

**The Role of Human-Animal Interaction in Promoting Positive Youth
Development: Toward Theory-Based Measurement and Application**

A dissertation

submitted by

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Abstract

Human-animal relationships are both ubiquitous and diverse across the life span, and may be especially salient among children and adolescents. However, there is little theory-predicated research documenting the role of human-animal interaction (HAI) in promoting young people's positive development, a lack of measures of HAI derived from such research, and an absence of evidence-based programs associated with such scholarship. Therefore, the purpose of this dissertation is to begin to fill these gaps by creating and refining a theory-based measure that explores emotions and cognitions about attachment, commitment, and moral orientation toward animals and, in turn, provides exploratory information about the possible correlates between HAI experiences and positive youth development. Data are derived from a pilot investigation, the Correlates of Positive Youth Development (C-PYD) Study, and from the 4-H Study of Positive Youth Development. These data are used to examine structural features of HAI experiences, the potential association between residential context and HAI, and developmental correlates associated with HAI in late adolescence. The implications of these studies will be discussed, and suggestions for new areas of inquiry about the role of HAI as an important developmental context will be presented.

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Table of Contents

Abstract.....	II
Acknowledgements.....	III
Table of Contents	V
List of Tables	VI
List of Figures.....	VIII
Chapter 1: Literature Review and Research Questions.....	1
Chapter 2: Measure Development and Validation.....	45
Chapter 3: HAI and Positive Youth Development	59
Chapter 4: Discussion.....	81
Conclusions.....	108
References	111
Footnotes	131
Tables.....	132
Figures	151
Appendix A.....	153
Appendix B	156
Appendix C	160

List of Tables

- Table 1. Patterns of HAI experiences in the C-PYD Study
- Table 2. Model fit for the two, three, and four factor EFA solutions
- Table 3. Factor structure for three factor HAI model in the C-PYD Study
- Table 4. Correlations among latent factors for the three factor HAI EFA model
- Table 5. Animal/pet ownership in the 4-H Study of PYD
- Table 6. HAI activity participation 4-H Study of PYD
- Table 7. Logistic regression results for gender, race, and maternal education predicting HAI
- Table 8. Geographic region, locale type, and HAI participation
- Table 9. Logistic regression for residential locale predicting participation in HAI
- Table 10. Regression parameter estimates, standard errors, and approximate p-values for type of animal predicting attachment, commitment, and moral orientation
- Table 11. Model fit statistics for latent class analysis with two through four classes
- Table 12. Regression parameter estimates and standard errors for class membership predicting attachment, commitment, and moral orientation.
- Table 13. Model trimming steps for HAI structural equation model
- Table 14. Unstandardized and standardized factor loadings and standardized errors for attachment, commitment, and moral orientation
- Table 15. Unstandardized and standardized factor loadings and standardized errors for the Five Cs, Contribution, Depression, and ISR

Table 16. Latent correlations among attachment, commitment, and moral orientation

Table 17. Latent correlations among indicators of developmental outcomes

Table 18. Standardized regression coefficients from trimmed HAI structural equation model

List of Figures

Figure 1. A model of the roles of HAI in human behavior and animal welfare

Figure 2. Three class solution for latent class mixture model of type of animal ownership

CHAPTER 1: LITERATURE REVIEW AND RESEARCH QUESTIONS

*The one absolutely unselfish friend that a man can have in this selfish world,
the one that never deserts him
and the one that never proves ungrateful or treacherous is his dog.
A man's dog stands by him in prosperity and in poverty,
in health and in sickness...
He guards the sleep of his pauper master as if he were a prince.
When all other friends desert, he remains.*

George Graham Vest, "Eulogy on the Dog," 1870

Introduction: Problem Statement

According to the American Pet Products Association (APPA), approximately 62% of homes in the United States include at least one animal (APPA, 2012). Pet ownership is particularly prevalent among families with children, as households with children younger than 18 years old make up 38% of all pet owners (APPA, 2009). As family sizes are decreasing, children are more likely to grow up with a pet in the home than a younger sibling or a grandparent (Melson, 2001). Animals frequently reside in the household, and youth often identify them as an important member of the family. In fact, one study demonstrated that when a group of nine to 12 year olds were asked to identify the most important relationships in their lives, almost half of them named a pet (more than named a grandfather, friend, aunt or uncle, teacher, or neighbor/other adult; Kosonen, 1996).

The ubiquity of human-animal interaction (HAI) and the salience of important relationships with animals are aligned with the social nature of

biological development. No form of life comes into being independent of other organisms and, therefore, social relations are fundamental to the course of adaptive development across evolution (phylogeny) and the life span (ontogeny; Tobach & Schnierla, 1968). There is even evidence that human-animal social relationships have been an important aspect of human life for many thousands of years. For example, across the past 12,000-14,000 years, archeological evidence demonstrates the practice of humans ritually burying dogs, as well as incorporating canines into human burial practices (Morey, 2006). Furthermore, the physiological and morphological evolution of canines from wolves to today's companion dogs (a reduction in size and the development of juvenile morphology) appears to have been largely shaped by the selection pressures of the domesticated environment (Morey, 1992, 1994). These findings provide evidence for the early presence of animals in human life as well as support for the historical practice of cultivating social relationships with animals.

The evolutionary purposes of human-animal (non-conspecific) relationships are different than the functions associated with human-to-human (conspecific) relationships. For example, within-species human social relationships serve a variety of purposes, such as reproduction, collaboration over obtaining food and other resources, romantic relationships, and companionship. Although both collaboration and companionship are also key functions of non-conspecific relationships, the adaptive aspects of human-animal socialization largely constitute a different group of purposes. That is, over the course of our evolutionary history, humans have developed relationships with animals for a

variety of reasons (Wendt, 1996). There is a long history of animals being used for various “working” purposes, such as protection, assistance to disabled humans (e.g., service dogs; Beck, 2000), search and rescue activities (Charleson, 2010), transportation, and nourishment (i.e., as a food source).

Across ontogeny, the purposes of our social relationships with animals may evolve and expand, as do our social relationships with other humans. For instance, initial findings from a study on the benefits of youth reading to assistance dogs suggest that the use of dogs in such programs may increase engagement and retention rates (Lenihan, McCobb, Freeman, & Diurba, 2011). In addition, recent media attention has focused on the use of dogs in courtrooms to support youth victims as they give sensitive or potentially traumatizing testimony (Glaberson, 2011). Student life coordinators at universities are also beginning to capitalize on the power of social relationships with animals, bringing in dogs to mitigate student stress during final exams (Favate, 2011). Growing awareness about the importance of our relationships with animals is beginning to permeate both popular culture and academia, reflected in the increasing popularity of HAI-related programs of study, which include content from the fields of archaeology, anthropology, biology, evolutionary biology, nutrition, and veterinary medicine, among others (Gorman, 2012). As our social needs change, so may the purposes of our relationships with animals, and the unique, adaptive nature of HAI.

Therefore, across the period of proto-hominid to hominid evolution, non-human animals have lived in relation with humans, whether as food, as supporting their life style, or as companions. The importance of this symbiotic relationship is

paralleled in the course of human development: there is evidence that for individuals at different points in the life span, and in different contexts, interactions with animals may be a key part of development, and this critical role is reflected in the number of families who report having an animal as a part of their lives.

Despite the high frequency of youth who have an animal in the home, or who identify having a significant relationship with an animal, the research surrounding HAI is scattered and largely non-developmental. Much of the research on the benefits of pet ownership presents vague, inconsistent findings, limited by small, homogenous samples, lack of replication, and correlational, cross-sectional research design (Herzog, 2011).

In turn, research that reviews the use of animals in therapeutic or medical settings does exist (Allen, Shykoff, & Izzo, 2001; Freund, Brown & Buff, 2011; Kazdin, 2011), and there is some research on the social aspects of relationships with animals. Moreover, humans play an important role in influencing the treatment and welfare of animals (Swaisgood, 2007). Nevertheless, there is a conspicuous gap in our understanding of the integrative relationship between HAI as a therapeutic technique, animal welfare concerns, and HAI as a context for promoting healthy children, families and communities (see Figure 1). In particular, although human-animal relationships are both ubiquitous and diverse across the life span, and may be especially salient among children and adolescents, there is little to no research documenting the role of HAI in promoting positive developmental outcomes for young people.

Therefore, the purpose of this dissertation is to begin to fill such gaps in four ways. First, I will review the existing research in various domains pertinent to HAI (Chapter 1). Much of the existing research focuses on adult populations; there is a paucity of high quality research involving children and adolescents. Accordingly, I use the extant, often adult-focused literature to generate ideas for how HAI may influence youth development, and to provide suggestions for future research that focuses on youth in particular. Furthermore, the majority of the existing research about HAI focuses on the use of animals in therapeutic or medically-related settings, and, as previously noted, there is little work exploring HAI as a context for positive, adaptive development. Therefore, I will propose the need for creating a developmentally-appropriate measure of attitudes towards animals that is appropriate for use during adolescence and young adulthood to study links between HAI and positive, healthy youth development.

Second, I will create and refine such a measure that explores emotions and cognitions about attachment, commitment, and moral orientation towards animals. I will utilize an iterative reduction process involving theoretical item development, expert rater review, and pilot testing to hone the scale into a useful operationalization of HAI in young people, and I will begin to provide exploratory information about the possible correlates between HAI experiences and positive youth development (Chapter 2). Next, I will use data from the 4-H Study of Positive Youth Development to examine the developmental correlates associated with HAI in late adolescence (Chapter 3). Finally, I will synthesize and interpret the theoretical and empirical implications of the present studies, and

provide suggestions for new areas of inquiry about the role of HAI as an important developmental context.

HAI Research: What We Know

The majority of the literature that does exist regarding the impact of animals on human lives can be organized into several large domains. Recently, increased attention has been paid to the use of animal-assisted therapy (AAT) as a therapeutic technique, and there is some research on the effectiveness of such practices, albeit often limited both conceptually and methodologically (e.g., homogeneous samples, lack of control or comparison groups, unclear or ambiguous treatment foci, and scope of assessment; Kazdin, 2011). In addition, perhaps the most well developed area of research pertaining to HAI (historically, and with respect to breadth and depth) involves the use of animals in stress mitigation and in promoting physical health. Finally, and perhaps most related to animal experiences as a context for positive development, some work explores the role of animals in developing social behaviors and skills.

Animal-Assisted Therapy (AAT)

Much of the current research exploring the impact of human-animal relationships is focused on the use of animals in therapeutic settings. For example, the use of canine-assisted therapy for military veterans with post-traumatic stress disorder (PTSD) is becoming increasingly popular (Esnayra & Love, 2005; Johnston, 2012; Yount, Olmert, & Lee, 2012). Service dogs are also becoming more widely used in the context of assisting youth with seizure disorders, ADD/ADHD, and autism spectrum disorders (Dalziel, Uthman, McGorray, &

Reep, 2003; Grandin, Fine, & Bowers, 2010; Greene, 2012). Such service dogs can alert people to the onset of medical or behavioral symptoms, as well as provide assistance with accessibility and mobility.

In addition, equine-assisted therapy is becoming an increasingly popular therapeutic technique for treating individuals of all ages with a range of physical and/or emotional conditions, such as cerebral palsy, multiple sclerosis, motor dysfunction, autism spectrum disorders, schizophrenia spectrum disabilities, learning disabilities, and trauma recovery (Freund et al., 2011). Working with horses on the ground (grooming and tacking up the horse) can provide opportunities for patients to learn to accept sensory input, develop nonverbal communication skills such as eye contact, and provide a comfortable situation to interact verbally with a therapist. While on the horse, the rhythmic motion of the horse's movement can encourage relaxation and focus, and the overall experience may promote self-confidence in learning a new skill (Freund et al., 2011). However, as Freund and colleagues (2011) note, it is difficult to obtain rigorous research on the specific outcomes and benefits of equine-assisted therapy due to the nature of this type of intervention. Equine-assisted programs are highly variable and individualized to the particular program setting, and serve a population of individuals with a wide range of conditions, making rigorous, controlled evaluation research difficult.

In fact, the difficulty of establishing the effectiveness of animal-assisted therapies is not limited to equine-assisted therapy, but is also present for other types of AATs. Often, research evaluating animal-assisted therapies involves a

single group pre-test to post-test design without a control or comparison group (Bachi, 2012; Kazdin, 2011). Newer forms of AAT, such as service dogs for military veterans, may involve programs that, while supported by anecdotal evidence, have not yet been empirically evaluated. Furthermore, the individuals who have the resources to access “alternative therapies,” such as animal-assisted therapies, are more likely to be a relatively select, homogeneous sample who can afford to engage in expensive treatment options (Kazdin, 2011). Finally, there are design and implementation issues within the therapy settings themselves that limit researchers’ ability to establish animal-assisted therapy as an evidence-based treatment technique. Animal-assisted therapy in general often has ambiguous treatment foci and questionable or unsupported assumptions about the specific practices (e.g., type of activities involved in therapy) involved in the treatment technique (Kazdin, 2011). In addition, therapy often consists of single therapists working with single animals, and the nature of these individual, specific relationships among the therapist, animal, and patient can provide challenges in evaluating effectiveness (Freund et al., 2011; Kazdin, 2011).

