and the benefits that label offers, can be modified or stripped depending on obstacles (Shir-Vertesh, 2012). Furtado et al. (in press) report some guardians consider, or do, relinquish their puppies due to being overwhelmed by the challenges of puppy raising. What drives this phenomenon, or its level of prevalence, is not yet understood. The reported "time and energy a puppy required" from our participants varied greatly. The majority of participants consistently reported low levels of regret toward getting their puppy and high levels of enjoyment in raising their puppy, and the lowest levels of enjoyment appeared to correspond with the highest rates of regret. Even the participants who reported higher levels of feelings of regret made no comments, indicating that the regret was leading to thoughts of relinquishment; however, while important that this information did not appear in our data, there are many reasons why it may not have. Most notable of which is that we did not explicitly ask. Furthermore, the participants who were committed enough to being interviewed and completing surveys for this study over many months may be a unique subset within the wider population of guardians. Hence, alternative responses may be identified in other groups.

Time was an important resource for our participants. Many reported the benefits of flexibility in time and the gift of added time (e.g., days off from work or others offering their time, such as puppy sitting). Time is required to supervise, provide care for, bond with, and train a puppy. Animal Medicines Australia (2019) reported 21% of guardians spend more than six hours a day with their dog. However, we do not know how this time was split between passive (being in the presence of the dog) and active (walking/playing/training the dog). That said, it may be that puppies require more active supervision compared with older dogs, allowing less time for multi-tasking and therefore creating a bigger time burden on guardians, though no studies currently exist to confirm.

Putting the Findings Together

Possibly the most important conclusion from this study is that the themes in this study are not isolated: each appears to have a degree of effect on the others. Training, for example,

likely has several effects within the puppy–guardian experience (e.g., help decrease unwanted behaviors, increase shared activities, increase opportunities for eudaimonic happiness, increase sense of support – particularly when professionals such as trainers are involved). This clear connectiveness of factors found in this study highlights the potential benefit of using ecological models in future studies, such as the Bronfenbrenner bioecological framework of human development (Goncalves Costa et al., 2023). This ecological framework may provide a useful framework for analyzing these effects as it accounts for complex, intertwined factors influencing and being influenced by other factors within environments such as the ones found in this study.

Limitations and Future Research

Owing to the nature of the wider study these results were taken from, the experience encountered by participants in the first 3 weeks of puppyhood (and the early adjustment to puppy parenthood) was not captured in this paper. It is possible however, that these experiences differ from those later in the puppy-raising experience as it represents the initial adjustment phase for both puppy and guardian. This could explain the lack of some expected challenges, such as guardian sleep disturbance, as seen in other puppy studies (Chur-Hansen et al., 2015; Taylor & Mills, 2007). Future research analyzing this stage of puppy parenthood may uncover new or unique challenges/positives that only occur during a puppy's early transition to a new home.

All participants in this study identified themselves as female and therefore these findings likely reflect a more female experience. Having an all-female cohort was unsurprising, as female-dominated participant groups are common in companion animal studies (Cowling et al., 2020; Plueckhahn et al., 2023; Qian Lau & Oliva, 2023; Reese et al., 2022). However, future studies may consider addressing recruitment strategies to attract a wider range of genders. It is important to note however, that qualitative studies are not designed to be generalized to the wider population or be representative of a population, but rather present an insight into an individual's experience. It is possible, however, that male participants would have reported different experiences; further studies are recommended.

Our chosen medium itself also presented limitations. Surveys, as static mediums, do not allow for further probing or exploration of ideas presented by participants. As discussed earlier, the wider study in which this survey sat also placed limitations on participant numbers.

Exploration of variations among breeds was not within the scope of this study. Studies with larger cohorts, which allow analysis to incorporate breed (and therefore account for differing development schedules), may present additional insights.

Individual levels of self-efficacy were not measured in this study, but many of the comments collected suggest many participants have high levels. A cohort with lower levels of self-efficacy may have produced different data, or indeed, outcomes closer to Furtado et al.'s (in press).

This study also took place during the COVID-19 pandemic; therefore, the restrictive public health measures and potential psychological effects of such an event likely affected participants. South Australia, which was home to the majority of participants,

only experienced a single 7-day lockdown in 2021 (starting on July 20), potentially reducing the effect on collected data. However, varying degrees of restrictions were in place for the entirety of 2021.

Conclusion

This study provides insight into the lived experience of a guardian raising a puppy in Australia. Results may help trainers, vets, shelters, breeders, and guardians understand the complexities of puppy raising as well as the importance of factors such as the multifaceted benefits of training, social networks, and attachment creation, amongst others. Crucially, this study highlights the interconnectedness and complexity of factors relating to positive and negative experiences in raising puppies, and this complexity needs to be taken into consideration in future studies.

Disclosure Statement

No potential conflict of interest was reported by the authors.

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Chapter 5

When things get ruff: Investigating factors associated with stress in guardians of puppies and dogs under 12 months of age.

Context statement

Chapter 5 aims to build on the findings of Chapter 4 and further explore Aim 2 through measuring the stress associated with puppy guardian challenges. To assess stress levels, a modified validated scale, commonly used to assess stress of those in parental roles, was used to measure stress levels in puppy guardians. Drawing from Chapter 4 and existing parental stress research, factors associated with higher or lower levels of stress were explored including the social support, guardian personality, self-esteem, and puppy personality. Notably, guardians who were satisfied with their puppy's behaviour, lived in Australia, scored higher in self-esteem, were happy with the division of puppy responsibilities in their household and were raising puppies scoring higher in trainability were all associated with lower stress scores. In contrast, first-time puppy guardians, guardians who worked from home some or all of the time, guardians raising puppies scoring higher in extraversion or neuroticism, and guardians who agreed that managing more than one dog in the household took up a lot of their time and energy, were all associated with higher stress scores. Furthermore, almost 20% of respondents reported considering rehoming or returning their puppy at some point during their puppy raising journey. This Chapter constitutes a valuable addition to the literature concerning stress amongst puppy guardians, introducing a valuable tool for researchers interested in investigating guardian stress and puppy development.

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i. the candidate's stated contribution to the publication is accurate (as detailed above);

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Abstract

Similar to parenting, raising a puppy can be stressful for guardians; however, this aspect of the guardian experience has received limited research attention. This study sought to fill the gap in understanding the stress experienced by puppy guardians and shed light on the factors influencing stress levels. An online survey was developed for guardians of dogs under 12 months of age and made available worldwide. A validated instrument (the Parental Stress Scale) was modified to suit 'parenting' of dogs and used to measure guardian stress levels. Data from 783 valid responses were received. For the model, we fitted a linear regression with a modified Parental Stress Scale as the single outcome variable. A full linear model was fitted with predictors with a p-value of 0.2 or less and a backwards stepwise selection process was used to find the ideal model, using AIC as the heuristic. Guardians who were satisfied with their puppy's behaviour, lived in Australia (compared to those living in USA and Canada), scored higher in self-esteem, were happy with the division of puppy responsibilities in their household and were raising puppies scoring higher in trainability were all associated with lower Parental stress scale scores. In contrast, first-time puppy guardians, guardians who worked from home some or all of the time, guardians raising puppies scoring higher in extraversion or neuroticism, and guardians who agreed that managing more than one dog in the household took up a lot of their time and energy, were all associated with higher Parental stress scale scores. Although not initially developed for puppy guardians, the modified Parental Stress Scale shows potential as a valid measure for future use in this population.

1.1 Introduction

Globally, dogs are widely regarded as one of our most popular companion animals (American Veterinary Medical Association, 2020; Animal Medicines Australia, 2021). In Western societies, dogs are increasingly being integrated, emotionally and physically, into the human family (Blouin, 2013; Carr & Cohen, 2009; Franklin, 2006, Volsche, 2019), with many households

preferring to raise their canine companion from a young age (King et al., 2009). Although the experience of acquisition and rearing of a puppy is a common occurrence within households, little work has been done to understand the overall experience of puppy guardianship (Goncalves Costa et al., 2023a).

1.2 Benefits and burdens of dog companionship

The advantages of dog companionship have been popularized in mainstream media, in particular extolling the positive impact of dog companionship on human health. These benefits include physical companionship (Black, 2012; Kretzler et al., 2022; Oliva & Johnston, 2021), increased opportunities for exercise (Cangelosi & Sorrell, 2010; Westgarth et al., 2014), and general improved measures of health (Headey et al., 2008; Kramer et al., 2019; McConnell et al., 2011). Although these benefits are likely overstated (Carr et al., 2020; Gilbey & Tani, 2015; Kramer et al., 2019; Utz, 2014) they commonly influence an individual's decision to bring a dog into the household (Holland et al., 2022).

The darker side of dog guardianship is a far less popular topic in mainstream media, and while the burdens of guardianship are less likely to be discussed, they are real. The existence of animal shelters and rehoming programs serve as partial evidence of potential burden outcomes. Coe et al. (2014) explored 115 primary-research articles in a scoping review reporting most common reasons for relinquishment included aggressive behaviours and rental or housing issues – confirming that burden can be directly due to the animal (such as the challenge of undesirable behaviours) or indirectly linked to the animal (the ability to find appropriate housing with the added barriers of animal guardianship). Financial burden can also be a factor within animal companion care (Coe et al., 2008) and there is evidence that guardianship may cause relationship strain for co-guardians and others within the household (Goncalves Costa et al., 2023b).

The majority of current literature investigating challenges of guardianship focus on adult dogs, or do not take dog age into consideration, such as Applebaum et al. (2020) who investigates guardian stressors caring for their pets during the COVID-19 pandemic, and Meier and Maurer (2022) who look at guardian stressors in older adults. While both of these studies provide valuable insight into the broader topic of guardian stress, none differentiate between puppies and adult dogs, therefore our knowledge of the burdens of puppy raising – especially in those first 6 months where guardians must deal with a number of developmental stages – represents a significant gap in the literature. While puppies are commonly perceived as cute and enjoyable, the task of nurturing them to become well-behaved and socially adept companions is certainly challenging (Chur-Hansen et al., 2015, Furtado et al., 2023; Goncalves Costa et al., 2023a). Furtado et al. (2023) reported puppy guardians experience emotions such as depression, grief, and anxiety in relation to the responsibility of raising their puppy in the "right" way. This phenomenon, colloquially referred to as "puppy blues," encompasses a combination of physical exhaustion and emotional pressure associated with the guardianship of a puppy. While the experience of puppy blues is typically regarded as temporary, lasting until a puppy reaches adulthood, some guardians encountered by Furtado et al. (2023) acknowledged feelings of regret and had considered the possibility of relinquishing their puppy. This suggests that puppy raising stress may be significant enough to be an animal welfare concern influencing outcomes for both guardian and puppy.

Goncalves Costa et al. (2023a) also found puppy guardians frequently expressing agreement with the statement, "caring for my puppy sometimes takes up more time and energy than I have to give." Combining these findings, we can surmise that puppy guardians may commonly find their experience highly stressful, however the factors associated with higher levels of stress are not yet well understood.

1.3. Caregiver stress and outcomes

The factors influencing stress levels in guardians raising puppies for companionship remain largely unexplored with limited existing knowledge and a significant research gap. Therefore, preliminary thoughts and assumptions must draw from the existing human literature and analogous experiences in caregiving roles, with the parenting experience currently offering the closest role resemblance.

Being a parent is recognized as a simultaneously rewarding and detrimental experience (Nomaguchi & Milkie, 2003). But while there will always be some good with the bad, high levels of parental stress negatively impact child outcomes (Barroso et al., 2018; Crnic et al., 2005; Deater-Deckard, 1998). Neece et al. (2012) reported that within early and middle childhood, parental stress had a positive relationship with child behaviour problems, and that parenting stress may be both an antecedent and a consequence of child behaviour. Baker et al. (2003) reported the same detrimental feedback loop, where high parental stress contributed to worsening child behaviour, and worsening child behaviour contributed to worsening parental stress. Tomanik et al. (2004) reported child maladaptive and adaptive behaviour accounted for a significant portion of differences in maternal stress between individuals, indicating that the behaviour of a dependant affects the stress of the caretaker.

Parental stress can have negative impacts on both children and the parents. Parental stress can decrease child-wellbeing in a number of ways, including increasing the risk of parental mistreatment and harsh parenting techniques (Curenton et al., 2009; McQuillan & Bates, 2017). There is also risk of poorer child social-cognitive development and lead to difficulties in regulation of emotions, behaviours and interactions between child and parent (Guajardo et al., 2009; Winstone et al., 2021). Of course, we also cannot discount the effects on the parent themselves. Winstone et al. (2021) reported that even minor parenting stress has a negative

relationship with levels of parenting satisfaction, as well as contributing to a poorer relationship between parent and child. In human-animal dyads, decreased relationship satisfaction is a risk for animal relinquishment (Kwan & Bain, 2013), and young dogs in particular are over-represented in the relinquished population in shelters (Diesel et al., 2010; New et al., 2000). High parental stress also increases risk of depression in the stressed parent (Deater-Deckard, 1998), marital conflict (Lavee et al., 1996), and the risk of less effective parenting (Crnic & Ross, 2017). A gender gap also exists in parental stress with women generally presenting with higher rates of parental stress than men (Oyarzún-Farías et al., 2021). Speculated to be due to a gender imbalance in the share of domestic labour within households (Schulz, 2021).

There are several known factors that can either contribute to, or mitigate, parental stress. Saisto et al. (2008) published a longitudinal study on the predictors of parental stress in mothers and fathers of toddlers, reported that parental stress can be predicted by a multitude of factors, including temperament of the child, the parents' self-esteem and personality, as well as their access to social support. The power of social support has been well documented, Park and Lee (2022) reported social support mitigating stress and depression in mothers, emphasising the importance of social support as a critical resource that may prevent some negative effects of parental stress. This emphasis on the importance of social support is echoed by a number of studies (Emam et al., 2021; Gelfand et al., 1992; Koeske & Koeske, 1990; Saisto et al., 2008). Although the exact mechanisms are still being researched, social support may help increase both parental resilience, and the overall quality of life of parents (Savari et al., 2021). Mai et al. (2020) published similar findings for puppy raising volunteers, reporting that during challenging times, puppy raisers benefited from both different types and different sources of support (including staff, other puppy raisers and family members).

Similarly, parent and child personality can affect perceived parental stress. Mothers who describe their child as 'easy to take care of', not very irritable, nor hard to please, i.e., temperamentally easy children, are more likely to report less parenting stress (Gelfand et al., 1992; Saisto et al., 2008). This isn't unique to mothers, studies have reported paternal stress levels are equally affected by child temperament (Saisto et al., 2008). Unsurprisingly, caretaker personality also influences risk of reported stress, as well as caretaker self-esteem (Koeske & Koeske, 1990; Rantanen et al., 2014). Similarly, Bender et al. (2023) reported in a systematic review that individual personalities of both guardians and dogs impact the negative and positive aspects of guardianship and urges future guardians to consider personality as a priority when making dog acquisition decisions. They also reported that some dog temperament traits were more linked to satisfied guardians than others, in particular energy, affection, intelligence, openness, agreeableness, and responsiveness to training. Mai et al. (2020) also published qualitative research confirming puppy influence an assistance-dog volunteer puppy raisers' overall experience, with more challenging temperaments proving more difficult for volunteers to manage, increasing volunteer stress and burden.

1.4 Exploring stress and puppy 'parenting'

Given the similarities between the experiences of puppy guardians and parents we can start to explore if these parenthood stressors may also apply to the puppy guardians (Goncalves Costa et al., 2023c). The objective of this study was to employ a stress assessment tool normally utilized in the assessment of parental stress and use in puppy guardians to investigate the various factors that may be associated with heightened or reduced levels of stress among puppy guardians to better understand the puppy raising experience. This paper hypothesizes guardian stress levels are associated with guardian and puppy personality traits (in particular, guardian extraversion and neuroticism, and puppy training focus) and that guardian stress levels will have a negative relationship with both guardian self-esteem and perceived social

support. For the purposes of this study, all juvenile dogs under 12 months of age are labelled as ‘puppy’.

2.1 Materials and Methods

This study employed a cross-sectional survey design to collect data from individuals who were over the age of 18 and the current guardian of a dog under 12 months of age. The survey was created using the Survey Monkey® platform and distributed through various social media platforms and forums such as Facebook® and Reddit® between 24th October 2022 and 11th January 2023. The survey was open to participants worldwide.

To optimize questionnaire exposure, the research team targeted puppy and several dog-focused social media groups, as well as appropriate Reddit threads, such as r/puppies101. Additionally, a small advertisement campaign, costing less than $100 (AUD), was implemented on Reddit® to target individuals on puppy-related threads.

This study was approved by the Human Ethics Committee of the University of Adelaide. Our ethics approval number is H-2022-189 and informed consent was collected from all participants prior to questionnaire commencement.

2.2 Questionnaire

The questionnaire consisted of a total of 102 questions, divided into sections designed to capture a comprehensive range of information. The sections included guardian demographic details, guardian personality and support, puppy demographic details, and puppy personality. Questions pertaining to satisfaction and puppy-raising experiences were included, such as

guardian evaluation of their level of satisfaction with their puppy and whether they had considered rehoming their puppy at any stage (questionnaire in Supplemental File 1)

2.3 Modified Parental Stress Scale (modPSS)

The Parental Stress Scale is a widely used instrument in research and clinical settings to assess parental stress (Louie et al., 2017). Originally designed as a shorter alternative to the 101-item Parenting Stress Index this validated scale consists of 18 questions investigating dependent behaviours, impact of lifestyle constraints and general feelings about parenting (Berry & Jones, 1995). Respondents are asked to rate each item on a 5-point Likert scale ranging from "strongly disagree" to "strongly agree" and can score between a range of 18 and 90 points inclusive. Higher scores signify higher levels of stress. For the purposes of this study, questions were modified only to place the guardian's puppy as the subject of caregiving, e.g., "I feel close to my child(ren)" was altered to "I feel close to my puppy". Minor modifications such as this to better fit with sample characteristics such as foster, and grandparents are well precedented with this scale although it has not been used previously for non-human guardians (Louie et al., 2017). The modified version used for puppy guardians in this study can be found in our questionnaire provided in Supplemental File 1 and will be referred to within this paper as modPSS.

To further explore factors associated with stress levels in guardians, we incorporated four additional validated and widely used scales (listed below). These scales aimed to assess various aspects, such as personality traits, self-esteem, perceived support, and canine personality, which may be associated with the stress levels experienced by puppy guardians.

2.4 Rosenburg Self-Esteem Scale (RSE)

The RSE was included to assess an individual's level of self-esteem (Rosenberg, 1965). Participants are asked 10 questions and asked to rate their level of agreement on a 4-point Likert scale ranging from "strongly agree" to "strongly disagree". Total score can range from 0 to 30, higher scores indicate higher levels of self-esteem.

2.5 The Big Five Inventory-10 (BFI-10)

The BFI-10 is a brief measure of five broad personality dimensions in people; Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness (Rammstedt & John, 2007). (Gosling et al., 2003). Respondents rate the extent each item describes them on a 5-point Likert scale ranging from "strongly agree" to "strongly disagree" in two items per personality factor and will score between 2 and 10 on each personality dimension. Extraversion reflects an individual's outgoing tendences and socialness, vs. reserved and introspective tendencies; agreeableness measures level of trust and compassion towards others, vs. competitive and independent tendencies; people who score high in conscientiousness are more likely to be organized, self-disciplined, than spontaneous and disorganized; neuroticism measures tendencies to feel anxious or irritability vs. a higher level of emotional resilience, and; openness measures willingness to engage in new ideas and is curious, vs. having a more traditional approach to life.

2.6 Multidimensional Scale of Perceived Social Support (MSPSS)

The MSPSS measures an individual's perception of support received from others around them (Zimet et al., 1988). The MSPSS can be broken into three subscales, measuring support from a significant other, friends, and family separately, or can be used as a total score for total perceived level of social support across a social network as a whole. Participants are asked to

rate their level of agreement with statements ranging from “very strongly disagree” to “very strongly agree” in a 7-point Likert scale. Achievable scores range from 1 to 7, inclusive, higher scores indicate a greater perceived level of social support.

2.7 Monash Canine Personality Questionnaire – Revised

The Monash Canine Personality Questionnaire – Revised scale assess personality traits across five dimensions in dogs (Ley et al., 2009). Respondents are asked to rate how well words describe their dog’s personality in a 6-point Likert scale ranging from “Really does not describe my puppy” to “Really describes my puppy”. Five subscales, representing the five dimentions of personality traits are created by summing the raw scores for each word on each subscale and dividing this number by the maximum score, and should be interpreted as a percentage. The five dimensions are as follows and are all as perceived by the guardian: 1) Amicability is the dog’s ability to tolerate others (both human and animal); 2) extraversion represents the dog’s energy levels; 3) motivation is the dog’s persistence in the face of distractions; 4) neuroticism, how cautiously or nervously the dog is perceived to behave, and 5) training focus is their perceived trainability.

3.1 Data management

Duplicate responses (more than one response from the same IP address) were identified and removed, prioritizing responses based on level of completeness. Those who indicated their non-consent to participate, had a puppy over 12 months of age at time of survey, or puppy’s age could not be confirmed and/or did not complete the modPSS were also removed. Data management was completed in Excel and R version 4.2.2 (The R Foundation, Vienna, Austria).

Some variables were combined into fewer categories to increase group sizes, specifically, the categories for “puppy acquisition” , “Additional dogs in household” (“1 or more”, “None”) , “Children in household” (“Children”, “No children”, “Adults in household” (“1 adult”, “2 or more adults”), “employment status” (“Full-time”, Part-time/Other”), “Working from home” (“Never work from home”, “Work from home some or all of the time”). Further information of these categories are available in Supplemental File 2. For similar reasons, Likert scales, (excluding those within validated scales) were condensed to three levels: Agree (Agree and Strongly agree combined) Neither agree nor disagree, and Disagree (Disagree and Strongly disagree combined). One participant recorded two countries of residence; authors presumed the first listed to be their primary place of residency. Additionally, certain values that were deemed likely to be respondent errors, such as reporting the time the puppy was left alone in an average day as 24 hours, were amended to 'missing' if the rest of the survey appeared genuine.

Unfortunately, we had a low number of non-binary (24) and other gender (3) responses in our data. Due to the limited sample size, these responses were marked as missing for analysis purposes only. This decision was made to ensure the validity and reliability of the statistical analysis while acknowledging the importance of including diverse gender identities in future research.

4.1 Statistical analysis

Data were analyzed by R version 4.2.2 (The R Foundation, Vienna, Austria) to investigate the relationships and interactions between our outcome variable, modPSS and other variables, including demographic characteristics, puppy personality, guardian personality, guardian perceived social support, and self-esteem.

Analysis determined that all three subscales of MSPSS were highly correlated with each other, therefore authors made the decision to use the Total MSPSS score rather than the three subscales. By using the total MSPSS score, analysis could still capture a holistic measure of perceived support, which could be more effectively analysed and interpreted within the context of the study. Guardian neuroticism, extroversion and conscientiousness were highly correlated with self-esteem and were therefore removed. Puppy neuroticism was highly correlated with puppy motivation and amicability, while puppy amicability was also highly correlated with puppy training focus. Therefore, puppy amicability and motivation were removed. Spay/neuter status and guardian age were both removed due to their correlation with puppy age, and guardian experience levels, respectively.