Despite these limitations, the effectiveness of AAT as a holistic treatment choice for a range of physical and mental health domains shows great promise. Therefore, a key task for future research in the domain of animal-assisted therapy research is to support cutting edge, high quality, longitudinal evaluation that begins to address these limitations to provide empirical support for best practices in AAT. In fact, at this writing, there are private foundations (such as the Horses and Humans in Research Foundation), and national institutes (e.g., National

Institutes of Health) that are devoting resources to supporting rigorous evaluation of animal-assisted therapy programs in a variety of settings and populations.

Stress Mitigation and Physical Health Promotion

While the research establishing the contexts of effective animal-assisted therapy is still being strengthened, there is an extensive body of research documenting the role of animals in mitigating stress and anxiety. Pets and companion animals have been linked to the reduction of anxiety (Barker & Dawson, 1998), autonomic reactivity (Allen, Blascovich, Tomaka, & Kelsey, 1991; Baun, Bergstrom, Langston, & Thoma, 1984), depression (Souter & Miller, 2007), and indicators of chronic levels of physiological stress (Friedmann, Barker, & Allen, 2011). In addition, the presence of an animal can reduce an individual's blood pressure in stressful situations (Friedmann, Katcher, Thomas, Lynch, & Messent, 1983). In fact, adult dog owners often turn to pets as attachment figures during emotional distress, more frequently than they turn to family members or best friends, and dogs are only surpassed by romantic partners as sources of comfort (Kurdek, 2009).

Pet ownership also can have an impact on overall physical health. Dog walking in particular has been suggested as a method for combating obesity by providing a regular, engaging context for being active (Bauman, Schroeder, Furber, & Dobson, 2001). Similarly, research demonstrates that the physical benefits of pet ownership can help promote recovery after a heart attack (Griffin,

McCune, Maholmes, & Hurley, 2011), and is associated with greater survival rate among patients with coronary artery disease (Aiba et al., 2012).

In addition to research focusing on adult samples, some literature exists on the impact of animals on stress mitigation in youth. It has long been documented that youth may turn to pets as a confidant (Katcher & Beck, 1986, 1987). Both children (Melson, Schwartz, & Beck, 1997) and adolescents (Covert, Whiren, Keith, & Nelson, 1985) frequently rely on pets as a way of reducing or mitigating stress. Pets also may help youth in acutely stressful situations, such as during medical procedures, or following traumatic experiences. The distracting presence of a dog during a doctor's visit has been shown to reduce children's blood pressure and heart rate (Nagengast, Baun, Megel, & Leibowitz, 1997) and, as well, to moderate stress responses at the dentist (Havener et al. 2001). Clearly, pet ownership (and perhaps dog ownership in particular) is an area of research that is important to explore in the context of public health concerns.

Social Behaviors

In addition to providing physical health benefits, pet ownership can impact social behaviors that may affect many areas of psychosocial health (Friedmann et al., 2011). As previously noted, adult pet owners often turn to their companion animals for emotional support (Kurdek, 2009) and, for youth in particular, pet ownership has been linked to self-esteem in young adolescents (Covert et al., 1985). The social nature of the child-pet relationship, and the dependence of pets on the child and family, may provide a situation in which children can work through issues of power, dominance, care, neglect, and

nurturance (Melson, 2011). The quality of a relationship with an animal can also provide information about the potential for maladaptive or psychopathological social behaviors. In fact, there is evidence that animal abuse (such as kicking, hitting, or verbally abusing a pet) may be a precursor of bullying, sibling violence (Ascioine & Maruyama, 2011), conduct behavior (Dadds, Whiting, & Hawes, 2006), and antisocial behavior (Kosson, Cyterski, Steuerwald, Neumann, & Walker-Matthews, 2002). Similarly, criminologists view animal abuse as a potential precursor to other violent behaviors (Beirne, 1999).

On a broader level, pets may be a form of social capital. Pet ownership can provide an opportunity for people to connect with other people through a shared interest in pets. Pets may help facilitate social interaction (e.g., conversation, exchange of favors) and use of shared space, including dog parks; these interactions may help individuals develop a sense of community and connectedness (Wood, Giles-Corti, & Bulsara, 2005). In fact, individuals in wheelchairs who utilize service dogs have reported increased socialization as an unexpected benefit of having a service animal (Hart, Hart, & Bergin, 1982).

Animal Welfare

Finally, it is important to consider not only what we know about how animals impact human well-being; we must also be aware of the role that humans play in affecting animal welfare (Rollin, 2006). Given the diverse range of functions that animals serve in human life, humans directly and indirectly influence animal welfare and well-being in many ways. For example, human intervention impacts the sustainability of agricultural production and animal

habitats (Vavra, 1996), and there are ethical issues related to captive welfare and breeding (Swaisgood, 2007). For domesticated species used in agricultural pursuits, the behavior of farmers and stockholders can impact the stress and productivity of livestock (Hemsworth, Barnett, & Coleman, 1993). In addition, there has been recent concern about the potential danger to animals used in sport settings, such as horse or dog racing (Bogdanich, Drape, Miles, & Palmer, 2012).

Furthermore, when using animals in research settings, it is important to consider not only the potential benefits to humans, but also the mental and physical health of the nonhuman animals used in such research. Even when conducting research outside of the laboratory setting, researchers must be attuned to the animals' needs. Researchers should recognize as well that they have moral obligations for the treatment of animals, and that their research may have potential impact on various ecosystems (Russow & Theran, 2003).

The public and the research community are becoming increasingly aware of issues related to humans and to the humane treatment of animals. In fact, fields such as animal welfare science have developed with the goal of using evidence-based practice to improve animal welfare practices across a broad set of domains (Dawkins, 2006). Although the present paper primarily focuses on the role of animals in impacting human development, it is nevertheless important to account for the role that humans take in influencing the ecological and social environments in which animals exist. Animals are not simply static treatment or education modalities; they are living creatures and their welfare and well-being must be considered when integrating animals into research or practice agendas.

Conclusions

Despite the challenges of conducting effective and rigorous research on the impact that animals have on therapeutic outcomes, stress mitigation, and social behaviors, it is clear from the overall body of research that animal relationships have an impact on a wide range of human emotions and behaviors at both the individual and social levels. The ubiquity and impact of animal experiences on individual behavior and social life suggests that human-animal relationships may be a particularly important context for development, one that merits further explanation and empirical examination. In particular, there is a lack of research exploring the impact that HAI can have on promoting positive developmental trajectories; the preponderance of the existing research focuses on ameliorating negative outcomes (e.g., stress, anxiety) or on patterns of cross-sectional covariation. While such research is important to the field as a whole, it is critical that HAI research begins to explore HAI experiences in the context of health-promotion and skill building.

HAI in Action: What do we know about Animal Experiences as a Context for Development in Youth?

Given the lack of research on HAI as a context for positive youth development, and the potential importance of developing a line of research that focuses on this aspect of HAI, it is important to first describe what research does exist. Beyond anecdotal and untested assumptions such as “pets can make kids more responsible,” what do we currently know about HAI as a context for positive youth development? How can contemporary empirical and theoretical

frameworks of human development that exist inform the advancement of HAI research?

Relational developmental systems theory (e.g., Overton 2010, 2011) indicates that developmental trajectories of youth should be studied not in isolation but, instead, as the product of the bidirectional relationships between the individual and his or her environment. Given that this theoretical approach emphasizes that there is plasticity (the potential for systematic change across the life span; Lerner, 1984) in these individual \leftrightarrow context relations, there are multiple directions of change (e.g., from problematic to positive) that can derive from variation in a youth's history of his or her relations within the context. If there is the potential for systematic change, then we can be optimistic that research can identify combinations of individual and contextual variables that can positively alter the course of development. Accordingly, in attempts to optimize development across the human life span, researchers, practitioners, parents, and institutions can capitalize on the plasticity of youth with developmental assets in the context to enhance the course of human development.

Youth experience many social, physical, emotional, and cognitive changes during the first and second decades of life that organize one's conception of self (Côté, 2009; Erickson, 1959), and that could impact one's views about the nature and importance of HAI in one's life. Experiences with animals may be a particularly engaging and motivating context to promote adaptive development in general (as illustrated above in regard to stress mitigation and health promotion) and a young person's positive self definition in particular. For instance, many

youth have grown up with pets in their household (APPA, 2009), or may have participated in other animal-related activities. In this context, we know that many of these youth identify having a bond with an animal as an important, positive, and meaningful part of their ecological context.

For example, in the 4-H Study of Positive Youth Development, close to 10% of high school youth in a Grade 10 sample reported an animal related activity or relationship as the most important or meaningful thing they do (Mueller, Geldhof, & Lerner, 2013). In a developmental period where normative life purposes for high school age youth pertain to academic, career, and relationship success (Nurmi, 2004), it is impressive that so many youth identify an animal relationship as the most important aspect of their lives. For many youth, an animal relationship is manifested in pet ownership, and many factors can contribute to the relative importance of that relationship, such as absence of siblings, racial and cultural identification, and income level (Siegel, 1995).

In addition to pet ownership, there is a small literature that documents other contexts of HAI. One such context is the presence of animals as part of the classroom curriculum. This research suggests that learning to care for and interact with an animal in a classroom setting can provide a context for improving motor skills, practicing communication and reading, improving emotional regulation and calm affect, coping with anxiety, loss, and grief, and improving motivation to learn (Gee, 2011). Teachers also may be able to use the presence of an animal as a strategy to discuss responsibility and ethical issues related to animals (Pederson, 2010). Although these findings are limited in regard to sampling and

generalizability, they suggest a need for future research on classrooms as a context for developing animal relationships in the service of promoting positive academic outcomes. An animal curriculum may be a method of introducing youth to the benefits of a relationship with an animal in a structured, guided way that may maximize the contextual assets of such a relationship.

Another way in which youth can engage with animals is within the context of youth development (YD) programs. YD programs are a subset of out-of-school time (OST) programs that include structured activities intended to affect positive developmental outcomes (Lerner, 2004). Such programs often contain the “Big Three” program characteristics (Lerner, 2004) shown to promote positive development, that is: (1) positive and sustained adult-youth relations; (2) youth life-skill building activities; and (3) youth participation in and leadership of valued community activities. YD programs, such as 4-H Clubs and other after school programs that incorporate the “Big Three” characteristics, provide a structured environment that serves as a developmental asset encouraging youth to take leadership and agency in their development (Eccles & Gootman, 2002; Larson, 2000) and to develop needed and useful life skills (Mahoney, Larson, Eccles, & Lord, 2005; Mueller, Lewin-Bizan, & Urban, 2011). Greater participation in such programs has been linked to indicators of positive youth development (Balsano, Phelps, Theokas, Lerner, & Lerner, 2009), and to the growth of positive outcomes such as higher grades, school engagement, self-esteem, and resilient functioning (Fredricks & Eccles, 2005).

Engagement with animals is a key part of several youth development programs' efforts to promote positive developmental outcomes. For example, many of the programs developed by the National 4-H Council have animal science components built in to their skill development curriculum. These programs include veterinary science, a dog curriculum, and a horse curriculum. These programs cover care of animals, training, nutrition, competition, and basic handling skills, and provide exposure to interaction with animals (4-H Council, 2011). The leaders of 4-H have recognized that an animal curriculum can provide a structured, programmatic experience for youth, one where they are building skills and developing relationships with animals. Such a program may be an important context for promoting positive development.

However, the animal-specific aspects of these programs have not been well evaluated. It may be that animal-related activity participation is a particularly engaging and beneficial experience for some youth. While there is research supporting the notion that the overall curriculum of programs such as 4-H promote positive developmental outcomes (see Lerner, Lerner, & Phelps, 2009), the specific effectiveness of the animal curriculum has not been extensively studied. Despite this lack of evaluation, what we do know about youth development programs can help inform theory and research pertaining to the impact of an animal-oriented curriculum within a YD program, conceptualizing HAI as an ecological context for promoting positive developmental outcomes. As previously noted, one of the "Big Three" aspects of quality youth development programs is the opportunity to develop specific life skills (Lerner, 2004). YD

program curricula, such as the dog and horse programs in the 4-H model, provide a specific, structured opportunity for youth to develop skills in an animal-related domain (e.g., how to provide animals with proper nutrition and training).