Descriptive statistics were performed on all variables. Distribution of scores on the modPSS were normal, however, no other validated scales appeared to exhibit normal distribution therefore the Spearman's rank correlation test was used to determine the relationship between scores on validated scales, while ANOVA's were used to determine relationships for categorical variables and modPSS scores. A bivariate model was fitted for each of the primary predictors. For each model, we fitted a linear regression with modPSS as the response and the predictor given as the sole predictor. The p-value for the model compared to the null model with only an intercept was measured. All those predictors with a p-value of 0.2 or less were then considered as primary candidates for the final model with the exception of "consideration of rehoming" which was removed from the model due to concerns with reverse causality. A full linear model was fitted with all those predictors and a backwards stepwise selection process was used to find the ideal model, using AIC as the heuristic. The function stepAIC() from the MASS package was used (Venables and Ripley 2002). As the function stepAIC() can only compare models with the same observations, we removed any

survey with missing values for the primary candidate predictors. All model assumptions were checked and appeared reasonable.

5.1 Results

A total of 977 survey responses were collected (over 80% of which originated from Reddit® threads) and 783 valid responses remained for analysis after removing duplicate and incomplete entries. Although 41 countries were represented in the data, over 55% of responses were from either USA or Canada (Table 5.1). The majority of respondents identified as a woman (77.4%), were between 18-34 years of age (59.9%), worked full time (65.4%) and lived in a household with at least one other adult (83.0%). Puppies from many breeds, including pure, cross and designer breed, were represented, and were relatively evenly distributed in both sex (42.3% female vs. 45.7% male, 12.0% unknown) and age group (43.6% were under 6 months of age). Most respondents were satisfied with both their puppy's personality (79.8%) and puppy's behaviour (61.0%), although almost 20% agreed that they had considered returning or rehoming their puppy at some stage of their puppy guardianship.

Table 5.1: Demographic characteristics and experiences of 783 participants worldwide who were over the 18 years of age and the current guardian of a dog under 12 months of age.

		Count (n)	Proportion (%)	Mean modPSS** Score
Guardian gender	Female	606	77.4	44.8
	Male	147	18.8	43.4

		Count (n)	Proportion (%)	Mean modPSS** Score
Guardian age*	18-34	469	59.9	45.6
	35 to 54	264	33.7	44.0
	55+	48	6.1	40.2
Country of residence*	USA	360	46	45.8
	Australia	179	22.9	40.0
	Canada	83	10.6	49.2
	Other	159	20.3	45.3
Employment	Full-time	512	65.4	45.0
	Part-time/other	251	32.1	44.0
Adults in household*	1 adult	132	16.9	46.0
	2 or more	650	83.0	44.4
Children in household*	Children	141	18.0	43.2
	No children	642	82.0	45.0
Level of experience*	Raised a puppy previously	405	51.7	41.8

		Count (n)	Proportion (%)	Mean modPSS** Score
	Lived with but not involved in care	140	17.9	48.9
	No experience	235	30.0	47.2
Additional dogs in household*	1 or more	233	29.8	40.5
	None	550	70.2	46.4
I am happy with the division of responsibility for puppy-raising in my household*	Agree	591	75.5	42.7
	Neither agree nor disagree	99	12.6	48.0
	Disagree	93	11.9	53.6
Managing interactions between my puppy and other dog(s) takes up a lot of time and energy*	Agree	168	21.5	44.6
	Neither agree nor disagree	39	5.0	37.7
	Disagree	75	9.6	37.2
	Not applicable	501	64.0	46.4
	Satisfied	478	61.0	40.2

		Count (n)	Proportion (%)	Mean modPSS** Score
I am very satisfied with my puppy's behaviour*	Neither satisfied nor dissatisfied	0	0.0	50.5
	Dissatisfied	80	10.2	59.7
Working from home	Never work from home	213	27.2	42.2
	Work from home some or all of the time	487	86	45.9
I have considered returning my puppy back to the seller/rehoming them*	Agree	156	19.9	52.3
	Neither agree nor disagree	44	5.6	51.1
	Disagree	466	59.5	40.9

*p-value <0.05

**Modified Parental Stress Scale

Of our respondents 11.9% were unhappy with the division of puppy responsibility within the household (mean modPSS score 53.6), and 21.5% Agreed or Strongly agreed that managing interactions between puppy and other household dogs took up a lot of time and energy (mean modPSS score 44.6) (Table 5.1).

Guardian stress levels as found by modPSS scores showed a normal distribution suggesting it would be an appropriate measure for assessing guardian stress in our sample. The mean modPSS score was 44.7, and median was 44, with a standard deviation of 11.8. Neuroticism had the lowest median score of the MCPQ – R. sitting at 41.8% but had a high standard deviation of 14.4% (Table 5.2).

Table 5.2: Median scores, standard deviation and Cronbach's alpha for each validated scale used for 783 participants worldwide who were over the 18 years of age and the current guardian of a dog under 12 months of age.

Scale (count)	Subscales/Dimensions	*Mdn* (max)	S*D*	Cronbach's Alpha
Parental Stress (783)	-	44 (90)	11.8	0.911
Rosenburg Self-esteem*[1] (719)	-	18 (30)	5.9	0.919
The Big Five Inventory-10 (774)	Extraversion[1]	5 (10)	2.3	0.761
	Agreeableness	7 (10)	1.8	0.348
	Conscientiousness[1]	7 (10)	1.8	0.395
	Openness	7 (10)	1.9	0.331
	Neuroticism[1]	7 (10)	2.3	0.679
	Total [2]	5.5 (7)	1.2	0.906
	Significant Other[2]	6 (7)	1.7	0.971

Scale (count)	Subscales/Dimensions	*Mdn* (max)	*SD*	Cronbach's Alpha
Multidimensional Scale of Perceived Social Support (743)	Family[2]	5.3 (7)	1.6	0.919
	Friends[2]	5.3 (7)	1.3	0.913
Monash Canine Personality Questionnaire – Revised (676)	Extraversion	77.8 (100)	15.3	0.854
	Motivation[3]	66.7 (100)	13.6	0.669
	Training focus[4]	72.2 (100)	13	0.814
	Amicability[3 4]	80 (100)	14.4	0.735
	Neuroticism[3]	41.8 (100)	14.4	0.780

* <15 = "low range", 15-25 = "normal range", and >25 = "high range"

[1] High level of correlation, self-esteem was kept, others removed from multivariate model. [2] High level of correlation, sub-scales removed from multivariate model. [3] High level of correlation, neuroticism kept, others removed from multivariate model. [3] High level of correlation, training focus kept, amicability removed from multivariate model.

5.2 Factors associated with guardian stress:

Our final model determined guardians' satisfaction with puppy behaviour was associated with an average of 12.5-point decrease in modPSS scores (i.e. lower parental stress), while being an Australian resident was associated with a 6.4-point decrease in modPSS on average compared to guardians living in Canada, and a 3.9-point decease on average compared to respondents

living in USA (Table 5.3). Three puppy personality traits made it into the final model: modPSS scores decreased by an average of 0.13 for every point increase in puppy training focus score, and decreased by 0.09 and 0.06 for every point increase for puppy extraversion and neuroticism, respectively. Guardians with experience raising a puppy previously had on average 3.1 points decrease to their modPSS score compared to those who had never raised or lived with a puppy previously. For every point increase in guardian self-esteem average modPSS score declined by 0.22. Guardians who worked from home at least some of the time had on average a higher modPSS score than those who never worked from home. Finally, guardians who agreed that managing interactions between their puppy and other dogs in the household took up a lot of time and energy on average had a 4.5 increase in modPSS scores (Table 5.3). Linear regression found that guardian openness was not significantly associated with modPSS scores, neither was puppy age (analyzed as a continuous variable), nor puppy class attendance. Supporting our analysis, p-values for each bivariate model can be found in Table 5.4, ANOVA predictors for the final model are in Table 5.5, and a Variable Importance Plot was created as a visual illustration of the contribution of each variable's influence on the outcome (modPSS) in the final model (Figure 1).

Table 5.3: Coefficients and 95% confidence intervals for variables in our final model contributing to a puppy guardian's modified Parental Stress Scale score for 783 participants worldwide who were over the 18 years of age and the current guardian of a dog under 12 months of age.

Variable	Subscales/Dimensions	Coefficient	lwr	upr
I am very satisfied with my puppy's behaviour	Satisfied	-12.47	-4.99	-9.95
	Neither satisfied nor dissatisfied	-5.50	-8.12	-2.87

Variable	Subscales/Dimensions	Coefficient	lwr	upr
	Dissatisfied	-	-	-
Country of residence	Australia	-	-	`-
	Canada	6.4	3.91	8.9
	USA	3.92	2.18	5.66
	Other	3.52	1.39	5.65
Puppy training focus score	-	-0.13	-0.18	-0.07
Puppy Extraversion	-	0.09	0.04	0.14
Level of experience	Raised a puppy previously	-	-	-
	Lived with but not involved in care	3.42	1.49	5.53
	No experience	3.10	1.45	4.75
I am happy with the division of responsibility for puppy-raising in my household	Agree	-	-	-
	Neither agree nor disagree	2.03	-0.04	4.11
	Disagree	3.98	1.75	6.21
Rosenburg self-esteem score	-	-0.22	-0.34	-0.09

Variable	Subscales/Dimensions	Coefficient	lwr	upr
Managing interactions between my puppy and other dog(s) takes up a lot of time and energy	Agree	-	-	-
	Neither agree nor disagree	-2.48	-6.94	1.08
	Disagree	-4.46	-7.24	-1.67
	Not applicable	0.14	-1.61	1.88
Puppy neuroticism score	-	0.06	0.02	0.10
Working from home	Never work from home	-	-	-
	Work from home some or all of the time	1.31	-0.20	2.82

Table 5.4: For predictor selection, we fitted a separate bivariate model with PSSS as the outcome and the predictor given in this table. The P-value of the likelihood ratio test of the bivariate model compared to the null model is given. Those predictors with a P-value of less than 0.2 are indicated with an asterisk. These were then used as a starting point in the full model.

	P-value
I am very satisfied with my puppy's behaviour*	2.94×10^{-61}
Puppy training focus score*	1.34×10^{-27}
I am happy with the division of responsibility for puppy-raising in my household*	1.46×10^{-18}
Level of experience*	1.26×10^{-12}

Managing interactions between my puppy and other dog(s) takes up a lot of time and energy*	4.35×10^{-12}
Rosenburg Self-esteem score*	1.19×10^{-11}
Additional dogs in household*	8.35×10^{-11}
Puppy extraversion score*	5.38×10^{-10}
Country of residence*	7.35×10^{-10}
Puppy neuroticism score*	7.70×10^{-6}
Total Multidimensional Scale of Perceived Social Support score *	2.33×10^{-5}
Working from home*	1.07×10^{-4}
Guardian agreeableness score*	3.39×10^{-3}
One-on-one dog training*	1.00×10^{-1}
Children in household*	1.04×10^{-1}
Adults in household*	1.45×10^{-1}
Puppy health*	1.70×10^{-1}
Puppy classes attendance	2.26×10^{-1}
Age of puppy	3.59×10^{-1}
Guardian openness score	3.81×10^{-1}

*Predictors with a p-value of 0.2 or less.

Table 5.5. ANOVA for the predictors in the final model. All of the p-values associated with each predictor are less than 0.05.

	p-value
I am very satisfied with my puppy's behaviour	2.15×10^{-44}
I am happy with the division of responsibility for puppy-raising in my household	1.34×10^{-23}

Country of residence	1.02×10^{-15}
Level of experience	8.91×10^{-11}
Managing interactions between my puppy and other dog(s) takes up a lot of time and energy	7.30×10^{-6}
Rosenburg Self-esteem score	1.83×10^{-5}
Puppy training focus score	3.71×10^{-5}
Working from home	2.87×10^{-3}
Puppy extraversion score	3.25×10^{-3}
Puppy neuroticism score	5.28×10^{-3}

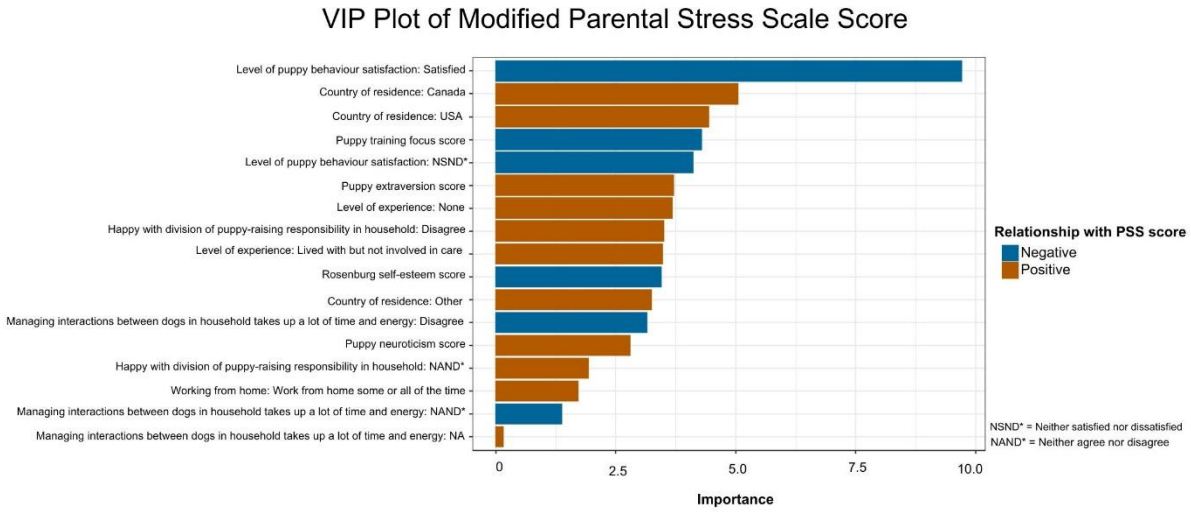

Figure 5.1: Variable Importance in Projection plot for factors associated with a puppy guardian's modified Parental Stress Scale score for 783 participants worldwide who were the current guardians of a dog under 12 months of age. The length of the bar indicates the magnitude of the relationship. Variables are shown on the x-axis. Default levels of variables are as follows: Level of behaviour satisfaction: Dissatisfied, Country of residence: Australia, Level of Experience: Previous experience, Managing interactions between dogs in household takes up a lot of time and energy: Agree, Working from home: Never work from home.

6.1 Discussion

In this study, we explored various factors associated with guardian stress while raising a puppy using the modPSS. At the time of writing, and to the best of the authors' knowledge, no other study has incorporated the use of a validated measure of parental stress to assess guardian stress during puppy raising. Analysis revealed that three variables stood out with the most significant associations: satisfaction with puppy behaviour, country of residence, and puppy trainability (one of the 5 dimensions of personality traits). Additionally, several others were found to be associated with parental stress, emphasizing the multifaceted nature of the factors contributing to modPSS scores. These results support the majority of our hypotheses, with the notable exception of guardian personality traits, some of where unable to be included in analysis due to high levels of correlation with self-esteem (neuroticism, extroversion and conscientiousness), and the remaining of which had no association with modPSS scores (agreeableness and openness).

6.2 Use of Parental Stress Scale in research in puppy guardians

The findings of this study suggest that the inclusion of modPSS as a measure could prove beneficial for future investigations on puppy care and the phenomenon of puppy blues. It is noteworthy that the results obtained from this study exhibited a normal distribution and the relationships among predictor variables appeared to align logically. These observations contribute to the validity and reliability of the study's outcomes; however, further study is required to fully validate assess its use within the puppy guardian population.

The modPSS scores for our puppy guardians were similar to previously reported studies using the Parental Stress Scale for those in parenting roles (Coughlin et al., 2009; Gerard et al., 2006;

Shapiro & Stewart, 2011; Sharry et al., 2005). While such comparisons may be intriguing, interpreting any contrasts between scores of parents and guardians are difficult due to differences in study populations.

6.3 Puppy personality and guardian stress

Extraversion and neuroticism had a positive relationship with modPSS,, while training focus scores had a negative relationship which appear consistent with the limited current literature available. Although not permanent guardians, Mai et al. (2020) reported puppy characteristics (including temperament) as a major factor affecting the experience of volunteer assistance-dog puppy raisers. And although not discussed directly, Chur-Hansen et al. (2015) also includes references to puppy temperaments when discussing volunteer stressors, in particular, volunteers disliked puppies with 'excitable', 'mad', 'boisterous', behaviour – all of which suggest high levels of extraversion. Research by Milla et al. (2022) also suggests that neuroticism in dogs may be strongly associated with unwanted behaviours which may explain the link between that particular personality trait and guardian stress.

It was unsurprising that training focus was one of the most significant factors associated with stress levels in guardians. Undesirable behaviours are a common reason for dissatisfaction with dog guardianship (Goncalves Costa et al., 2023a; Herwijnen et al., 2018; Kwan & Bain, 2013). Goncalves Costa et al. (2023a) also reported guardians listing training as one the most helpful factors when raising puppies as it decreased undesirable behaviours (which were challenges). It stands to reason that if training alleviates undesirable behaviours, then a dog perceived to be more 'trainable' will present an easier and greater opportunity to alleviate behavioural challenges. Supporting this theory, Milla et al. (2022) also reported training focus as negatively associated with unwanted behaviours such as impulsivity and aggression.

Our findings strongly support Bender et al. (2023) and their call for guardians to place greater importance on temperament when whey choose which puppy to acquire, rather than aesthetics, which is often the leading motivator for guardians. Our results suggest that certain temperaments in puppies may lead to greater levels of stress in guardians.

6.4 Puppy behaviour and guardian satisfaction

Puppy behaviour emerging as a significant predictor of modPSS scores was unsurprising. Younger dogs present a wider array of behavioural challenges in comparison to older dogs due to a mix of incomplete training and unavoidable developmental challenges (Asher et al., 2020; Goncalves Costa et al., 2023a; Owczarczak-Garstecka et al., 2023). Our findings reveal an association between dissatisfaction with behaviour and elevated modPSS scores, conferring with previous research demonstrating links between behaviour problems and caregiving burden (Buller & Ballantyne, 2020). However, our study focused on collecting data related to guardians' feelings and experiences, rather than directly tracking, or representing real-time observed puppy behaviours. Therefore, these results indicate that a guardian feeling dissatisfied with their puppy's behaviour is the key indicator in our results, not the puppy's actual behaviour. It is well documented guardians' levels of tolerance for unwanted behaviours in their animal companions can differ widely, therefore asking the guardian their perception of their puppy's behaviour may be more informative than measuring puppy behaviour directly as a risk factor for guardian stress and/or dissatisfaction levels (Chung et al., 2016; Khoshnegah et al., 2011; Tamimi et al., 2013; Yamada et al., 2019). This may be due to the role of expectation (Goncalves Costa et al., 2023a). Inaccurate expectations play a role in the transition into parenthood, mothers with less accurate, and simpler expectations of parenthood may be more likely to struggle adjusting to parenthood (Kach & McGhee, 1982; Pancer et al., 2000). Breeders, trainers and shelter staff may have interests in managing guardian perceptions of

behaviour before and/or after, puppy acquisition, although research on how best to manage guardian expectations, or it's true effect on outcomes, requires further research. Furthermore, investigation is required to ascertain whether particular aspects of puppy behaviours drive satisfaction/dissatisfaction with puppy behaviour as this was unable to be determined by this study.

6.5 Satisfaction with division of responsibility

The division of responsibility within puppy raising encompasses a range of tasks, both daily and intermittent, that are essential for proper care. These tasks can include administrative duties such as coordinating veterinary requirements and legal obligations, as well as day-to-day responsibilities such as feeding, exercise and training, all of which can be time consuming activities. Our results suggest that guardians who are unhappy with the division of responsibility of puppy raising within their household were more likely on average to have higher modPSS scores. While in parenting, women often report higher parental stress compared to men (Nomaguchi & Milkie, 2003), our results did not show gender as a significant factor associated with modPSS in puppy guardians. However, it may be reasonable to assume that the participant completing the questionnaire would be the person with the greatest (or at least equal) responsibility for the puppy. Hence comparison between genders in this study design may be complicated, as these two factors likely go hand in hand.

Holopainen and Hakulinen (2019) reported that mothers experiencing post-birth depression often felt anger, disappointment and despair when they perceived imbalances between their support needs and the support they received from others, including their significant others. Additionally, Robertson et al. (2004) identified social support as a significant factor in

protecting against the development of depression. As already mentioned, our study design may be a limitation here. It is also possible that more female-identifying respondents – which is typical of surveys related to dog care – may actually reflect the gendered nature of dog care, however, future studies comparing within multi-adult households may offer more guidance on would offer more clues into gender and division of labour.

6.6 Country

The country of residence has a strong association with the levels of stress guardians reported. It is plausible that the level of guardian stress, and puppy blues, may vary between nations in the same way variations between countries is observed in parental burnout (Roskam et al., 2021). Roskam et al. (2021) findings suggest that culture, particularly the level of individualism within each culture, plays a significant role and they observed a linear relationship between a country's level of individualism and the prevalence of parental burnout, with the United States of America and Canada grouped in highest rates of parental burnout, globally. Further research is required to explore this further.

Cultural norms, attitudes, and expectations surrounding the human-dog relationship, as well as the associated responsibilities can vary widely between (and within) nations are likely contributing factors to country variation in guardian modPSS scores (Volsche et.al., 2022). It is possible that a parallel of the parental determinism seen in some cultures, as discussed earlier, may exist in puppy raising, and account for some of this disparity. However, cultural requirements of dog guardians and expectations of “responsible guardianship” can vary widely even within a single nation (Westgarth et al., 2019) therefore broad statements at the national level, may not be useful on their own. We also cannot forget cultural variations in the proximity to dogs within the home can influence specific tasks and training requirements for

guardians; for instance, in countries where weather conditions allow dogs to be more commonly kept outdoors, certain responsibilities such as toilet training may be less relevant or necessary.

6.7 Consideration of rehoming

Although we did not include it in our final model, almost 20% of our cohort agreed or strongly agreed with the statement "I have considered returning my puppy back to the seller/rehoming them". This is a considerably higher proportion than was reported by Brand et al. (2022). Although specifically looking for differences between pre-pandemic and pandemic levels of puppy relinquishment, Brand et al. (2022) found 0.9% of puppy guardians considered rehoming their puppies during a non-pandemic year (with a marginal increase to 1.2% for Pandemic Puppies – a statistically insignificant difference). It is possible that our mostly reddit-sourced cohort accounts for the difference between Brand et al. (2022) and our results, as guardians having difficulties with their puppies may be more likely to seek help from online forums creating a self-selection bias. Further research is required.