Theoretically, this type of structured, skill development activity should be associated with positive developmental outcomes. In addition, programs in which youth learn to care for and to be responsible for the welfare of animals align with the principle of allowing youth to take leadership in valued activities. By providing an engaging opportunity for youth to take responsibility for the care of an animal, an animal-related YD program curriculum may serve as a potent context for promoting positive developmental outcomes.

Constructing HAI Theory and Research: Characteristics of HAI Experiences

Although research suggests that human-animal interaction may be a context for promoting positive developmental outcomes, HAI is still a new, developing area of scholarly inquiry. The paucity of high quality research that is predicated on developmental theory limits our current understanding about the positive impact that human-animal relationships may have on human health and behavior (Griffin et al., 2011). Therefore, it is a timely and important task to identify future directions for the field of HAI, and to begin to develop a theoretical framework for the issues that need to be explored in examining HAI as a context for positive development (Esposito, McCune, Griffin, & Maholmes, 2011). Accordingly, I will explore how the structure and sequence of HAI experiences may influence positive youth development. These facets include

structural aspects of HAI experiences, the type of animal involved in HAI, and, finally, the quality of the human-animal relationship.

Structural Types of HAI Experiences

One of the primary steps to establishing a coherent framework for theory and research about the impact of HAI on positive youth development is a discussion of the various ways HAI experiences may be structured, and how these variations may differentially impact the type of outcomes that are associated with HAI. Such structural variations may include interaction with animals as pets, in the context of a youth program, in an agricultural setting, or as part of a therapeutic program. For instance, it may be that a young person's relationship with his or her household pet is associated with different settings, requisite skill sets, and outcomes than a relationship with an animal used for competitive purposes (such as a horse), or with a livestock animal that is raised with the ultimate goal of being a food source.

In fact, it may be that the type of structure within youth HAI experiences directly impacts the specific nature and outcomes of the experience. Many youth have close relationships with their household pets, but this relationship may lack formal boundaries, expectations, or goals beyond companionship. Serpell (1989) defines pets as animals that we live with, but who do not have any obvious function. As such, it may be that the skills associated with pet ownership could be quite different than those associated with animal interaction in a more formal setting. Youth who interact with animals within a group or club (such as 4-H), or in a competition setting such as horseback riding, may experience different

outcomes that are attributable to the level of structure involved in their experiences. As noted previously, research on youth development programs more generally suggests that structural features, such as the presence of adult relationships and distinct and clearly demarcated opportunities for setting and achieving goals with adult leadership and supervision, may be critical to promoting positive developmental outcomes in HAI experiences (Lerner, 2004). The skills that youth may acquire as part of an HAI experience may be, at least in part, related to the specific structure of the experience. Future empirical research is necessary to delineate which specific structural features (e.g., the presence of adults or leaders, the role of peer relationships) of HAI are related to positive outcomes.

Furthermore, it may be that the structure of HAI experiences is related to the type of animal involved in the relationship, and the role of between-species variation in structure and outcomes should be taken into account. Therefore, the types of animals included in HAI research should be expanded to focus on a wider breadth of animal species. Much of the existing empirical work is based on youth relationships with dogs (or “pets” as a general, catch-all category) and horses, due to the popularity of these particular species. A key task of future research is to delineate the differential structure and impact of HAI experiences involving different species of animals, for instance, the livestock raised in farm settings (e.g., chickens, pigs, and cows) or “exotic” pets (e.g., reptiles and tropical birds).

Given the potential impact of structural differences in HAI, an important task for research is to begin to delineate the specific structural features of HAI

participation, and to explore what specific instantiations of HAI are related to what specific outcomes. For example, it could be that involvement in a close bond with one's pet is associated with empathy-related skills, while participation in competitive horseback riding is related to goal-setting skills. In addition, given that various types of HAI experiences may be uniquely related to specific outcomes, future scholarship should focus on creating developmentally appropriate measures that assess the nuances of the specific structure of youth relationships with animals.

Beyond further delineating the structural and content-related qualities of youth HAI experiences, existing research on OST activities, and on YD program participation, suggests the importance of exploring the impact of various patterns of participation in activities. These patterns include duration of participation, the intensity or frequency with which a youth is involved in activities, and breadth of involvement in various types of programs (Mahoney, Vandell, Simkins, & Zarrett, 2009). Consistency of participation over time (duration) in a YD program has been shown to predict positive outcomes (Kiely, 2010; Zaff, Moore, Papillo, & Williams, 2003). Similarly, intensity of involvement can positively affect the impact of program participation, especially when there is also high duration of involvement (Gardner, Roth, & Brooks-Gunn, 2008).

Given that HAI experiences may often occur in an activity setting for many youth, the activity participation research points to the importance of exploring the role of both duration and intensity in shaping the impact of HAI experiences (Mueller, Phelps et al., 2011; Zarrett, Peltz, Fay, Li, & Lerner, 2007;

Zarrett et al., 2009). For example, duration and intensity of exposure to a relationship with an animal could impact the degree to which a youth feels connected to the animal. As with building a social relationship with another human, relationships can deepen and strengthen over time. Therefore, it is possible that the intensity and duration of a youth's relationship with an animal may be directly related to the types of positive outcomes that result from that relationship. An important area of future HAI research certainly will be focused on the associations among patterns of duration and intensity, the strength of youth connection with animals, and the role of these connections in youth's positive developmental trajectories.

It may also be critical to explore the impact of HAI-related experiences in conjunction with other activity participation. Research by Zarrett and colleagues (2009) has demonstrated that activity participation can affect youth differentially based on patterns of participation in multiple activities. For example, the benefits of participating in sports were different depending on the other types of activities in which youth also participated (e.g., a combination of sports and YD program participation was related to positive youth development, whereas sports participation alone was associated with engaging in risk behaviors) even when controlling for the total time youth spent in activity participation and duration of participation (Zarrett et al., 2007, 2009). Therefore, this research suggests the need to examine HAI in conjunction with other experiences in a youth's life, and how multiple OST experiences may interact in a supportive and collaborative way.

Finally, youth (and adolescents in particular) may become involved in HAI within an employment setting. The role of families in adolescent employment is changing in the United States, with fewer adolescents employed in the context of family farms or agricultural enterprises than a century ago, when the Future Farmers of America (FFA) program was founded (National Future Farmers of America Organization, 2012). However, youth are still becoming involved in agricultural training that may involve animal experiences (FFA reports a current membership of over 500,000 members ages 12-21; National Future Farmers of America Organization, 2012), and other animal-related organizations such as shelters or advocacy groups. Veterinary medicine is also a growing field (current membership in the American Veterinary Medical Association [AVMA] includes over 80,000 veterinary professionals in the United States; AVMA, 2012), and youth may become involved in employment opportunities that are related to an interest in a career in animal husbandry or veterinary science. Future research should address the potential role animal-related interests in framing the employment and vocation choices of young people.

Type of Animal

In combination with the structural features of HAI experiences, one of the most important and variable factors in youth HAI is the type of animal involved in the interaction. As previously noted, it may be that the nature and quality of HAI is influenced by the species involved; a relationship with a pig that is being raised for food purposes is likely associated with different behaviors, emotions, and

youth outcomes than a relationship with a domesticated cat that lives in the household. To fully understand how and why youth become involved in HAI experiences, more research is needed to explore what individual attributes (e.g., youth desire to care for an animal) and contextual factors (e.g., whether the animal will be a household pet) contribute to youth choosing to engage in relationships with particular kinds of animals, and how animal choice is embedded within the structural qualities of the HAI experience. Such knowledge would be useful in attempts to optimize the probability of engaging youth in animal relationships that are associated with adaptive developmental regulations.

For example, choice of animal may be impacted by the degree to which certain species are able to be domesticated and trained to fit the needs of the human-animal relationship. Dogs have become one of the most ubiquitous species involved with humans, serving a range of purposes such as household pets, service dogs, and hunting dogs. As previously noted, humans have a long history of co-existing with dogs (Wendt, 1996). One of the possible reasons for our deep connection to dogs in particular may be the ease with which humans have been able to adapt dog breeds to fit a multitude of different needs and purposes. Indeed, there is a vast range of dog breeds (over 150 breeds are recognized by the American Kennel Club; Herzog, 2006). These breeds manifest variation in size, head shape, speed, agility, strength, and temperament. Due to this variation, there are dog breeds that have been domesticated, bred, or trained by humans for many specific tasks. Therefore, dogs are a popular type of animal for youth to become involved with because of their flexibility and versatility.

The example of human manipulation of dog breed characteristics illustrates the point that humans recognize the need to choose (or develop) animals who are appropriate for the specific relationships we are engaging in with these animals. The appropriateness of an animal for his or her function within the human-animal relationship is critical to the success of this relationship. Therefore, a crucial aspect of engaging youth in HAI experiences may be finding a particular type of animal or breed of animal that fits the specific needs and goals of the individual. Understanding how to maximize “goodness-of-fit” (Chess & Thomas, 1996) in the relationship between the youth and the animal may serve an important role in both engaging youth in HAI initially, and keeping them involved over time.

Quality of Human-Animal Relationship: Attachment and Commitment

While it is critical to understand the structure and patterns of youth HAI experiences, as well as the type of animal involved in the interaction, it is also important to recognize and explore the impact that the nature of the specific relationship between a youth and an animal may have on the outcome of the experience. Humans have a long evolutionary history of involvement with animals (Wendt, 1996), and humans demonstrate the unique behavior of keeping members of another species purely for enjoyment (Herzog, 2010). What are the bases and manifestations of our attachment to animals?

This question can be explored through a variety of theoretical perspectives, including evolutionary, cultural, and emotional reasons for our attachment to animals. Although some animals (household pets in particular) have

no tangible function, we still continue to devote resources to these animals.

According to APPA (2012), Americans spend over \$20 billion on pet food, over \$13 billion on veterinary care, and over \$12 billion on pet supplies per year.

Furthermore, 70% of pet owners say that their animals are sometimes allowed to sleep in their bed, and many note that they buy their pets presents, cook meals for them, and dress them up (Herzog, 2010). Given the monetary and emotional investment humans devote to pets alone, it is clearly important to recognize and explore the strength of human attachment to animals, and how this attachment may impact the causes and consequences of youth HAI experiences.

The nature and impact of human attachment to pets in particular has been explored in depth in the extant literature. Attachment to pets has been linked to a host of outcomes including, but not limited to, generativity (Marks, Koepke, & Bradley, 1994), mental health (Budge, Spicer, Jones, & St. George, 1998), and empathy and prosocial orientation (Vidović, Štetić, & Bratko, 1999). Attachment has also been consistently predictive of grief after pet death (Adams, Bonnett, & Meek, 2000; Gosse & Barnes, 1994).

In general, while humans' attachment and commitment (whether financial or emotional) to their pets is fairly well documented (e.g., APPA, 2012; Stallones, Johnson, Garrity, & Marx, 1990), attachment and commitment to animals have not been fully explored vis-à-vis their impact on youth HAI experiences. The majority of existing research focuses on youth relationships to household pets, and there is a paucity of research that explores the nature of animal relationships that are related to competitions, raising livestock, or other structured purposes

where youth may become involved with animals. In these various settings, when do human-animal interactions become relationships that involve a level of commitment and emotional attachment? It may be that there are differences in cognitions about and expressions of emotional attachment and commitment of resources to animals across both species and settings, and, as well, the structure and pattern of HAI may have a differential impact on the outcomes associated with such experiences. Cultural context may also play a role; animals serve various purposes across cultures (e.g., a dog may be a companion in one culture, but a food source in another), and cultural attitudes about animals may impact the nature of youth attachment to animals (e.g., youth may likely feel less emotional attachment toward animals who will become food). Thus, to truly provide a nuanced understanding of youth HAI, a key task of future research is to explore the way in which youth express attachment and commitment to animals across a variety of settings.

HAI and Positive Youth Development (PYD)

Although it is critical to explore in detail the various aspects of the structure and sequence of youth HAI experiences that may impact positive developmental outcomes, it is equally important to develop a coherent theoretical framework to explain exactly *how* HAI experiences may affect development in positive ways. Given the variation in nature and quality of HAI experiences, the nascent field of youth HAI research should be framed by a developmental perspective that focuses on ascertaining the role of HAI in various pathways to PYD.

Relational developmental systems theory (e.g., Overton, 2010, 2011; Overton & Müller, 2012) provides a developmental perspective about how HAI may play a role youth's lives as they progress across the adolescent period, depicting the person-context relational processes (represented as individual \leftrightarrow context relations) that may be involved in health-promoting and positive exchanges between individuals and contexts. These exchanges are termed "adaptive developmental regulations" (Brandtstädter, 1998). An animal-related experience may be an example of a context for development that affords youth the opportunity to foster mutually beneficial adaptive developmental regulations.