Of course, it is important to remember that consideration of rehoming is not the same as actual relinquishment and no follow up questions were asked to find out how serious the considerations were, what the main factors were behind the considerations, or to view outcomes of such considerations - these queries were outside the scope of this study. Carroll et al. (2022) investigated the effect of the pandemic on guardian relinquishment, reporting 4.1% of guardians (encompassing dogs and cats of all ages) considered giving up their companion animal but only 0.7% actually relinquished their companion animal reinforcing that not all guardians who consider rehoming do so.

6.8 Stress, guardians and future research

In parenting literature, parental burnout has in part been attributed to the change in our relationship and perceived responsibilities in child rearing (Faircloth, 2014). Modern society has increasingly high expectations of parents resulting in the expectation of "intensive parenting" or "parental determinism", whereby successful outcomes for children are believed to hinge entirely on the competence with which individuals fulfill their parental role. Consequently, parents are experiencing greater stress and sense of responsibility leading to overwhelm and burnout (Faircloth, 2014; Novoa et al., 2022). Whether this shift is mirrored in puppy raising remains unexplored, but the emerging evidence of puppy guardians feeling emotionally burdened by their impact on their puppy suggests it may play a role. Goncalves Costa et al. (2023a) reported one major source of stress for guardians was the worry they had to be a "good guardian", and participants reported feeling "mothers guilt" and self-placed pressure to do a good job of puppy raising. Kogan et al. (2022) surveyed over 500 dog guardians and found guilt related to dog guardianship levels matched those reported by parents of human children in both prevalence and severity. (Furtado et al., 2023) also reported puppy blues primarily being driven by the perception that puppy's outcomes were contingent on being raised "correctly", strongly suggesting an interesting parallel between parental determinism and similar attitudes in puppy raising and offering interesting leads into future research.

7.1 Limitations

We must acknowledge that this study was conducted exclusively with English-speaking participants, predominantly from English-speaking countries. Given the findings from Roskam

et al. (2021) regarding the variation of parental burnout across cultures, it is possible that the results in this paper may only apply to (some) English-speaking nations. Similarly, our data represented a younger cohort and results may differ from older guardian experiences. Furthermore, given our recruitment strategies were highly dependent on online puppy forum/groups, it is possible that our data was collected from a biased or self-selected sample as stressed or struggling guardians may be more likely to visit these pages looking for support. The BFI-10 test yielded Cronbach's alpha values as low as 0.331, revealing internal consistency issues however none of these ended up in the final model.

8.1 Conclusion

In summary, guardians who were satisfied with their puppy's behaviour, lived in Australia, scored higher in self-esteem, were happy with the division of puppy responsibilities in their household and were raising puppies scoring higher in trainability were all associated with lower modPSS scores. While guardians who were first-time puppy guardians, were working from home some or all of the time, guardians reporting managing a multi-dog household as taking up a lot of time and energy, and those raising puppies scoring high in extraversion or neuroticism were all associated with higher modPSS scores. Almost 20% of guardians reported having considered rehoming their puppy at some stage of their guardianship, although further research would be required to better understand the relationship between consideration of rehoming and actual rehoming. This study also presented a preliminary look into the validity of the modPSS in this population and may offer researchers a useful measure to research stress in puppy guardians.

9.1 References

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Supplemental File 1: Questionnaire

1. By ticking 'yes' to the following question you confirm that:

- You are 18 years of age or older; and
- you currently live with, and are the guardian of a puppy (a dog less than 12 months of age); and
- You acquired your puppy for companion purposes only; and
- You have read and understood the information provided above.

(a) Yes, I wish to participate
(b) No, I do not wish to participate

2. How old are you?

(a) Under 18
(b) 18-24
(c) 25-34
(d) 35-44
(e) 45-54
(f) 55-64
(g) 65+

3. Gender: How do you identify?

(a) Woman
(b) Man
(c) Non-binary
(d) Prefer to self-describe _____

4. What country do you currently reside in with your puppy?

5. When was your puppy born?

6. What date (approximately) did you bring your puppy home?

7. What age was your puppy when you brought them home?

(a) less than 7 weeks old
(b) 7-8 weeks old
(c) 8-10 weeks old
(d) 10 -15 weeks old
(e) older than 15 weeks

8. Which of the following categories best describes your employment status?

(a) Full-time work
(b) Part-time work
(c) Casual/seasonal worker
(d) Currently studying
(e) Not currently employed
(f) Retired
(g) Currently not able to work (disability, illness, et.)

9. In the last 7 days, approximately what proportion of your working hours were completed from home?

(a) 0% - I did not work from home
(b) 10%
(c) 20%
(d) 30%
(e) 40%
(f) 50%
(g) 60%
(h) 70%
(i) 80%
(j) 90%
(k) 100% - I worked entirely from home
(l) Not applicable - I did not have work in the last 7 days

10. How many adults (individuals over 18 years of age), including you, live in your household?

(a) 1 - you're the only adult
(b) 2
(c) 3
(d) more than 3

11. How many children (individuals under the age of 18 years of age) live in your household?

(a) 0
(b) 1
(c) 2
(d) 3
(e) more than 3

12. I am happy with the division of responsibility for puppy-raising in my household

(a) Strongly agree
(b) Agree
(c) Neither agree nor disagree
(d) Disagree
(e) Strongly disagree

13. Which of these situations applies most to you?

(a) I have never lived in a household with a puppy before now
(b) I have lived in a household with a puppy (under 12 months of age) before and was involved in their care
(c) I have lived in a household with a puppy (under 12 months of age) before but was NOT involved in their care

14. Number of other dogs (not including your puppy) in the household

(a) No other dogs in the household
(b) 1
(c) 2

(d) More than 2

15. Managing interactions between my puppy and other dog(s) in the household takes up a lot of time and energy.

(a) Strongly agree
(b) Agree
(c) Neither agree nor disagree
(d) Disagree
(e) Strongly disagree
(f) Not applicable - my puppy is the only dog in the household

16. The following statements describe feelings and perceptions about the experience of being a puppy guardian. Think of each of the items in terms of how your relationship with your puppy typically is. Please indicate the degree to which you agree or disagree with the following statements.

(a) I am happy in my role as a puppy guardian
(b) There is little or nothing I wouldn't do for my puppy if it was necessary
(c) Caring for my puppy sometimes takes more time and energy than I have to give
(d) I sometimes worry whether I am doing enough for my puppy
(e) I feel close to my puppy

17. The following statements describe feelings and perceptions about the experience of being a puppy guardian. Think of each of the items in terms of how your relationship with your puppy typically is. Please indicate the degree to which you agree or disagree with the following statements.

(a) I enjoy spending time with my puppy
(b) My puppy is an important source of affection for me
(c) Having a puppy gives me a more certain and optimistic view for the future
(d) The major source of stress in my life is my puppy
(e) Having a puppy leaves little time and flexibility in my life

18. The following statements describe feelings and perceptions about the experience of being a puppy guardian. Think of each of the items in terms of how your relationship with your puppy typically is. Please indicate the degree to which you agree or disagree with the following statements.

(a) Having a puppy has been a financial burden
(b) It is difficult to balance different responsibilities because of my puppy
(c) The behaviour of my puppy is often embarrassing or stressful to me
(d) If I had to do over again, I might decide not to get a puppy
(e) I feel overwhelmed by the responsibility of being a puppy guardian

19. The following statements describe feelings and perceptions about the experience of

being a puppy guardian. Think of each of the items in terms of how your relationship with your puppy typically is. Please indicate the degree to which you agree or disagree with the following statements.

(a) Having my puppy has meant having too few choices and too little control over my life
(b) I am satisfied as a puppy guardian
(c) I find my puppy enjoyable

How well do the following statements describe your personality?

20. I see myself as someone who…

(a) ...is reserved
(b) ...is generally trusting
(c) ...tends to be lazy
(d) ...is relaxed, handles stress well
(e) ...has few artistic interests

21. I see myself as someone who...

(f) ...is outgoing, sociable
(g) ...tends to find fault with others
(h) ...does a thorough job
(i) ...gets nervous easily
(j) ...has an active imagination

We are interested in how you feel about the following statements.

22. Read each statement carefully. Indicate how you feel about each statement.

(a) There is a special person who is around when I am in need.
(b) There is a special person with whom I can share my joy and sorrows.
(c) My family really tries to help me.
(d) I get the emotional help and support I need from my family.
(e) I have a special person who is a real source of comfort to me.

23. Read each statement carefully. Indicate how you feel about each statement.

(a) My friends really try to help me.
(b) I can count on my friends when things go wrong.
(c) I can talk about my problems with my family.
(d) I have friends with whom I can share my joys and sorrows.
(e) There is a special person in my life who cares about my feelings.
(f) My family is willing to help me make decisions.
(g) I can talk about my problems with my friends.

24. Below is a list of statements dealing with your general feelings about yourself. Please indicate how strongly you agree or disagree with each statement.

(a) On the whole, I am satisfied with myself.
(b) At times I think I am no good at all.

(c) I feel that I have a number of good qualities.
(d) I am able to do things as well as most other people.
(e) I feel I do not have much to be proud of.

25. Below is a list of statements dealing with your general feelings about yourself. Please indicate how strongly you agree or disagree with each statement.

(a) I certainly feel useless at times.
(b) I feel that I'm a person of worth, at least on an equal plane with others.
(c) I wish I could have more respect for myself.
(d) All in all, I am inclined to feel that I am a failure.
(e) I take a positive attitude toward myself.

26. What breed is your puppy?

27. What sex is your puppy?

(a) Male
(b) Female

28. Is your puppy currently neutered/desexed?

(a) Yes
(b) No
(c) I don't know
(d) Other (please specify)

29. Where did you acquire your puppy?

(a) Breeder
(b) Animal shelter or rescue center
(c) Bred them myself
(d) Gift
(e) Found stray
(f) Pet store
(g) Family, friend, or neighbour
(h) Other (please specify)_____

30. In a typical weekday, how many **hours** does your puppy spend alone? (without human companionship)?

31. Have you, or do you plan to, attend puppy class with your puppy?

(a) Yes - I plan to
(b) Yes - have already attended/started attending
(c) No
(d) I am undecided
(e) I don't remember

32. Excluding puppy classes, have you attended any other training with your puppy? Choose all that apply.

(a) Dog classes

(b) One-on-one instructor
(c) Dog sports (scent work, agility, etc.)
(d) Other (please specify)_____

33. Is your puppy currently suffering from any significant health problems?

(a) Yes
(b) No

34. If your puppy is currently suffering from any significant health problem, please briefly describe the issue.

35. I am very satisfied with my puppy's behaviour

(a) Very satisfied
(b) Satisfied
(c) Neither satisfied nor dissatisfied
(d) Dissatisfied
(e) Very dissatisfied

36. I am very satisfied with my puppy's personality

(a) Very satisfied
(b) Satisfied
(c) Neither satisfied nor dissatisfied
(d) Dissatisfied
(e) Very dissatisfied

37. Please rate how well each word describes your dog's personality by marking the appropriate number (1 = really does not describe my dog, 6 = really describes my dog). Consider how your dog behaves overall. For example, if your dog is friendly to most people, some dogs but not others, you may rate them as a 3 or 4. A dog that is friendly to every person and every dog they meet would be a 5 or a 6 on the scale.

(a) friendly
(b) persevering
(c) nervous
(d) energetic
(e) attentive
(f) easy going
(g) independent
(h) trainable
(i) non-aggressive
(j) hyperactive

38. Please rate how well each word describes your dog's personality by marking the appropriate number (1 = really does not describe my dog, 6 = really describes my dog). Consider how your dog behaves overall. For example, if your dog is friendly to most people,

some dogs but not others, you may rate them as a 3 or 4. A dog that is friendly to every person and every dog they meet would be a 5 or a 6 on the scale.

(a) submissive
(b) determined
(c) relaxed
(d) tenacious
(e) timid
(f) biddable (how
(g) willing is the dog to
(h) do what it is asked?)
(i) active
(j) intelligent
(k) sociable
(l) restless

39. Please rate how well each word describes your dog's personality by marking the appropriate number (1 = really does not describe my dog, 6 = really describes my dog). Consider how your dog behaves overall. For example, if your dog is friendly to most people, some dogs but not others, you may rate them as a 3 or 4. A dog that is friendly to every person and every dog they meet would be a 5 or a 6 on the scale.

(a) fearful
(b) obedient
(c) lively
(d) reliable
(e) assertive
(f) excitable

40. What has been the most challenging part of raising a puppy?

41. What has been the best part of raising a puppy?

42. I have considered returning my puppy back to the seller/or rehoming them.

(a) Strongly agree
(b) Agree
(c) Neither agree nor disagree
(d) Disagree
(e) Strongly disagree

Supplemental File 2: Count, proportion and modified Parental Stress Scale mean for individual variables prior to amalgamation to increase group sizes

		Count (n)	Proportion (%)	Mean modPSS* Score
Puppy acquisition	Breeder	482	61.6	44.0
	Animal shelter or rescue centre	110	14.1	46.8
	Family friend or neighbour	61	7.8	43.2
	Pet store	11	1.4	48.0
	Gift	4	0.5	41.8
	Bred by respondent	3	0.4	32.7
	Found stray	2	0.3	55
Additional dogs in household	1 other dog	150	19.2	41.22
	2 dogs	50	6.4	40.1
	More than 2 dogs	33	4.2	38.1
	No other dogs in household	548	69.9	46.5
Children in household	No children	643	82.1	45.0

		Count (n)	Proportion (%)	Mean modPSS* Score
	1 child	63	8.1	44.1
	2 children	59	7.5	42.7
	3 children	16	2.0	40.9
	More than 3 children	3	0.4	46.7
Adults in household**	1 adult	132	16.9	46.0
	2 adults	519	66.3	45.0
	3 adults	79	10.1	42.1
	More than 3 adults	52	6.6	42.5
Employment status**	Full-time	512	65.4	45.0
	Part-time	93	65.4	43.7
	Casual/seasonal worker	12	1.5	41.8
	Currently not able to work (e.g., disability/illness	21	2.7	40.9
	Currently studying	55	7.0	41.9
	Not currently employed	46	5.9	48.7

		Count (n)	Proportion (%)	Mean modPSS* Score
	Retired	24	3.1	44.4
Proportion of working hours completed from home (in the last 7 days)	0%	213	37.2	42.2
	10%	21	2.7	43.2
	20%	24	3.1	42.3
	30%	25	3.2	49.0
	40%	24	3.1	45.6
	50%	42	5.4	45.2
	60%	24	3.1	40
	70%	17	2.2	47.9
	80%	45	5.7	46.4
	90%	28	3.6	41.9
	100%	234	29.9	47.1
	NA – did not work last 7 days	86	11.0	44.2

*Modified Parental Stress Scale

**Missing values not shown

Chapter 6

Thesis Discussion

6. Discussion

6.1 Summary of findings

When it comes to the modern dog, humans have an extraordinary amount of power, and the way we selectively breed and raise dogs plays a crucial role in a dog's ability to meet society's needs (Bray et al., 2021; Mai et al., 2021; McMillan, 2017; Wilsson, 2016). This is not novel. For the majority of the history of the human-canine dyad, dogs have been bred for purpose and, naturally, researchers and breeders have long explored how to enhance dogs' abilities to align with our goals. A limitation of current literature is the tendency to focus on factors affecting puppy development whilst in the care of the breeder while overlooking critical factors coming into play when a puppy transitions into the familial home. Additionally, current literature lacks understanding on the role guardians play in a puppy's life. To help fill this gap, this thesis had two aims:

1) To understand how we can better capture the complexity of puppy development in research, particularly whilst in guardian care.
2) To investigate the experience of guardians as they raise their puppies in the present day.

The first half of this thesis achieves Aim 1 by offering a new approach to understanding and researching puppy raising by modifying Bronfenbrenner's bioecological theory for use with puppies (Chapter 2) and demonstrating the power of its application in research (Chapter 3). These Chapters showcase the complexity of factors impacting puppy development and produce novel insights into interactions between puppy, guardian and their environment. The second half of this thesis explores Aim 2 with a longitudinal study of puppy guardians during

their first year of puppy raising and demonstrates the multi-faceted and complex reality for guardians raising a puppy (Chapter 4). Following from these findings, this thesis then zooms further into the guardian experience and investigates the factors associated with stress in puppy guardians with a worldwide survey (Chapter 5). Together these Chapters lay the groundwork for future researchers to fill the gaps in our knowledge of puppy guardian experience. The final Chapter of this thesis (Chapter 6) maps potential impact on the industry, as well as the application of findings in the field.

6.2 Introduction to a new ecological model to understand puppy raising.

Chapter 2 of this thesis introduces an ecological model, the Bronfenbrenner model, and its modifications for application in puppy development. This model helps to highlight the complexity of puppy development and demonstrate how puppies are influenced *by* and have influence *on* the environments around them. Capturing these interactions in the internal, immediate, and non-immediate environments is crucial in gaining a more holistic understanding of puppy development. This Chapter is novel as it presents a detailed description of the modified Bronfenbrenner model and offers an example of a Bronfenbrenner-inspired study design for researchers to use as a guide. It also brings puppy development research in line with other health and development spaces, such as the human health industry, aiming to capture real-life complexities to better understand and monitor outcomes (Woodland et al., 2021; World Health Organisation, 2023).

Current research has arguably limited success capturing the complexities of puppy development. Our understanding of guardian impact on puppy development, for example, is limited to a few studies of volunteer puppy raisers in the assistance-dog industry (Chur-Hansen et al., 2015; Mai et al., 2020; Mai et al., 2021). A Bronfenbrenner model will enable researchers to view the many forces upon development as ecological models are designed to create a way to systematically capture many sub-systems, environments and their interactions with each

other (Müller et al., 2011). Commonly used in environmental science, health and human development (Bronfenbrenner, 1999; Richard et al., 2011), ecological models have also been used when discussing animal welfare. The World Small Animal Veterinary Association has specified that "it is implausible to think about animals without considering their wider ecological context" (Ryan et al., 2019) – a sentiment mirrored by this thesis.

6.2.1 How application of a Bronfenbrenner model helps to expand puppy research.

Chapter 3 operationalises Chapter 2's conceptual framework by employing our adapted Bronfenbrenner model to analyse the real-world experience of puppy raising. This approach unveils three pivotal areas that have received limited attention in the literature until now: 1). Households are not uniform, static entities, 2) The role of relationships in learning, and 3) Effect of new puppy on household dynamics.

Households are not uniform, static entities.

This section reveals the complexity of a human household when viewed through the Bronfenbrenner lens. It is likely that the majority puppies spend much of their time within the guardian's property (in or outside the home). This means that *all* individuals living within the guardian's property, by default spend the most time with the puppy, and are therefore likely to be the biggest influences on a puppy's environment and development (Philpotts et al., 2019). Our findings highlight the fact that individual caretakers should not be considered reliable representatives of their puppy's interactions with others in the household. Training and relationships between puppy and individuals vary widely even when other factors remain equal.

Although this thesis focuses on dogs under 12 months of age, this finding has potential implications for the entire companion animal industry. Variability of relationship between the

household dog and the humans within a household has also been previously reported while investigating the relationship between dogs and their guardians. Hoffman et al. (2013) reported a significant variability in attachment with the dog between individuals within families, as well as a positive association between attachment to the dog and guardian level of responsibility for the dog. Chapter 3 highlights this important aspect hinted at, but not fully explored, by Hoffman et al. (2013): the flaw in our reliance on individuals representing entire households. Doing so may yield misleading conclusions as it overlooks the broader dynamics and the potential for many one-on-one relationships within households. Failure to consider these complexities can obscure crucial interactions and influences, impacting the validity of research findings.

Within Chapter 2 the direct implications on our understanding on training techniques was discussed, as our findings strongly suggested guardians claiming to use humane dog training methods do not automatically represent a humane training method household. But this representative fallacy extends much further into the literature. For example, dog guardians often lack knowledge and understanding of dogs and the responsibilities of dog guardianship which may negatively affect the welfare of dogs (Philpotts et al., 2019). Given that researchers are likely to target the primary caregiver (who will likely have a higher incentive for acquiring knowledge) it begets the question of what this would look like if they were applied to the rest of the household, not to mention its implication to dog welfare. Consideration of the whole household is crucial for acquiring accurate understanding of puppy raising environments and guardianship experience.

The role of relationships in learning

Government, shelters, charities, trainers, and veterinarians dedicate significant resources providing education for dog guardians. This effort aims to promote and positively influence

animal welfare and responsible ownership, decrease friction between companion animals and their humans, as well as decrease the instances of rehoming (Philpotts et al., 2019). However, Chapter 3 illustrates that simply offering education to an individual does not lead to automatic absorption of that knowledge. Guardians filter the information they receive based on their perceptions of the educator. While this finding may not initially seem surprising, it's noteworthy that no previous studies (to the knowledge of this author) have explored how various factors contribute to guardian trust in trainers, vets, groomers, and other professionals within the industry. This gap in research is significant, as it clearly represents a barrier to the uptake of advice, and therefore effects both puppy development and animal welfare as a whole and should be of concern to all in the industry.

Philpotts et al. (2019) emphasizes the challenge of multiple influencers attempting to educate guardians, additionally highlighting the issue of contradictory and inconsistent advice between, and within groups of sources. Philpotts et al. (2019) argues that all these sources are flawed, including the absence of regulation within the industry exacerbating the proliferation of competing sources vying for guardian influence. In this environment Philpotts et al. (2019) raises the crucial question of how guardians, when inundated by information of varied sources, quality, and relevance, can possibly discern whom to trust and follow? Chapter 3 (and subsequent findings in Chapter 4) offers a potential insight: our willingness to absorb and accept knowledge is often dictated by relationship and perceived authority. Of course, perceived authority is subjective, and in the absence of regulatory oversight, coupled with the influence of "entertainment" media, authority can easily be conferred upon individuals promoting outdated training techniques with little concern for animal welfare (Todd, 2018). Given these barriers, it's understandable that guardians may inadvertently follow incorrect and inhumane information when raising their puppies (Forrest et al., 2023; Todd, 2018). This

consideration is essential both during the research process and when stakeholders apply findings in educational settings.

Effect of new puppy on household dynamics

Chapter 2 offers a further novel perspective - building on the model's assertion that developing individuals have an impact *on* others, as much as they are impacted *by* them (Bronfenbrenner & Evans, 2000). In this Chapter, we explore how puppies affect other individuals within their microsystems and, crucially, shape relationships outside of their own dyads (See Table 6.1 for definitions of Bronfenbrenner's systems). In this Chapter, guardians reported puppies added increased tensions, as well as an increase in bonding between family members (mesosystem). Intriguingly, this was also seen in the non-humans in the family, such as the existing older dog (microsystem and mesosystem).

Table 6.1: Definitions of Bronfenbrenner's bioecological theory of human development systems applied to puppies as published in Chapter 3 of this thesis (Goncalves Costa et al., 2023).