The mutually influential relationship between an individual and an animal may be a clear manifestation of adaptive developmental regulations. This mutually beneficial relationship between a person and an animal is embedded within a developmental system, and therefore it is important to consider the specific outcomes that may be related to the dynamic relationship that exists between person and animal. As previously noted, the particular outcomes related to an individual's relationship with an animal may differ with respect to the specific structural or functional qualities of the relationship. As well, the relationship may be impacted by various systemic influences (e.g., the role of parents in facilitating youth-animal relationships). Thus, it is important to use a positive youth development perspective grounded in relational developmental systems theory as a foundation for proposing potential domains of adaptive developmental regulations that should be studied as we begin to construct the field of developmental HAI research. Such correlates may involve youth life

purposes, the development of intentional self-regulation skills, social skills, complex moral reasoning, physical health and fitness, and caring and responsibility. Finally, it is critical to discuss issues of access and resources related to youth engaging in positive HAI experiences.

It is important to acknowledge that HAI may not always be related to beneficial outcomes. While people prefer to hear about the positive aspects of animal ownership (Herzog, 2011), several studies have in fact noted that pet owners (and, in particular, individuals who demonstrated an extremely high level of attachment to their pets) displayed higher levels of psychological problems such as depression, insomnia, and anxiety than non-pet owners (Miltiades & Shearer, 2011; Müllersdorf, Granström, Sahlqvist, & Tillgren, 2011). While the present paper focuses on the positive outcomes associated with animal interaction, it is important to note that HAI may not be universally beneficial and to recognize the contexts in which animal experiences may not be appropriate or advantageous. A taxonomy of positive and problematic instances of HAI should be a focus of future research.

Purpose

One potential outcome that may result from, or be influenced by, a mutually beneficial youth \leftrightarrow animal relationship is purpose. Damon (2008) defines purpose as “a stable and generalized intention to accomplish something that is at once meaningful to the self and consequential for the world beyond the self” (p.33). It is an “ultimate concern” or overall goal for one’s life, helping to organize one’s life decisions and actions, and is thus manifested in one’s

behavior. The purpose is internalized, or “owned” by the individual, and therefore is central to his or her identity. However, youth may not manifest purpose in the same way, and variations in purpose may place adolescents into distinct subgroups, for instance, having purposes that pertain to athletic performance (Zarrett et al., 2007), to religious service (King, Carr, & Boitor, 2011), or to political activity (Zaff, Hart, Flanagan, Youniss, & Levine, 2010).

Among the myriad ways in which young people can set goals that transcend self-interest, one study found that a small but substantial proportion of adolescents from diverse backgrounds point to the nurturing, care, and interaction with animals as a key purpose in their lives (Mueller et al., 2013). This emphasis on human-animal interaction may be manifested in different ways by youth from different racial, ethnic, religious, or cultural-origin backgrounds. Nevertheless, across such variation HAI is a prominent part of diverse youth’s interests, motivations, and purposes.

Damon’s conception of purpose highlights that purpose involves goals that are far-reaching and stable, as compared with short-term, “lower-level” goals (e.g., winning a sports game). Purpose involves one’s search for deeper meaning that is often beyond self-interest and involves contributing to others. Therefore, when identifying youth who demonstrate purpose in the domain of HAI, it will be important to recognize how their participation and engagement in an animal-related activity or experience is a meaningful and purposeful part of their lives. An animal-related experience provides a context in which youth can become engaged in a purposeful goal that is long-term and stable. HAI involves

developing a relationship with an animal (or multiple animals), and the development of such a relationship involves time, and behavioral (and, perhaps as well, emotional) commitment. To have a successful and meaningful HAI experience, a relationship with an animal requires contribution beyond the self, that is, it involves cultivating a relationship with the animal and taking ownership of the animal's well-being. HAI may be a means by which young people can engage in a mutually beneficial relationship with their environment, one that capitalizes on their affection for, and interest in, animals as a manifestation of their purpose and as a pathway to PYD.

Intentional Self-Regulation Skills

Research on the strengths that youth bring to their interactions with their social contexts has increasingly assessed adolescents' abilities to seek out and acquire resources in their environment. For example, research by Gestsdóttir and colleagues (e.g., Gestsdóttir & Lerner, 2007, 2008; Gestsdóttir, Lewin-Bizan, von Eye, Lerner, & Lerner, 2009), building on the research of Baltes and colleagues (Baltes & Baltes, 1990; Freund & Baltes, 2002) has provided support for the notion that intentional self-regulation (ISR) behaviors, involving the selection of goals, acting to optimize the resources needed to make such goals a reality, the ability to compensate effectively when goals are blocked, and the ability to reorganize one's goal system due to the loss of the capacity to achieve the goal (loss-based selection), are skills that youth can use to seek out and maximize resources in the environment. These selection (S), optimization (O), compensation (C), and loss-based selection (LBS) skills provide a set of cognitive, emotional,

and behavioral attributes that an individual may employ to contribute to mutually beneficial relations (i.e., adaptive developmental regulations) with his or her context (Freund & Baltes, 2002; Gestsdóttir & Lerner, 2008; Lerner, Freund, De Stefanis, & Habernas, 2001).

This SOC model thus offers a framework for understanding adolescents' abilities to influence or select from and use the resources in their contexts for the purpose of promoting positive, adaptive social relationships. Prior research has indicated that SOC skills are predictive of PYD outcomes (e.g., Gestsdóttir & Lerner, 2007; Zimmerman, Phelps, & Lerner, 2007), with high SOC scores associated with the highest PYD trajectories (Zimmerman, Phelps, & Lerner, 2008). It may be that developing a meaningful relationship with an animal requires a unique set of goal-related skills. The ability to maximize contextual resources may be critical in developing and maintaining a positive and mutually beneficial relationship with an animal. Animals, by nature, are relatively unpredictable, and any long-term relationship with an animal will certainly involve both challenges and setbacks. Therefore, possessing and developing compensation and loss-based selection skills may be particularly important for youth who are committed to an HAI-related purpose or goal.

For instance, Mueller and colleagues (2013) found that, in a sample of 10th grade students, youth who identified having an HAI experience demonstrated a more differentiated instantiation of ISR, with distinct factors emerging for selection, optimization, and combined compensation/loss-based selection, as compared with non-HAI youth who showed a more general ISR structure, with

essentially no differentiation between optimization, compensation, and loss-based selection. Thus, to have a successful, adaptive social relationship with an animal (as compared to another human), youth may need to hone their ISR skills in a specific way to maximize the person \leftrightarrow context relationship, having the purpose of promoting positive developmental outcomes that are associated with adaptive human-animal relationships.

Many of the youth in the Mueller et al. (2013) study whose purpose involved animals cited some aspect of being responsible for the care of animals or interacting with animals in a competitive setting (e.g., horse showing, dog agility) as the most meaningful activity in their lives. Within these particular cases of human-animal relationships, it is likely that the animal will present the youth with distinct challenges at some point in the experience (e.g., behavioral or health-related challenges). As compared with other goals or purposes cited by youth (e.g., being successful in school, competing in a sport, developing relationships with family members), the youth may have less direct control over the course and direction of his or her relationship with an animal, and youth may not be able to succeed in human-animal relationships using optimization skills alone. Although these animals are domesticated, their behavior may nevertheless not be entirely predictable. Such an HAI situation may provide a more likely context for the youth to face challenges in which they will need to use specific compensation or LBS skills to develop and maintain a successful relationship with the animal.

Although this initial research is limited by its exploratory, cross-sectional nature, these findings provide preliminary support for the notion that the structure

of human-animal relationships, as compared with human-human relationships, may be associated with different manifestations of the abilities that promote adaptive developmental regulations. Given the importance of ISR skills in impacting multiple levels of function, it will be critical to ascertain whether some instantiations of HAI experiences promote the development of these skills, or if youth who have highly developed ISR skills are more likely to self-select into HAI pursuits.

Social Skills

Another important domain of inquiry related to the impact of adaptive developmental regulations resulting from a mutually beneficial human-animal relationship is that of social skills. In human-human relationships, regulation and awareness of facial expressions and mutual eye contact are critical to engaging in positive social interactions (Argyle, 2009). Similarly, animals (such as dogs) are particularly sensitive to their owners' change in facial features and eye contact, and gaining and maintaining eye contact is a critical feature of sustaining an animal's attention to effectively communicate with it (Serpell, 1986). Therefore, interaction with an animal may serve as a means of "practicing" appropriate facial features and eye contact, and these skills may translate to human-human relationships.

On a more macro-level, the presence of animals can serve as a catalyst for social relationships among people. An experiment conducted in France found that women were significantly more likely to give their phone number to an attractive man when he was with a dog than when he approached them without a dog

(Gueguen & Ciccotti, 2008). The same researchers also found that people were more likely to give “bus money” to a confederate with a dog than one without a dog. These studies and others contribute to the notion that animals can serve as social facilitators to conversations or interactions, whether it be by providing a topic of conversation or conveying a sense of responsibility; the mechanisms of this phenomenon are still not clearly empirically delineated (e.g., see Serpell, 2000).

Future research should focus in particular on the parallels between youth-animal and human-human social relationships. The presence of an animal may simply afford youth the opportunity to interact with peers. In addition, if a connection exists between the skill sets required for these relationships, then it might be useful to capitalize on animal relationships as a way to promote the development of social skills. In fact, one study found that beneficial effects of pet ownership were highest with the participants who had the fewest friends (Allen et al., 2001), thus providing preliminary support for the notion that animal relationships may be helpful to individuals who need assistance in developing social skills. While animals provide feedback with regard to the effectiveness of a human’s social cues, they are not judgmental and therefore may provide a context in which youth feel safe to interact and express emotions.

Moral Orientation

Animals occupy many diverse functions and purposes in human ecology. These many functions highlight the importance of animals in our lives, but they also create moral challenges in how we think about the role of animals and about

our responsibility to treat them with respect. It may be that these challenges offer an opportunity for youth to develop nuanced ways of handling difficult moral issues.

Although many people are often very fond of animals, many people also find the need to support the use of animals for purposes that cause them harm (e.g., biomedical research) and to justify these actions (Knight & Herzog, 2009). As such, cognitions and actions related to animals can often be contradictory. For example, one study exploring the relationship between animal activism and vegetarianism found that over half of the animal activists reported eating meat (Herzog & Golden, 2009). Although the animal activists devoted much of their time and thought to promoting animal rights, they were still able to justify the use of animals for food.

The complicated moral issues related to animals are associated with the use of complex cognitive strategies. For example, individuals often claim to use a mental cost/benefit analysis when evaluating animal use scenarios, such as hypothetical animal research proposals (Galvin & Herzog, 1992). Social intuitionist theorists suggest that humans use a two-pronged approach to addressing difficult moral issues. Individuals first respond in an intuitive, emotional way, and then use deliberative logic to justify the emotion-based decisions (Haidt, 2001, 2008). In addition to these strategies, individuals also use socially institutionalized moral distancing language as a way of linguistically separating animals that we are emotionally attached to from animals that are used for food or research (Herzog, 2010). This moral distancing can take place in the

terms that are used to describe animals. People may refer to a cow sitting in a field, but use the term beef when talking of food on their plates. The level and degree of moral distancing can be culturally specific. In the United States, people name their dogs and may let them sleep on their beds, while in Saudi Arabia, dogs are viewed as vermin (Herzog, 2010).

If being involved with animals requires a nuanced way of thinking about moral situations, then HAI may be an important context for the development of moral reasoning and behavior. How people think about and treat animals can reflect how they treat other human beings (Knight & Herzog, 2009). Therefore, learning respect for other living creatures and working through complicated moral scenarios may be yet another way in which animal experiences may serve as a context for promoting positive development for youth.

Health and Physical Fitness

As previously noted, pet ownership can have favorable association with health outcomes, such as reduction of stress (Barker & Dawson, 1998; Friedman et al., 2011) and obesity (Bauman et al., 2001). However, the literature describing the role of animals on health outcomes is limited by the lack of longitudinal data exploring the impact of various animal experiences on the development of youth health.

Nevertheless, despite the paucity of data, the information that does exist suggests that involvement in animal-related activities may be important in addressing health outcomes. For instance, young children in dog-owning families are often less likely to be overweight or obese than children in families without

dogs (Timperio, Salmon, Chu, & Andrianopoulous, 2008). Although much of the existing research does not control for selection effects (e.g., families may choose to own a dog, in part, because they already enjoy being active), findings such as these reveal that it may be useful to explore how long-term relationships with animals may be associated with health and physical fitness. To create effective and empirically-predicated health interventions and programs involving animals, future research should explore how the various configurations of animal experiences (with respect to type of animal, structure of experience, and duration of involvement) differentially impact health outcomes such as stress mitigation, obesity, nutrition, and healthy habits.

Similarly, there is little research documenting the role of animal experiences in promoting continued engagement in athletic activity and positive body image. Sports and activities such as competitive horseback riding, dog showing, livestock breeding, and 4-H club often involve physical activity. It may be that animal activities provide a particularly engaging context for physical activity for some youth who may not have interest in participating in other sports or activities. Future research should explore youth-animal experiences in the context of physical activity to fully explore the potential benefits that may be associated with animal experiences.

Caring and Responsibility

Finally, there is reason to consider the role of animals in helping youth develop nurturing behaviors such as caring and responsibility. Katcher and Beck (1987) noted that the type of physical and verbal dialogue that humans use when

interacting with animals closely resembles the characteristics of nurturing behavior that exists between parents and young infants. These authors suggest that caring for others is a fundamental aspect of human functioning, and caring for animals is an important component of maintaining this nurturing behavior. There is even some empirical evidence that young children may, in part, develop knowledge about nurturing from care of domestic animals (Melson & Fogel, 1989).

Indeed, some research from the animal-assisted therapy domain suggests that youth who participate in these therapeutic programs often demonstrate an increased sense of responsibility (Chardonens, 2009). Educational interventions have provided similar results; exposure to and education about animals have been associated with an increased sense of responsibility (Mariti et al., 2011). Educational interventions may be, then, a particularly useful venue for teaching youth about caring and empathy toward both humans and non-human animals (Ascione, 1997).

Accordingly, existing evidence suggests that further exploration into the link between HAI and the development of caring, empathy, and responsibility is warranted. Nevertheless, further empirical investigation is necessary to determine what specific contexts of caring and responsibility may be impacted by animal experiences, such as the development of interpersonal relationships, or responsibility in school and at home. Specifically, this research should include longitudinal exploration of what particular animal contexts in conjunction with

which individual attributes are associated with the adaptive developmental regulations involving characteristics of caring, nurturing, and responsibility.

In sum, the extant literature exploring the positive developmental benefits of human-animal experiences is limited with respect to sampling, study design, and developmental theory (Esposito et al., 2011). Nevertheless, the scholarship that does exist points to many possibilities for the ways in which human-animal experiences may promote PYD. In addition to conducting methodologically rigorous, theoretically-predicated developmental studies involving the role of HAI in promoting positive developmental outcomes, the emerging field of youth HAI research must also identify strategies to get more youth involved in HAI activities in optimal ways.

Youth Involvement in HAI: Resources and Access

How is it that youth become involved in HAI experiences? If HAI experiences do constitute a context for promoting adaptive developmental regulations, then it is important to understand what individual or contextual factors play a role in youth access to and engagement in HAI. For those youth involved in HAI, research should identify the factors associated with keeping youth involved in HAI experiences over time.

There are several factors related to resources and access to animals that may impact an individual's ability to become and stay involved in animal-related experiences (specifically, experiences that involve providing for the health and well-being of an animal; raising animals as food sources may not present the same issues of resources and access). For example, caring and providing for an animal

can involve a significant commitment of monetary resources. Involvement in an activity such as competitive horseback riding can be prohibitively expensive, with costs related to horse ownership, travel to competitions, and instructor fees.

Household pet ownership can even be quite costly, with lifetime costs averaging \$8,000 for a medium-sized dog and \$10,000 for a cat (Herzog, 2011). As the field of veterinary medicine continues to develop new, cutting-edge procedures, animal owners are faced with increasingly difficult decisions about how much money they are able or willing to spend on their animals' medical treatment (Grimes, 2012).

The costs associated with owning an animal or participating in an animal-related activity may limit access to these experiences for many youth. Siegel (1995) found that pet ownership in adolescence was more common among households with annual incomes over \$40,000 per year than those with lower incomes. If human-animal experiences constitute a pathway for positive youth development, then a key task is to identify ways in which the cost of animal interaction can be reduced to become accessible to youth who may not otherwise have the resources to engage in animal experiences. Such solutions may involve providing animal experiences in school settings, or engaging more youth in animal-related youth programs such as 4-H.

Related to commitment of financial resources, residential location can dramatically influence youth's access to animals. Youth who live in detached, single family homes are more likely to own pets than youth who live in a multiple-family dwelling (Siegel, 1995). Living in an urban location may decrease

the space available for having pets or developing animal-related programs or activities as compared to youth who live in suburban or rural settings. In the service of increasing access for all youth to animals and animal activities, creative solutions involving collaboration among families, schools, and communities may be necessary to provide the resources and space necessary to afford youth with an ecological context that supports involvement in human-animal experiences.

The Present Studies

The field of youth HAI research is a new but, nevertheless, key area of scholarship. Animal interaction is an important aspect of the lives of many young people, and the ubiquitously engaging nature of interacting with animals affords an opportunity to use animal experiences to promote positive developmental outcomes. The existing empirical research pertaining to HAI is largely non-developmental, and does not adequately explore how animal experiences may influence positive youth development. It does not elucidate how these relationships vary in structure and function. For instance, there are no extant data indicating if, as youth develop, the nature of the bidirectional, mutually influential relationship between youth and animals evolves in the service of maintaining the adaptive nature of the relationship. However, despite the limitations of the existing HAI scholarship with respect to addressing positive youth development, interest in the field is rapidly increasing (Gorman, 2012), thus providing a timely opportunity to develop systematic programs of research that address the importance of animals for young people. The field of HAI research among adolescents should involve theoretically-predicated, methodologically rigorous

programs of longitudinal research that describe the diverse array of youth-animal experiences and their implications for development in childhood, adolescence, and beyond.

As such, the key tasks of this dissertation are to use a PYD-based theoretical framework as a conceptual basis for creating and refining a developmentally appropriate, psychometrically-sound measure of human-animal experiences. The measure is intended to index the processes associated with youth \leftrightarrow animal adaptive developmental regulations. It will be used to assess how these developmental regulations involving youth-animal relationships are manifested in adolescence. These goals will be addressed in a three-step process noted below.

Chapter 2, *Measure Development and Validation*, will use a theoretically-based process of scale development to create an HAI questionnaire appropriate for use in adolescence and young adulthood. The scale is intended to operationalize the structure and patterns of youth HAI experiences, and attitudes and cognitions about animals. I will first use the existing, relevant literature in conjunction with information from already-existing measures to create an initial HAI questionnaire.

Next, I will use feedback from expert raters in conjunction with pilot data to both reduce and refine the item pool. I will use pilot data from a sample of undergraduate students to provide initial information about the quality, psychometric properties, and convergent validity of the HAI questionnaire. Exploratory factor analysis will be used to evaluate the structure of the emotions

and cognitions about animals scales, and to identify items that should be dropped from the measure. Finally, the pilot data will be used to provide initial, exploratory information about the existing patterns of youth HAI experiences, and the potential relationships between HAI and positive developmental outcomes.

In turn, Chapter 3, *HAI and Positive Youth Development*, will use data from the final HAI questionnaire developed in Chapter 2, which was included in the final wave of the 4-H Study of Positive Youth Development, a longitudinal study of adolescence from Grade 5 through early college. These data will be used to: 1. assess the patterns of HAI experiences in a national sample of late adolescents and young adults, 2. identify potential contextual influences of residential locale on HAI experiences, and 3. explore in more detail the relations between HAI and positive developmental outcomes.

The overall goal of this dissertation is to provide a step forward in the field youth HAI scholarship by addressing the need for theoretically-predicated, developmentally appropriate measurement tools and, as well, research that explores the role of HAI in adaptive developmental regulations. The present research aims to further our knowledge about the role of HAI as a context for health promotion. The research seeks to ascertain if HAI is an important context for positive youth development.

CHAPTER 2: Measure Development and Validation

Although engagement in animal-related relationships and experiences is a ubiquitous context in the lives of many young people, Chapter 1 noted the paucity of theoretically-predicated, developmentally-oriented indices of HAI that are both appropriate for use in childhood and adolescence and useful for understanding the potential positive benefits of HAI experiences. The present study aims to take an initial step in developing useful measures that, as suggested in Chapter 1, operationalize the structure and patterns of youth HAI experiences, and the emotions and cognitions about animals that may be associated with positive developmental outcomes. The approach taken in this scale development process was to use existing theory and measurement models to develop an initial item set measuring the above noted domains of HAI. Next, expert raters were used to assess the utility of each item, and to provide information to reduce and refine the item pool (in conjunction with pilot data, see below). Finally, pilot data were used to provide initial, exploratory information about the association between HAI and positive development.

Structural Characteristics of HAI

As noted in Chapter 1, a key aspect of assessing the relationship between HAI and development is ascertaining the specific nature and composition of HAI experiences. In the service of understanding the mechanisms driving adaptive person \leftrightarrow context relations involving HAI, we first must understand what constitutes HAI experiences for youth in various contexts. Therefore, a critical component of developing new indices of HAI was incorporating items measuring

the structural characteristics of HAI. The theoretical perspectives framing the choice of items measuring the structural qualities of HAI were drawn largely from the literature exploring the structural characteristics of youth out-of-school-time (OST) activity participation (e.g., Mueller, Lewin-Bizan et al., 2011; Zarrett et al., 2007, 2009).

As suggested in Chapter 1, it is important to assess the type of animal involved in the human-animal relationship, as the differing characteristics of such animals could potentially impact the nature of the relationship. Therefore, the first item added was an index of animal ownership, asking what kind of pet(s) or animal(s) the individual has (i.e., dog, cat, horse, fish, bird, lizard/snake/turtle/other reptile, hamster/guinea pig/other rodent, rabbit, goat, pig, cow, or other [with space to fill in]; see Appendix A, Item 8). To delineate the degree to which a youth is involved in the care of the animal, one item was also added asking how often the individual is responsible for the animal's care (Appendix A, Item 3).

In addition to pet/animal ownership, nine items were developed to index participation in animal-related activities. Such activities included horseback riding, dog showing, livestock competitions, animal-related 4-H clubs, animal therapy (recipient or volunteer), work in an animal shelter, animal-related club or extracurricular activity, or other (fill in); see Appendix A, Item 16. Consistent with findings suggesting the impact of intensity (frequency) of participation on positive outcomes associated with OST activities (Mueller, Phelps et al., 2011), the item stem structure was "How often do you participate in the following

activities?” with response options ranging from “never or rarely” to “almost every day.” Similarly, past research on youth programming also has supported the importance of duration or length of activity participation (Mueller, Phelps et al., 2011). Therefore, items were added to measure the number of years of participation in each of the above noted activities (see Appendix A, Item 17).

Cognitions and Emotions about Animals: The ACM HAI measure

In addition to the structural characteristics of HAI, it is important to develop scales that measure developmentally-appropriate constructs related to youth emotional and cognitive orientations toward animals. In Chapter 1, I discussed many potential correlates of HAI experiences. However, the goal of the present measure development process was to create indices of HAI that operationalize feelings and thoughts about animals that may be potential mechanisms through which youth become involved in and benefit from HAI experiences.

Attachment

As described in detail in Chapter 1, a critical component of understanding the quality of human-animal relationships is attachment. In conceptualizing animals as part of the ecology of human development, understanding the processes that promote adaptive human \leftrightarrow animal relationships includes the strength and quality of the connection between an individual and an animal. As a result of domestication, animals are often reliant on humans for the fulfillment of basic needs. However, as Serpell (1989) notes, contemporary animal ownership (pet ownership, more specifically) does not necessarily involve any tangible or

obvious benefit to the human. Therefore, it is important to understand the mechanisms driving humans' continued interaction with animals, especially with regard to pet ownership.

One explanation that has been explored is emotional attachment to animals. As previously noted, attachment to pets has been associated with various positive outcomes (e.g., mental health, Budge et al., 1998; or empathy and prosocial orientation, Vidović et al., 1999). While there is literature documenting the correlates of animal attachment, there is little developmental research exploring attachment as a component of systemic, adaptive individual \leftrightarrow context relations involving animals. Therefore, the goal of this study was to use information from existing attachment measures to inform the development of a measure of attachment appropriate for use in adolescence and that could be used in the context of assessing the development of adaptive human \leftrightarrow animal relationships during this portion of ontogeny.

Although there is, in general, a paucity of high quality measurement tools indexing animal relationships for young people, attachment is one area of scholarship that has many available measurement instruments (e.g., CENSHARE Pet Attachment Scale, Holcomb, Williams, & Richards, 1985; Child Pet Attachment Scale, Melson, 1988). For this study, three attachment items (see Appendix A, Items 1, 5, and 24) were adapted from the Comfort from Companion Animals Scale (CCAS; Zasloff, 1996). In addition, five items were adapted from the Lexington Attachment to Pets Scale (LAPS; Johnson, Garrity, & Stalones,

1992). All eight of these items were adapted to reflect general animal ownership (instead of pet ownership in particular) and developmental appropriateness.