System	Definition
Dog/Person	**Force:** Internal characteristics, like personality traits, affecting how an individual responds to their environment.
	Resource: Lessons and capabilities an individual brings to interactions
	Demand: Physical characteristics that can influence how others interact with the individual.
Microsystem	Any setting in which the developing puppy of interest is situated, in which they have face-to-face interactions with other individuals and objects. Proximal processes occur here. For a puppy, this would include the household - with

	their human and non-human inhabitants –and other areas in which the puppy is directly interacting, such as puppy classes and dog parks.
Mesosystem	This deals with the linkages between microsystems - the interconnectedness and influence of the microsystems on each other, outside of direct contact with the puppy. For example, a poor or conflict-ridden relationship between owners and puppy class instructors. Despite the puppy not being directly involved in the relationship between the two, the interactions between owner and instructor will ultimately affect the puppy's own experience.
Exosystem	This is a microsystem for someone other than the developing puppy of interest e.g., the owner's microsystem) but which has an indirect effect on one or more of the developing puppy's microsystems. For example, an owner's workplace experiences have an influence on subsequent interactions with their puppy despite the puppy not being present at work. Similarly, online communities exist in a puppy's exosystem, puppies do not engage with these communities directly however their influence can be felt through others (e.g., an owner seeking advice on behavioural issues).
Macrosystem	Any sociocultural group sharing values, beliefs, access to resources, a sense of identity, etc. Macrosystems can be coterminous with an entire society or with racial or ethnic or socioeconomic groups (subcultures) within that society. This may include beliefs relating to the value and status of dogs (dogs as family versus dogs as utility), what the definitions are of "a good dog" and the ethics and beliefs around how our dogs should be treated. Expectations are a large factor in creating a positive dog/owner relationship and relationship issues may occur when there is misalignment between dog behaviour and human

	expectations. These expectations are likely being influenced by the owner's own person characteristics, but also from the beliefs and culture in which the owner lives.
Time	**Microtime:** The manner in which proximal processes proceed during specific episodes. For example, how focused/distracted a puppy and owner is during puppy training. Puppies and owners who are equally focused and engaged are likely to have different outcomes during a training session than those where one or both participants are distracted and unfocussed.
	Mesotime: The extent to which proximal processes occur (e.g., frequently or infrequently). For example, training that occurs weekly, vs. daily is likely to affect outcomes. Socialisation is also a good example, we currently presume there is a minimum amount of socialisation required to avoid negative outcomes, and a maximum amount of socialisation where increased impact ceases, but do not yet know what either of these amounts might be. Taking mesotime into account in future study designs may help.
	Macrotime: Current social, political, and economic conditions of society, and changes in those conditions, for example, how society views dogs' role within it.

These findings resonate with research conducted on assistance-dog puppy raiser volunteers. Chur-Hansen et al. (2015) documented numerous negative effects that puppies had on the volunteers individually, as well as on the dynamics within their families. Echoing observations in Chapter 3, Chur-Hansen et al. (2015) noted strained family relationships, with members

expressing they were becoming "…snappy, angry, grumpy and on edge", mirroring our participants' experience in Chapter 3. Additionally, participants from both studies reported conflicts with family and friends regarding the management of puppy behaviours.

The effect of puppies on others represents an unresearched area in puppy literature, however, it parallels a significant topic of discussion in human parenting. Extensive evidence indicates that children not only directly affect their parents as individuals, but they also affect other dyads the children are not part of, such as marital relationships (mesosystem) (Kowal et al., 2021; Twenge et al., 2003). Parents consistently report lower marital satisfaction compared to non-parents, with this disparity increasing with each additional child. Although outside the scope of this thesis, there are strong indicators that similar outcomes might be found in puppy/guardian dynamics, and this would be worth exploring.

6.3 The experience of puppy raisers: mapping the Bronfenbrenner model to the guardian experience

In Chapter 4 of this thesis, we explore into the guardian perspective with the help of the Bronfenbrenner model. Chapter 4 presents a novel study exploring the guardian experience raising puppies for companionship. By examining the guardian experience, we gain insights into the lives of puppies and how the guardian's experience shapes the puppy's developmental environment. Our findings suggest that guardians enjoy nurturing a bond with their puppies and celebrating the milestones along their puppy raising journey. However, they find their puppy's behaviour and training the biggest challenges, and couple this with an internal struggle to feel adequate as guardians. To overcome these challenges, guardians rely on the community around them, their ability to access resources, their own realistic expectations, as well as training and socialisation of their puppy.

Chapter 4 explores these themes both individually and in their interconnectedness, as it is the links between them that provide the most profound insights. In Table 6.2 we can see the influence guardians exert across every system within the Bronfenbrenner model. We can consider training and socialisation as an example, as they cross all six systems. Participants in Chapter 4 reported some puppies appeared to be more trainable than others, an example of a puppy's personality affecting their development (dog/person: force and resource). However, it could also be based on guardian perception. The guardian approach to training a puppy, whether through positive reinforcement or aversive methods, hinges on numerous factors: the puppy itself, their personality for example (puppy/dog) (Kuo et al., 2024), the guardian preference (microsystem), the advice and information available to the guardian (exosystem), the integration of received advice (mesosystem, as discussed in Chapter 3), and the availability of training options which is based on the prevailing cultural norms, community expectations, and temporal context (macrosystem and time).

Table 6.2: Mapping the guardian experience from Chapter 4 onto Bronfenbrenner's bioecological theory as modified for use with puppies. Orange represents themes developed for what guardians enjoyed most, Blue represents what they found most helpful, and red what they found most challenging.

	DOG/PERSON	MICROSYSTEM	MESOSYSTEM	EXOSYSTEM	MACROSYSTEM	TIME
From strangers to family		✓				✓
Eudaimonic happiness		✓				✓
Training and socialisation	✓	✓	✓	✓	✓	✓
It takes a village		✓	✓	✓		✓
Material or physical assets		✓			✓	✓
Realistic expectations				✓	✓	✓
Training and behaviour	✓				✓	✓
Being a good guardian			✓	✓	✓	✓

While not extensively explored in the preceding Chapters of this thesis, we can see in Table 6.2 that Bronfenbrenner's chronosystem (time) plays a role in each theme within Chapter 3. For example, Chapter 3 data collection occurred during the COVID-19 pandemic, affecting the guardian's ability to socialise their puppies. In fact, the COVID-19 pandemic offers many examples of the effects of macrotime (current social, political and economic conditions), which consequently affects the guardian (microsystem and exosystem). The pandemic, a human illness, instigated behavioural shifts amongst millions of guardians. Puppies born during this period were less likely to have attended training classes, have a health check-up prior to purchase, and be exposed to as many socialising environments when compared to pre-pandemic puppies (Brand et al., 2022). This underscores the notion that what affects guardians, ultimately impacts dogs. These impacts during the COVID-19 pandemic may have led to an increased number of adult dogs with undesirable personality traits such as fear and aggression (Sacchettino et al., 2023). This underscores the need for researchers and industry stakeholder such as veterinarians, councils, and breeders to consider the wider setting in which puppy development occurs.

6.4 Development of a stress scale to be used with puppy guardians

As this thesis emphasises, Bronfenbrenner's model shows that puppies do not exist in a vacuum, and the guardian experience directly affects puppy outcomes. Additionally, Chapter 4 highlights numerous guardian challenges during their puppy raising journey, identifying potential sources of stress for puppy guardians. Furtado et al. (2023) were the first to document the colloquialism "puppy blues" among puppy guardians. A self-ascribed feeling of overwhelm and depression experienced during the challenges of puppy raising for companionship which is short-lived but intense. In their qualitative research, Furtado et al. (2023) observed several real-world experiences of puppy blues, including some guardians

expressing a desire to rehome or return puppies to sellers. To date, there is no defined diagnosis of puppy blues, limited understanding of its outcomes, and scarce published data on its prevalence or its impact on guardians.

The parallels with the human parental literature are thoroughly discussed in Chapter 5: high levels of parental stress can lead to negative child outcomes (Barroso et al., 2018; Crnic et al., 2005; Deater-Deckard, 1998), and an increase in behaviour problems including maladaptive behaviours (Neece et al., 2012; Tomanik et al., 2004). This in turn increases the risk of parental mistreatment and harsh parenting techniques, and negatively affects parent/child relationships (Curenton et al., 2009; McQuillan & Bates, 2017; Winstone et al., 2021) as well as causing high levels of personal distress to the parents (Deater-Deckard, 1998; Lavee et al., 1996). Findings reported by Furtado et al. (2023) suggest that stress can both affect the guardian (description of grief, depression, negative impact on existing relationships, high levels of stress), and the puppy (risk of return, guardian struggling to meet puppy needs). This area warrants additional research, and Chapter 5 represents a crucial first step towards addressing this gap.

Chapter 5 follows the well-known adage “to measure is to know”. To acquire better understanding of guardian stress and its impact on both guardian and puppy development and outcomes, it is essential to have a means of measurement. This Chapter offers a parental stress scale modified for use with puppy guardians. While it still requires validation, Chapter 5 demonstrates this scale holds promise as a tool for measuring guardian stress in future studies.

Comparing the median modified Parental Stress Scale scores from Chapter 5 for our puppy guardian population with other studies investigating English-speaking human parents suggests that puppy guardianship (mean 44.7) may be similarly stressful as parenting children aged 6-11

with behavioural and developmental problems (47.8), and less stressful than being a stepmother in the U.S. (50.9) (Louie et al., 2017). However, it may be more stressful than parenting while your spouse is deployed in war (35.8), being the mother of a healthy, developmentally typical child (36.3), or a grandparent with primary responsibility over a child (41.5) (Louie et al., 2017). Although these comparisons are interesting, the scores are not directly comparable as Parental Stress Scale scores should be compared over similar populations and times, or the same population over a longitudinal study. Further studies using the modified Parental Stress Scale may allow better comparisons between different guardian and dog populations (such as for first time dog owners, or in adult dogs, or recently acquired rescue dogs).

Being able to measure guardian stress gives us a foundation to further explore puppy blues and offers researchers a new, more reliable way to investigate the microsystem. Having a further understanding of what is 'normal' and an expected amount of stress for guardians also will allow us to better understand other areas of guardian experience, such as relinquishment, and even adjacent industries such as volunteer retention in assistance-dog puppy raising programs.

6.5 Next steps in research and applications in the field

6.5.1 Improving research with study design and data interpretation

The findings of this thesis hold significant implications for future research, particularly in the development of more appropriate study design and data interpretation. The topic of puppy classes serves as an excellent example of how insights from this thesis can be applied in future studies. Despite widespread recommendations for puppy classes as a means to positively impact puppy development, Howell et al. (2015) highlights the doubt within literature on any causal links between puppy class attendance and development outcomes. Existing literature

focuses on three aspects of puppy classes, 1). Attendance, 2). Socialisation, and 3). Training (specifically, appropriate responses to training cues). An example of this is Seksel et al. (1999), a widely cited study examining effects of puppy classes. Seksel et al. (1999) reported socialisation and training puppy classes increased in likelihood of puppies responding appropriately to training cues at week 2 and 4 when compared to puppies who did not attend these types of classes, but no other significant differences between cohorts were observed. Similarly, González-Martínez et al. (2019) found puppy class attendance improved some variables, such as reduced family-dog aggression and non-social fear, as well as increased trainability, but not others, such as reduction in stranger and owner-directed aggression. Overall, researchers have not yet reached consensus on the potential benefits of puppy class attendance (Howell et al., 2015). Viewing puppy classes through a Bronfenbrenner lens reveals significant gaps in the current literature. Puppy classes, comprising only a fraction of a puppy's environment, offer limited weekly contact compared to numerous other developmental factors such as veterinary visits, walks, and social interactions. Additionally, the effect of puppy classes on guardians themselves has been overlooked (microsystem and mesosystem).