Commitment

Related to, but distinct from attachment, is individuals' commitment to animals. As previously noted in Chapter 1, many humans devote a considerable amount of financial resources to animals. In the United States, Americans spend well over \$50 billion dollars a year on pet supplies and care (APPA, 2012), and the equestrian industry has a \$102 billion impact on the U.S. economy (American Horse Council, 2012). In addition, the rate of pet ownership (over 62% of U.S. homes own a pet; APPA, 2012) suggests that families are willing to commit their time to the care of an animal.

Given the significant commitment that many individuals are willing to invest in animal-related pursuits, it is important to index such commitment to help begin to understand both why humans are willing to invest such resources in animals, and what impact this commitment may have to maintaining a mutually beneficial and/or long term context for human-animal interaction. Furthermore, it is useful to measure commitment in a way that accesses both emotional and financial commitment to animals. Such commitment may be particularly relevant for adolescents and young adults, who may be becoming increasingly aware of the financial and effort-related resources that animal care requires. To index such commitment, one item was adapted from the LAPS (Johnson et al., 1992), and four items were adapted from the Miller-Rada Commitment to Pets Scale (Staats, Miller, Carnot, Rada, & Turnes, 1996). Again, these items were adapted to reflect

more general animal interaction and developmental appropriateness (see Appendix A, Items 10, 11, 14, 18, and 23).

Moral Orientation

Finally, as described in Chapter 1, interacting with animals provides a unique opportunity for youth to grapple with difficult moral issues. Animals have many purposes in human life. These functions highlight the importance of animals in human life. However, they also create challenges in how individuals conceptualize the role of animals and the degree to which animals are viewed as having rights and privileges. Therefore, it was important to include items indexing youth orientation toward issues of morality related to animals. Similar to attachment and commitment, the degree to which an individual views an animal as having rights may impact becoming and staying involved in HAI, and, in addition, the outcomes associated with HAI experiences. We need to understand how youth perceptions of animals' roles vis-à-vis humans' needs and desires impacts the mechanisms and processes involved in promoting adaptive individual \leftrightarrow context relationships.

To index youth moral orientation toward animals, six items were used with author permission from the Animal Attitudes Scale (Herzog, Betchart, & Pittman, 1991), and two items were adapted from the LAPS (Johnson et al., 1992). It is important to note that higher scores on these items do not indicate that an individual is more highly developed with regard to morality; instead, such scores reflect youth orientation toward moral issues related to animals (e.g., the degree to which animals are deserving of humane treatment, rights, and respect).

As researchers, we are not directly measuring individuals' morality. Instead, we are interested in how orientation to issues of morality related to animals may predict various types of, and outcomes from, HAI experiences.

Expert Rater Review Process

Subsequent to the initial process involving the theoretical selection and adaptation of the four items indexing structural characteristics of HAI experiences, and the 21 items indexing attachment, commitment, and moral orientation toward animals (termed the Attachment-Commitment-Moral Orientation Human-Animal Interaction Measure; or ACM-HAI) an expert review process was used to achieve several goals. The expert reviewers consisted of veterinarians (DVM or DVM/PhD), developmental scientists (PhD), and medical doctors (MD). The group was assembled to provide a range of raters who were familiar with animals in clinical and therapeutic settings, and/or who had knowledge of human development and developmental measurement techniques. Reviewers were given definitions of each of the four domains being measured (structural aspects/nature of HAI experiences, attachment, commitment, moral orientation) and were asked to rate how well each item represented each of the domains. Ratings were made on a scale from 0 (does not fit at all) to 10 (fits extremely well). See Appendix A for the expert rater questionnaire.

The goals of the review process were to: 1. assess if expert raters would place items in the theoretically generated domain, 2. identify any items that were a poor fit, 3. identify any items that may have dual-loadings in multiple domains, and 4. to suggest any items that may need to be modified or re-worded. In general,

there was agreement among the expert raters with regard to many of the items. Several wording adaptations were suggested and used to create the HAI questionnaire used for pilot study (see Appendix B). The expert rater review feedback was then used in conjunction with the pilot data (see below) to reduce and refine the item pool into the final questionnaire used in Chapter 3 (Appendix C).

Pilot Study and Measure Validation

Subsequent to the theoretical development and expert rater review of the HAI items involving structural characteristics of HAI and the ACM-HAI measure, a pilot study was conducted to empirically evaluate the utility and psychometric properties of the measures. The purpose of the pilot study was to 1. provide descriptive information about the presence of animal experiences in the lives of young adults, 2. validate the ACM-HAI measure, and 3. begin to explore the relationship between HAI experiences and positive development.

Method

Participants and Procedure

The Correlates of Positive Youth Development (C-PYD) Study assessed various constructs theoretically related to hope, including future orientation, goal-setting skills, and positive and negative developmental outcomes. Participants were recruited through posters on the university campus and through social media websites (e.g., Facebook). Individuals were invited to participate in an approximately 30 minute online questionnaire, which included various indices of individual and contextual bases of positive development and thriving (including

the HAI questionnaire). The sample consisted of 196 undergraduate students, ages 18 to 25 ($M = 20.4$ years). The participants were 69% female, and self-reported as 68.5% White/Caucasian, 12.5% Asian/Asian American, 6.6% Hispanic/Latino, 3.0 % Asian Indian/Indian-American, 2.5% African American, 5.6% multiethnic, and 1.0% other. Although this sample is overrepresented with regard to women (the overall Tufts University student body is about 50% women), it is relatively representative with respect to racial and ethnic diversity (approximately 30% of Tufts students identify as students of color).

Measures

Structural characteristics of HAI. As noted earlier in this chapter, participants were asked to answer 21 items about the nature and type of their animal-related experiences, such as whether they currently have any animals, what type of animals they have, and how often they were responsible for their animal's care (if applicable). Participants also were asked about their participation in various animal-related activities (e.g., horseback riding, dog showing, animal-related clubs or extracurricular activities, animal-assisted therapy), and the duration (in years) that they participated in that activity.

ACM-HAI. The 21 items of the ACM-HAI measure were included in the survey. As previously noted, the ACM-HAI measure indexes three domains of cognitions and emotions related to animals: youth emotional attachment to an animal, cognitions and feelings about financial and emotional commitment to animals, and moral orientation toward animals. Appendix B presents the pilot

study HAI questionnaire with the items measuring the structural features of HAI as well as the ACM-HAI measure.

Positive Youth Development. Youth thriving was indexed by a 34-item short version measure of Positive Youth Development (PYD; Bowers et al., 2010; Geldhof et al., in press; Lerner et al., 2005). PYD is calculated as a mean score of the Five Cs (Competence, Confidence, Connection, Character, and Caring, ranging from 1-5; in past research, a long form, 80+ item version with a range of 0 to 100 was used; Phelps et al., 2009, see Geldhof et al., in press for comparisons of versions.).

Competence is a positive view of one's actions in domain-specific areas including the social and academic domains (6 items; e.g., "I am just as smart as others my age"). Confidence is an internal sense of overall positive self-worth, identity, and feelings about one's physical appearance (6 items; e.g., "I am happy with myself most of the time"). Character involves respect for societal and cultural rules, possession of standards for correct behaviors, a sense of right and wrong, and integrity (8 items; e.g., "Helping to make the world a better place to live in"). Connection involves a positive bond with people and institutions that are reflected in healthy, bidirectional exchanges between the individual and peers, family, school, and community in which both parties contribute to the relationship (8 items; e.g., "My friends care about me"). Finally, Caring is the degree of sympathy and empathy, i.e., the degree to which participants feel sorry for the distress of others (6 items; e.g., "When I see another person who is hurt or upset, I feel sorry for them.").

All scales are calculated as mean scores of the individual items (ranging from *Strongly Disagree* [1] to *Strongly Agree* [5]). Higher scores represent higher levels of the Five Cs and therefore, higher levels of thriving, with scale scores ranging from 1 to 5. Cronbach's alpha indicated good reliability for the PYD short form in the present sample, $\alpha = .82$. Full details about the PYD measure, and its construction, and validity and reliability can be found in Lerner et al. (2005), Bowers et al. (2010), and Geldhof et al. (in press).

Results

The purpose of the pilot study was to provide initial, exploratory information about patterns of HAI experiences among late adolescents and young adults, and to test the psychometric properties of the ACM-HAI, a new measure of cognitions and emotions about animals. Finally, we provide initial descriptive information about the potential covariation between HAI and positive developmental outcomes.

Patterns of HAI Experiences

About 43% of the sample indicated involvement with animals either as a pet or in an animal-related activity. Table 1 displays the patterns of HAI experiences across the sample. Dogs and cats were the most prevalent household pets, and horseback riding was the most frequently reported HAI activity. Duration of participation in an HAI activity ranged from 0 to 22 years. Of the participants who were involved in HAI experiences through animal ownership or activity participation ($N = 85$), 75.3% were female. Overall, most animal-owning participants reported at least some involvement in caretaking; when asked how

often they were responsible for their animal's care, 12.0% reported "almost always," 25.3% "often," 25.3% "sometimes," 30.7% "rarely," and 6.7% "almost never".

Exploratory Factor Analysis and Item Reduction

To explore the structure of the ACM-HAI measure, the data were analyzed using exploratory factor analysis (EFA) in SPSS. For each group, we extracted factors utilizing maximum likelihood and direct oblimin rotation. The scree plot indicated that a two or three factor solution would likely be the best fit, and therefore the two, three, and four factor solutions were tested. The optimal factor solution was chosen based on model fit (chi-square and Root Mean Square Error of Approximation [RMSEA]), parsimony, and interpretability of the factors.

In the two-factor solution, the moral orientation items did not load strongly onto either of the factors, and the four factor solution was not easily interpretable. The three-factor solution replicated the theoretically predicated model of attachment, commitment, and moral orientation factors. In addition, there was good model fit for the three factor solution, $\chi^2(150) = 216.57, p < .001$, RMSEA = 0.05-0.07. Therefore, the three-factor solution was accepted. Model fit statistics for the two, three, and four factor solutions are presented in Table 2.

Finally, the factor loadings, in combination with the expert rater reviews, were used to reduce the item pool to a 16-item, three-factor measure. HAI Items 20 and 21 had the lowest factor loadings in the moral orientation subscale, and were subsequently removed. In addition, three items were removed from the attachment factor. HAI Item 4 had a dual factor loading and, in addition, there

was disagreement among the expert raters over the appropriateness of the item. HAI Item 6 was also removed, as it was theoretically an item measuring commitment, but was more strongly loading onto the attachment factor. Finally, HAI Item 7 was removed due to mixed expert rater ratings. Table 3 presents the factor loadings for each item, and indicates the items that were targeted for removal. Table 4 presents the correlations among the factors.

The final HAI scale included a six-item attachment subscale, a four-item commitment subscale, and a six-item moral orientation subscale. Cronbach's alpha estimates for the scales indicated good reliability; $\alpha = .88, .86,$ and $.76$ for the attachment, commitment, and moral orientation subscales, respectively.

Finally, the categories of animal ownership were collapsed from 12 to six categories in order to obtain a more parsimonious measure that is reflective of more common patterns of animal ownership. Similarly, the animal-related activities were collapsed to from nine categories to four categories. For the study conducted in Chapter 3, the duration of activity participation questions were dropped for space concerns. However, the duration items were retained for use in future research. Appendix C presents the final version of the HAI questionnaire.

HAI and Positive Youth Development

In addition to assessing the structure and reliability of the HAI questionnaire, the pilot data were used to explore the potential presence of covariation between HAI experiences and indices of positive development, using the overall PYD measure as an index of youth thriving. Results indicated support for the notion that HAI may be related to positive development. Participants who indicated involvement with HAI had significantly higher overall PYD scores

$t(160) = 2.03, p < .05$ than those who did not. Furthermore, multiple regression analyses controlling for gender differences indicated that higher scores on the attachment to an animal scale (calculated as suggested by the EFA) were associated with higher overall PYD scores on PYD ($B = .09, t [90] = 2.00, p < .05$), although this model only explained a small amount of the variance in PYD ($R^2 = .06$), a not surprising finding given the multiple sources of PYD in the lives of youth. No significant relationship was found between commitment and moral orientation and PYD.

Conclusions

The pilot study provided important, initial descriptive information about the role of HAI in the lives of adolescents and young adults. The findings suggested some support for the link between HAI and positive development. Although the HAI-PYD relations described in the present study may of course be due to unmeasured variables and/or to the selection of HAI activities by youth high in PYD, these initial findings suggest the importance of developing longitudinal assessments of HAI as a potential context for promoting PYD. These findings will be interpreted in light of the Chapter 3 findings in the Discussion.