Early advice offered to guardians has the potential for significant impacts in influencing guardian behaviour, and therefore, animal behaviour and development. Gazzano et al. (2008a) demonstrated this potential by showing that guardians who received behavioural advice from a veterinary behaviourist raised and interacted with their puppies differently *and subsequently* had puppies with significantly better behavioural outcomes than those who did not receive pre-emptive behavioural advice. In this case, these information sessions provided by the veterinary behaviourist did not include additional socialisation and were not held in a class environment. Therefore, any changes in outcomes can be attributed to the change in the guardian. Reported puppy behavioural changes following this intervention included less instances of toileting in inappropriate locations, less aggression towards unknown people and

dogs, and less mouthing or mounting guardians –outcomes similarly seen in puppy class attendance studies. Gazzano et al. (2008a) paired with Chapters 2 and 3 within this thesis, strongly suggest that our focus should be on the effect of puppy classes on guardians (microsystem, and mesosystem) – not just puppies (puppy/dog). It is possible, and very likely, that puppy class attendance has the potential to affect both puppy and guardian behaviours, but that guardian behaviours then feed back into influencing future puppy behaviour in a far stronger way – especially given puppy class attendance would average one hour per week of impact while puppy guardians have 168 hours' worth of influence per week (Figure 6.2).

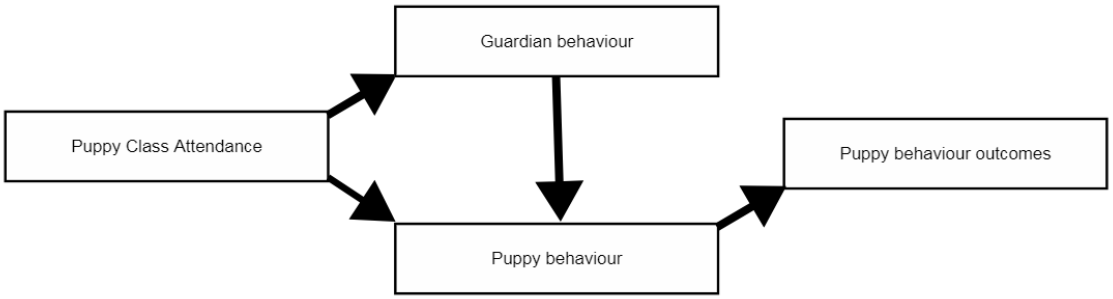

Figure 6.1: The potential 'missing link' impact of guardians on puppy development outcomes when investigating the effect of puppy classes.

Of course, how we get puppy classes to not become just another voice within the multitude of voices highlighted by Philpotts et al. (2019) needs to be explored. This may be difficult when even a single puppy class can contain conflicting voices, as evident in Chapter 3. Furthermore, given the ecological lens, researchers could also investigate what may influence guardian levels of trust in source (and their relationship with the educational provider). As well as how that education moves through to other individuals within the household (for example, co-guardians who do not attend puppy classes) to avoid the pitfalls of assuming 'static, uniform, households' (Chapter 2). Moving out further into the mesosphere it may even be pertinent to investigate

whether knowledge passed onto guardians within a puppy class make any changes to their interactions with other animals in the household, or to friends or family and their dogs.

6.5.2 Next steps to understanding guardian stress

Findings within Chapter 5 offer both industry insights, and pathways for further study. One of the industry insights is related to support programs for puppy guardians. Results indicate first-time puppy guardians may benefit from additional support, suggesting industry stakeholders such as veterinarians and dog trainers may want to identify these clients early-on. Additionally, identifying other high-stress-risk populations for additional, or individualised support may also be beneficial. These can include multi-dog puppy households, guardians with low self-esteem, and guardians with puppies showing high levels of extraversion or neuroticism. Identifying vulnerable groups for targeted intervention or additional support is common in parenting support programs (McDonald et al., 2012), and therefore may also be helpful in the companion animal sector.

Chapter 5 also highlights the impact of culture and regional differences, as evidenced by the strong association between country of residence and the levels of stress reported by guardians. Through the lens of Bronfenbrenner's model, it is apparent that regional differences may greatly alter the macrosystem and exosystem, impacting the perception of the companion animal role, how much time we spend with them, expectations of both guardians and puppies, as well as access to resources. However, the workings of these mechanisms are still not well understood and requires further research. These findings may help further target support interventions for vulnerable populations.

While the modified Parental Stress Scale presented within this thesis holds promise, it does require further validation for continued use in research. Nonetheless, having a scale may offer

researchers an opportunity to better investigate the guardian experience (microsystem), particularly across different stages of a puppy raising journey.

Although we did not find puppy age to be a significant factor in association with guardian stress (Chapter 5), it is plausible that 'weeks in care' rather than puppy age may be the influential factor. This is because newly acquired puppies will need to acclimate to their new environment, including the individuals within it, while simultaneously, guardians must also adjust to the new dynamics and routines that come with a new puppy. This transitional time (the first few day/weeks post-acquisition) may represent periods of higher stress. We know that newly adopted dogs struggle with their settling in period regardless of age, it is possible that puppy stress is linked to that transitional period as well (Thumpkin et al., 2024). Chur-Hansen et al. (2015) explored the impact of puppies on guide dog puppy raising volunteers and observed that the initial week post the most challenges. The transitional period for new puppies was difficult for volunteer-guardians to navigate, and one significant challenge identified was sleep deprivation, with follow-on effects impacting pre-existing relationships within the household (mesosystem) and even heightening volunteer susceptibility to illness. Similarly, Taylor and Mills (2007) reported (albeit from a small sample) puppies were most likely to disturb guardian sleep in the first week of transitioning into the family home. These types of transition challenges may be contributors to puppy blues as described by Furtado et al. (2023) and while investigating the transitional period when puppies come into the home was outside the scope for this thesis, it may represent an interesting topic for future researchers to explore.

Of course, a crucial step is still missing from the literature: whether guardian stress affects guardian and puppy outcomes in the same way parental stress affects child/parent outcomes. While this thesis has taken the initial step of introducing a tool to assess puppy guardian stress,

it is essential to validate the assumptions underlying it, particularly the idea of applying the stress scale to puppy guardians and that relationships between puppies and guardians mirror those between children and parents. As already discussed, while the modified Parental stress scale presented within this thesis holds promise, it does require validation for continued use in research. Nonetheless, having a scale may offer researchers an opportunity to better investigate the guardian experience (microsystem), particularly across different stages of a puppy raising journey. Still, confirmation of these assumptions is imperative for advancing our understanding of this field and will aid in providing further context to the findings within this thesis.

6.5.3 Uncovering the village that raises our puppies.

This thesis leads us to look at the bigger picture. Puppies, much like children, are raised in a village. We see glimpses of this village in Chapter 4; Puppies were raised by households, including non-human residents, as well as other humans in the guardian's network including paid professionals (trainers and vets). This highlights the interdisciplinary systems simultaneously changing a puppy's environment and applying real-time pressures in their development – factors that are all captured under the scope of an ecological model.

King et al. (2009) reported the majority of Australians prefer to acquire dogs as puppies, speculating that this may be due in part to a puppy's perceived "clean slate", with greater chance of uncomplicated history and behavioural problems. Of course, a puppy, even as young as eight weeks of age is anything but a "clean slate" as by this time a multitude of factors have already begun to affect their development, including their genetics, early handling, environment and more (Gazzano et al., 2008b; Serpell et al, 2016; Wilsson, 2016; Majecka et al, 2020; Santos et al, 2020). This means that regardless of the power of guardians in puppy development, this thesis cautions any notion that guardians *alone* have the biggest impact. To

believe so would be to miss the point of this thesis entirely – that many factors, as directed by Bronfenbrenner's theory, creates a web of influence. Even if guardian influence over puppy development is underplayed and undervalued in research, we must try to remember a puppy's development is in the hands of many humans, from breeders, to guardians, veterinarians, trainers, councils, neighbours, friends, and family – each of these have their roles within Bronfenbrenner's bioecological model.

That such complexity of puppy development exists also demonstrates the importance of industry in puppy development. There is concern that current industry practices and laws may not be optimal, nor sufficient, to facilitate positive development of puppies (Baker, 2020; Bir et al., 2016; Dawson et al., 2019; Menor-Campos, 2024; Woodhead et al., 2018). Dawson et al. (2019) makes the argument that modern breeding systems are insufficient in their goals to produce resilient fit for purpose companion dogs, even so far as arguing that the current system works against producing such animals by automatically neutering (and therefore removing from the gene pool) companion dogs well suited to the role, with a large proportion of breeders focusing on either profit, or breed standards that are not always compatible with animal companion goals. Dawson et al. (2019) argues a systematic restructure of the industry is required. This thesis agrees with Dawson et al. (2019) and argues the need for holistic interdisciplinary teamwork within the industry and society as a whole.

6.6 Limitations and strengths

6.6.1 Limitations

The limitations of individual Chapters are included within each one, however, limitations of this thesis in a broad sense will be discussed here. Arguably, the main constraint of this entire thesis is that it falls short of fully utilizing Bronfenbrenner's intended framework in any one of its Chapters. However, it is this thesis' stance that demonstrating the benefits of the model's

incomplete use is of far more use to current puppy researchers, as researchers who find the full PPCT system overly complex can still extract benefits from elements within Bronfenbrenner's theory without dismissing the entire framework. Besides, for those inclined to follow the model comprehensively, detailed instructions are still provided in Chapter 2.

As our findings in Chapter 5 reiterated, experiences likely differ between cultures and countries. Chapters 2, 3 and 4 are all based on data collected from English-speaking Australian puppy guardians and therefore may not apply to non-English speaking Australians, Indigenous Australians, nor to puppy guardians in other countries. Although somewhat more culturally varied, Chapter 5 was also predominantly the experience of those residing within the Global North– as most respondents were from Australia, the United States of America or Canada.

Furthermore, while Chapter 5 offers a starting point on exploring stress and guardians, it must be repeated that our findings are associations, and may not be causative. However, Chapter 5 still offers researchers a foundation for further investigation.

6.6.2 Strengths

This thesis is best viewed as a guiding map for researchers in the field of puppy studies as well as for stakeholders in the animal companion industry. The Bronfenbrenner model in Chapter 2 offers an excellent lens with which to view how we breed and raise dogs fit for modern human companionship. This perspective may prove beneficial for both researchers and industry stakeholders including advocacy groups and lawmakers. Chapter 3 offers a cautionary guide to understanding the limitations that certain study designs may introduce, such as surveys that rely on individuals as household representatives. While Chapter 5 introduces a tool to measure puppy guardian stress and opens the door for further exploration of the guardian experience, including puppy blues. The resources presented in this thesis serve to foster a nuanced and

more detailed understanding of puppy development and puppy raising, paving the way for more informed decision-making and policy development and ultimately has 1) offered a new approach for stakeholders to better view and capture the complexity of puppy development, in particular whilst in guardian care (Aim 1), and 2) offered valuable insights into the contemporary experiences of puppy guardians, while also suggesting directions for future research (Aim 2).

6.7 Conclusion

In sum, this thesis pushes our understanding of puppy development forward by offering new tools and novel insights for researchers interested in puppy development and the guardian experience. For this reason, this document serves as both a guidebook for future research and a source of immediate insights applicable in the industry, including considerations for stakeholders when managing puppy households. A conceptual model, such as a modified Bronfenbrenner's bioecological theory of human development, offers researchers and industry professionals with a framework to better comprehend the intricacies of puppy development. Additionally, this thesis presents a preliminary look at the experience of raising a puppy from the guardian perspective, exploring the good, and the stressful, throughout their journey, as well as creating a new tool to explore these themes further. Gaining a holistic understanding of these mechanisms, may help guardians, and the industry that supports them, better navigate the challenges of puppy raising for the benefit of both sides of the human-canine dyad.

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