CHAPTER 3: HAI and Positive Youth Development

The preliminary findings from the data presented in Chapter 2 suggest that HAI (as operationalized by animal/pet ownership and/or participation in an animal-related activity) is prevalent in the sample of late adolescents and young adults that were studied, and that HAI experiences may be associated with positive developmental outcomes. Chapter 3 aims to extend these findings by: 1. assessing the patterns of HAI experiences in a sample of late adolescents and young adults derived from across the nation; 2. identifying potential relationships between residential locale and HAI experiences, and 3. exploring in more detail the relations between HAI and positive developmental outcomes.

Research Question 1: Patterns of HAI Experiences in Late Adolescence

As noted in Chapter 1, a key first task for understanding the nature of adaptive person \leftrightarrow context relations involving HAI is exploring the structure and frequency of various patterns of HAI experiences. Therefore, using the indices of structural characteristics of HAI developed in Chapter 2, I aimed to use a larger sample of participants from across the nation to ask:

1. What are the various instantiations of HAI involving type of animal, context of HAI (e.g., pet ownership, activity participation), and intensity or frequency of participation?
2. What basic demographic characteristics might be related to likelihood to be involved in HAI?

Research Question 2: Residential Locale and HAI

In addition to exploring patterns of HAI in late adolescence and young adulthood, it is important to consider the potential relationship between contextual factors and engaging in HAI. As discussed in Chapter 1, residential location is one important contextual factor that may be linked to resources and access related to animals (e.g., Siegel, 1995). Participants living in an urban location may have less space available for having pets or developing animal-related programs or activities as compared with individuals who live in suburban or rural settings. Therefore, in addition to exploring the patterns of HAI experiences, this study also aims to explore:

1. What are the patterns of HAI across geographic location?
2. Does the likelihood of individuals being involved with animals vary in relation to whether they live in rural, suburban, or urban locations?

Research Question 3: Human-Animal Interaction and Positive Developmental Outcomes

Finally, as discussed in Chapter 1, the goal of the present study was to examine the associations between HAI and positive developmental outcomes in late adolescence and young adulthood. More specifically, I sought to answer the following two questions about the nature of the relations between HAI and positive outcomes for youth:

1. Is HAI associated with positive developmental outcomes (i.e., the Five Cs, Contribution, and intentional self-regulation) and negatively associated with depression?

- a. Does overall HAI participation, animal ownership, and animal-related activity participation predict thriving?
 - b. Is intensity of engagement in interacting with an animal associated with developmental outcomes?
2. What factors or processes are involved in the associations between HAI and thriving?
- a. Using Confirmatory Factor Analysis (CFA), can the factor structure of the ACM-HAI measure of cognitions and emotions involving animals (developed in Chapter 2) be confirmed in an independent sample of late adolescents and young adults?
 - b. Does type of animal involved in the interaction predict levels of attachment, commitment, and moral orientation toward animals?
 - c. Are emotions and cognitions about animals (as indexed by the ACM-HAI measure) positively related to adaptive developmental outcomes and negatively associated with depression?

Method

Participants

The current study included participants from Wave 9 (one year post-high school) of the 4-H Study of Positive Youth Development, a national, longitudinal study of over 7,000 youth from 42 states in the U.S. from Grade 5 to post-high school. The present study used all 567 participants from the post-high school wave of the 4-H Study, the only wave in which the human-animal interaction questions were included in the survey. Participants ranged in age from 18 to 26

($M = 20.3$ years). The participants were 70.8% female, and self-reported as 81.6% White/Caucasian, 2.6% Latino/a, 1.0% Native American, 0.8% African American, 0.5% Asian or Pacific Islander, 0.8% multiethnic/multiracial, 0.3% other, and 9.8% missing racial information.

Procedure

In Grades 5 to 12 of the 4-H Study, for youth that were surveyed in their schools or youth programs, teachers or program staff gave each child an envelope to take home to the parent or guardian. The envelope contained a letter explaining the study, two consent forms (one that was returned to the school and one that could be kept for the records of the parent or guardian), a parent questionnaire, and a self-addressed stamped envelope for returning the parent questionnaire and consent form. For the youth surveys, data collection was conducted by trained study staff or assistants hired at more distant locations. A detailed protocol was used to ensure that data collection was administered uniformly and to ensure the return of all study materials. The procedure began with reading the instructions for the student questionnaire to the youth. Participants were instructed that they could skip any questions they did not wish to answer. A two-hour block of time was allotted for data collection, which included one or two short rest periods.

Youth who were absent on the day of the survey or were from schools that did not allow on-site testing were contacted by e-mail, mail, or phone, and were asked to complete the survey. Beginning in Wave 5 (Grade 9), youth could go online to complete the survey. Youth participating in 4-H clubs were given the paper survey or used club computers to complete the survey online. Lerner et al.

(2005), Phelps et al. (2009), and Bowers et al. (2010) present details of the data collection procedures and other methods used in Grades 5 through 12.

For the post-high school wave of data used in the present study, past participants of the study were contacted by email and postcard (using contact information obtained at prior waves). They were invited to participate in an approximately 30 minute online questionnaire, which included various indices of individual and contextual bases of positive development and thriving.

Attrition. Attrition in the 4-H Study sample is not randomly distributed across schools or youth program sites. For example, in Grades 6 and 7, some principals withdrew consent for their school to participate, and thus, these students “dropped out” without having had the opportunity to remain in the study. In subsequent grades (8-12), many of the same schools did not allow us to conduct on-site data collection. Youth in these schools were contacted through mail or phone and were asked to complete the survey and mail it back to us or to go online to complete it. Since we consistently contacted all youth who ever participated in the study, many youth who were not surveyed in earlier waves came back into the study in later waves. During Grades 8 to 12 we continued to contact all youth who were part of the first three waves (Grades 5 to 7) and, in addition, we increased the sample by expanding our recruitment of youth in 4-H clubs around the country. For post-high school data used in this study, over 88% of the participants had participated in three or more waves of data collection.

Measures

Structural characteristics of HAI. As noted in Chapter 2, participants were asked several questions about the nature and type of their animal-related experiences. First, participants were asked if they currently have any animals and, if so, what type of animals they have (youth could select multiple choices from, dog, cat, horse, fish/bird/rabbit/small rodent, cow/pig/goat/other large animal, and other [write in]). Participants who indicated having a pet or other animal were also asked how often they were responsible for their animal's care (response options ranged from *Almost Always* to *Almost Never*).

In addition, participants were asked how frequently they participated in various animal-related activities (e.g., horseback riding, dog/livestock showing, animal-related clubs or extracurricular activities, animal-assisted therapy), with response options ranging from *Never* to *Almost Every Day*. To facilitate interpretability of frequency of participation, and consistent with other research on activity participation (e.g., Mueller, Phelps et al., 2011), the activity variables were recoded to reflect days per month of activity participation (*Never* = 0 days/month; *Once a month* = 1 day/month; *Twice a month* = 2 days per month; *Once a week* = 4 days/month; *Twice a week* = 8 days per month; and *Almost Every Day* = 20 days/month).

ACM-HAI. The 16 items of the final version of the ACM-HAI measure were included in the survey. As noted in Chapter 2, the ACM-HAI measure indexes three domains of cognitions and emotions related to animals: 1. youth emotional attachment to an animal, 2. cognitions and feelings about financial and

emotional commitment to animals, and 3. moral orientation toward animals.

Appendix C presents the HAI items (developed and refined in Chapter 2) included in the overall 4-H Study questionnaire, along with the items measuring the structural features of HAI as well as the ACM-HAI measure. Items were randomized in the online survey.

Attachment. Emotional attachment to an animal was calculated using the 6-item scale developed in Chapter 2. Participants were asked, “How much do you agree or disagree with the following?” with response options ranging from *Strongly Agree* to *Strongly Disagree* (with a *Does Not Apply* response option for those without animals). An example item is “My animal provides me with companionship.” Cronbach’s alpha indicated good reliability for this scale, $\alpha = .94$.

Commitment. Emotional and financial commitment to animals was calculated using the 4-item scale developed in Chapter 2. Participants were asked, “How much do you agree or disagree with the following?” with response options ranging from *Strongly Agree* to *Strongly Disagree*. An example item is “If an adult dog or cat was having problems with housebreaking, I would get rid of it.” Cronbach’s alpha indicated good reliability for this scale, $\alpha = .86$.

Moral Orientation. Moral orientation toward animals was calculated using the 6-item scale developed in Chapter 2. Participants were asked, “How much do you agree or disagree with the following?” with response options ranging from *Strongly Agree* to *Strongly Disagree*. An example item is “Humans have the right

to use animals as we see fit.” Cronbach’s alpha indicated good reliability for this scale, $\alpha = .79$.

Residential Locale. Participants’ reported residential zip code was used to assess the type of their residential locale. Using the participant’s zip code, locale type was determined by using the National Center for Education Statistics (NCES) global locator (available online at <http://nces.ed.gov/globallocator>). Residential locale types ranged from large city to rural remote. For the purpose of the present analyses, locale was collapsed into three categories; Urban (large, midsize, or small city), Suburban (suburb or town), and Rural (rural fringe, rural distant, or rural remote). Finally, for descriptive purposes, state information was used to create aggregate geographic region variables (Western region, North central region, Southern region, and Northeast region).

Maternal Educational Attainment. Based on research documenting the link between maternal education and youth educational and career attainment (e.g., Bornstein, Hahn, Suwalsky, & Haynes, 2003; Hauser & Featherman, 1976), maternal education was used as an indicator of participants’ socioeconomic background/status (SES). The items pertinent to maternal education asked about the education level of the mother (or primary guardian). There were nine categories, from 8th grade or less to doctoral degree, with higher scores indicating higher levels (i.e., more years) of formal education. The variable was recoded into four dummy codes: less than two years of college education (14.8%), two years of college education (13.2%), four years or more of college (30.9%), and missing maternal education information (41.4%). Maternal education was not measured in

the post-high school wave of data collection; therefore, the participants' most recently reported maternal educational level was used for analytic purposes.

The Five Cs of Positive Youth Development. Youth thriving was indexed by the Five Cs of PYD (Competence, Confidence, Connection, Character, and Caring). Full details about the PYD measure, and its construction, and validity and reliability can be found in Lerner et al. (2005), Bowers et al. (2010), and Geldhof et al. (in press). Higher scores represent higher levels of the Five Cs and therefore, higher levels of thriving.

Competence is a positive view of one's actions in domain-specific areas including academic competence (e.g., "I am just as smart as others my age"), social competence (e.g., "I have a lot of friends"), and physical competence (e.g., "I could do well at just about any new athletic activity"). The scale is calculated as a mean of six items on a 1 (*Strongly Disagree*) to 5 (*Strongly Agree*) scale. In the present sample, Cronbach's alpha suggested adequate reliability for this scale, $\alpha = .70$.

Confidence is an internal sense of overall positive self-worth (e.g., "I am happy with myself most of the time"), positive identity (e.g., "All in all, I am glad I am me"), and feelings about one's physical appearance (e.g., "I think I am good looking"). The scale is calculated as a mean of six items on a 1 (*Strongly Disagree*) to 5 (*Strongly Agree*) scale. In the present sample, Cronbach's alpha suggested good reliability for this scale, $\alpha = .86$.

Character involves social conscience (e.g., "Helping to make the world a better place to live in"), valuing diversity (e.g., "Knowing a lot about people of

other races”), possession of standards for correct behaviors (e.g., “I usually act the way I know I am supposed to”), and a sense of personal values and integrity (e.g., “Accepting responsibility for my actions when I make a mistake or get in trouble”). The scale is calculated as a mean of eight items on a scale of 1 (*Strongly Disagree, Not Important to Me, or Not at all like me*, depending on the item) to 5 (*Strongly Agree, Extremely Important to Me, or Very much like me*, depending on the item). In the present sample, Cronbach’s alpha suggested adequate reliability for this scale, $\alpha = .73$.

Caring is the degree of sympathy and empathy, i.e., the degree to which participants feel sorry for the distress of others. An example item for Caring is “When I see another person who is hurt or upset, I feel sorry for them.” The scale is calculated as a mean of six items asking “How well do each of these statements describe you?” on a scale of 1 (*Not well*) to 5 (*Very well*). In the present sample, Cronbach’s alpha suggested good reliability for this scale, $\alpha = .88$.

Connection involves a positive bond with people and institutions that are reflected in healthy, bidirectional exchanges between the individual and peers (e.g., “My friends care about me”), family (e.g., “I have lots of good conversations with my parents”), school (e.g., “I get a lot of encouragement at my school”), and community (e.g., “Adults in my town or city listen to what I have to say”) in which both parties contribute to the relationship. The scale is calculated as a mean of eight items on a 1 (*Strongly Disagree*) to 5 (*Strongly Agree*) scale. In the present sample, Cronbach’s alpha suggested good reliability for this scale, $\alpha = .80$.

Contribution. Participants responded to 12 items, which were weighted and summed to create two subscales, action and ideology. The Contribution items are derived from existing instruments with known psychometric properties and used in large-scales studies of adolescents, i.e., the Profiles of Student Life-Attitudes and Behaviors (PSL-AB; Benson, Leffert, Scales, & Blyth, 1998) survey and the Teen Assessment Project (TAP; Small, & Rodgers, 1995) survey question bank. Items from the leadership, service, and helping scales measured the frequency of time youth spent helping others (e.g., friends or neighbors), providing service to their communities, and acting in leadership roles. Together, the leadership, service, and helping subsets comprise the action component of Contribution. The ideology scale measured the extent to which Contribution was an important facet of their identities (e.g., “It is important to me to contribute to my community and society”). The action and ideology components are weighted equally to calculate the Contribution scores on a range of 0–100. In the present sample, the Cronbach’s alpha for Contribution is .80.

Intentional Self-Regulation Skills. The Selection, Optimization, and Compensation (SOC) questionnaire (Baltes, Baltes, Freund, & Lang, 1999; Freund & Baltes, 2002) was used to measure intentional self regulation (ISR). Each of the subscales (elective selection [S], optimization [O], and compensation [C]) has six items with a forced-choice format. Each item consists of two statements, one describing behavior reflecting S, O, or C and the other describing a non-SOC related behavior. Participants are asked to decide which of the statements is more similar to how they would behave.

An item from the Elective Selection subscale is “I concentrate all my energy on few things [Person A]” or “I divide my energy among many things [Person B].” An Optimization subscale item is “I don’t think long about how to realize my plans, I just try it [Person A]” or “I think about exactly how I can best realize my plans [Person B].” An item from the Compensation subscale is “When something does not work as well as before, I get advice from experts or read books [Person A]” or “When something does not work as well as before, I am the one who knows what is best for me [Person B].”

For the present study, the 9-item global construct version of this measure was used (as recommended by Gestsdóttir and Lerner, 2007). Cronbach’s alpha suggested adequate reliability for this scale, $\alpha = .69$.

Depression. The Center for Epidemiological Studies Depression (CES-D) scale is a 15-item self-report measure of depressive symptomatology (Radloff, 1977), and was included in the 4-H Study as a measure of risk. Depression was conceptualized as feelings of frustration, sadness, demoralization, loneliness, and pessimism about the future (Radloff, 1977). Items are summed for a total score, with a maximum score of 60, and higher scores are indicative of higher depressive symptomatology – greater frequency and number of symptoms of depression. In the 4-H Study, we do not assess a clinical cutoff for Depression; rather, we refer to higher scores on the CES-D as indicative of greater depressive symptoms. Cronbach’s alpha suggested good reliability for this scale, $\alpha = .90$.

Results

The purpose of the research reported in Chapter 3 was to extend the pilot data findings from Chapter 2, explore the nature of HAI experiences in late adolescence and young adulthood, identify potential associations between residential locale and engaging in HAI, and examine the associations between HAI and developmental outcomes.

Research Question 1: Descriptive Patterns of HAI Experiences

1. Instantiations of HAI. To assess the patterns of HAI experiences in the present sample of late adolescents and young adults, I explored the reported instantiations of HAI as indexed by animal/pet ownership and animal-related activity participation. Overall, 72.3% of participants indicated some form of HAI; 69% of the sample reported having an animal/pet, and 31.4% participated in at least one animal-related activity.

With regard to overlap between the two categories of HAI experiences, 40.9% of the sample reported having a pet but no activity participation, 3.4% reported participating in an HAI activity, but did not have a pet, and 28.0% reported both having a pet *and* participating in an HAI activity; the remainder of the sample (27.7%) did not indicate any HAI. In addition, although dogs were the most frequently cited animals, participants noted interaction with a variety of species (see Table 5) and participation in a range of HAI activities (see Table 6 for percentages and intensity of participation by activity).

Of the participants who reported having an animal, 40.9% reported being “almost always” responsible for the animal’s care, 25.6% as “often” responsible,

21.2% as “sometimes” responsible, 7.4% as “rarely” responsible, and 4.3% as “almost never” responsible. Finally, of the 178 participants who noted participation in an HAI activity, 45.5% were involved in one activity, 33.1% in two activities, 16.9% in three activities, and 4.5% in four activities.

2. Demographic Characteristics and HAI. In addition, given the high percentage of both female and White/Caucasian participants in the sample, I explored whether either of these two individual characteristics predicted likelihood of being involved in HAI. Furthermore, given the importance of maternal educational level as a proxy for socioeconomic status, I explored whether maternal education level predicted likelihood of involvement in HAI. White/Caucasian participants were 2.68 times more likely to report having an animal and 2.47 times as likely to be involved in animal-related activities as compared to other participants. In addition, having a mother with four or more years of college education was negatively related to pet ownership (i.e., having a four-year college degree or higher was associated with a lower probability of owning a pet). Finally, no gender differences were found in pet/animal ownership, but females were 1.67 times more likely than males to participate in an animal-related activity. Table 7 presents the full logistic regression results.

Research Question 2: Context of Residential Locale and HAI

1. Patterns of Geographic Location and HAI. The purpose of exploring the relationship between residential locale and participation in HAI was to begin to ascertain the potential associations of contextual influences on access to and engagement in HAI. In the present sample, the regional location of our sample

was moderately diverse with respect to both geographical region and rurality/urbanicity (Table 8 presents overall HAI participation by region).

2. Residential Locale and HAI. Given the above-noted hypothesis that rurality would be positively associated with participation in HAI, I used chi-square and logistic regression analyses to test if locale (dummy-coded urban and suburban, with rural as the reference group) would predict participation in HAI. For overall HAI participation (having an animal/pet and/or engaging in an animal-related activity), the model indicated that residential locale significantly predicted HAI participation; $\chi^2(2, N = 533) = 7.55, p = .02$. The odds ratios indicated that individuals who lived in urban areas were .50 times as likely than individuals in rural areas to participate in HAI. There were no statistically significant differences between individuals who lived in suburban areas compared to those who lived rural areas in likelihood of participating in HAI (Table 9 presents the full model results and odds ratios).

Research Question 3: Human-Animal Interaction and Positive Youth Development (PYD)

1. Participation in HAI and PYD. To obtain an initial assessment of the associations between engaging in HAI and both positive and negative outcomes, I explored whether animal ownership and/or animal-related activity participation predicted various indices of development (i.e., the Five Cs of PYD, Contribution, ISR, and Depression). Overall, there were no significant differences (controlling for race/ethnicity and maternal education, as suggested by the logistic regression analyses) between animal owners and non-animal owners in any of these

outcomes. However, individuals who participated in animal-related activities (as opposed to animal ownership) had higher Contribution scores than those who did not, controlling for race/ethnicity and gender (as suggested by the logistic regression analyses); $\beta = .16, p < .001$. No other significant differences were found.

Next, I examined whether intensity of engagement in interacting with an animal (operationalized by responsibility for the care of an animal or frequency of participation in an HAI activity) may be associated with developmental outcomes. Among animal owners, participants who reported higher scores regarding being responsible for their animals' care demonstrated significantly higher Character scores ($\beta = .12, p = .026$) and Contribution scores ($\beta = .19, p < .001$), controlling for race/ethnicity and maternal education (as suggested by the logistic regression analyses). Intensity of activity participation significantly predicted Contribution only ($\beta = .10, p = .025$). This finding may be interpreted as reflecting the nature of the measure of intensity used in this research. That is, as will be discussed in Chapter 4, it may be that the measure of activity participation used in the present study was not nuanced enough to differentiate between intense, impactful HAI activity experiences and more superficial experiences.

2. Emotions and Cognitions about Animals and PYD. Beyond exploring the basic associations between HAI and both positive and problematic outcomes, it is critical to begin to understand the emotions and cognitions about animals as a mechanism by which individuals may benefit from such experiences. Although the findings from the previous section suggest minimal differences in

positive and negative outcomes between individuals who participate in various instantiations of HAI and those who do not, these analyses do not take into account individual emotions and cognitions related to animals.

The above findings indicate that just because an individual is involved in HAI, there is not necessarily any link to positive outcomes. Specific emotional or cognitive processes, however, may nevertheless be linked to associations between animal experiences and positive development. Therefore, I tested the relationships between emotions, cognitions, and outcomes as they are related to HAI. First, I confirmed the structure of the ACM-HAI measure of cognitions and emotions involving animals (developed in Chapter 2) in an independent sample of late adolescents and young adults using Confirmatory Factor Analysis (CFA). Next, I assessed the relationship between type of animal, as well as various patterns of animal ownership, and levels of attachment, commitment, and moral orientation toward animals. Finally, I explored if emotions and cognitions about animals (as indexed by the ACM-HAI measure) were positively related to adaptive developmental outcomes (the Five Cs, Contribution, and ISR) and negatively associated with depressive symptomology.

The ACM-HAI Measure: Confirmatory Factor Analysis (CFA). A CFA model was used to examine the validity of the factor structure of the ACM-HAI measure. The three factor solution suggested by the exploratory factor analysis in Chapter 2 was tested using Mplus. The CFA suggested acceptable model fit; $\chi^2(101) = 354.01, p < .001, RMSEA = .07, 95\% CI [.06, .08]; CFI = .94, TLI = .93$. The standardized factor loadings from the CFA model are presented as part of

the larger structural equation model noted below. These results provide support for the validity of the three-factor ACM-HAI model as an index of emotions and cognitions toward animals.

Type of Animal and Cognitions and Emotions about Animals. To better understand the nuanced processes associated with adaptive individual \leftrightarrow context relations involving animals, it is important to assess if interacting with a particular type of animal is associated with particular emotions and cognitions about animals (see Chapter 1). Therefore, regression analyses explored whether reporting ownership of a particular species of animal or pet predicted scores on the attachment, commitment, and moral orientation scales of the ACM-HAI measure. Next, Latent Class Analysis (LCA) was used to identify subgroups, or classes, of different types of animal ownership. Within the mixture model, multinomial logistic regression was then used to explore whether patterns of animal ownership would predict scores on attachment, commitment, and moral orientation.

Regression results indicated that among pet owners, type of animal significantly predicted attachment scores, $F(6, 371) = 3.24, p = .004$. More specifically, individuals who reported having a dog or horse had significantly higher attachment scores than those who did not. In addition, type of animal significantly predicted commitment scores, $F(6, 380) = 2.75, p = .012$. Owning a dog was positively related to commitment, whereas individuals who reported having a cow, pig, goat, or other large animal had significantly lower commitment scores than those who did not. Finally, type of animal also predicted moral

orientation scores, $F(6, 380) = 7.42, p < .001$. Interestingly, horse and cow, pig, goat, or other large animal ownership were negatively associated with moral orientation. Table 10 presents the full regression results.

Next, with the goal of exploring patterns of animal ownership in more detail, LCA was used to identify potential patterns of animal ownership, as indexed by type of animal (i.e., dog, cat, fish/bird/reptile/small rodent, horse, other large animal). LCA is a mixture modeling technique that can be used to detect latent categorical subgroups (Collins & Lanza, 2010). Results from the LCA clearly indicated that a three class solution was the best fit to the data. Model fit statistics (AIC, BIC, sample size adjusted BIC, LRT, and BLRT) are presented in Table 11. Most likely class membership indicated that the most prevalent class was *no or few animals* ($n = 326$). This class was characterized by a very low likelihood of owning a fish, bird, reptile, small rodent, horse, or other large animal, and a small likelihood of owning a cat or dog. In addition, a class emerged that represented individuals who were likely to have *small animals only* (dog, cat, fish, bird, reptile, small rodent; $n = 79$), and another for participants who were likely to have *both large and small animals* ($n = 162$). Figure 2 presents a graphical representation of the three-class solution.

Next, to assess the relationships between patterns of connections between type of animal ownership and emotions and cognitions about animals, I used the AUXILIARY option in Mplus to run the three class model including multinomial regression analyses comparing scores on attachment, commitment, and moral orientation among the three classes. Results indicated that attachment² and

commitment scores did not differ among the three classes. However, the “large and small animal” class was associated with significantly *lower* moral orientation scores than both the “no/few animals class” ($B = 1.45, p < .001$), and the “small animals only” class ($B = 1.42, p = .001$). All regression results are presented in Table 12. Implications of these findings will be discussed in Chapter 4.

Cognitions and Emotions about Animals and PYD. Finally, I explored the relationship between emotions and cognitions about animals (as indexed by the three ACM-HAI latent factors) and developmental outcomes (as indexed by the Five Cs, Contribution, ISR, and depressive symptomology). I tested these relations in a structural equation modeling (SEM) framework using Mplus.

Emotions and cognitions about animals were measured using the previously identified latent factors of attachment, commitment, and moral orientation. The Five Cs, Contribution, Depression, and ISR were also measured as latent constructs. For Competence, Confidence, Character, and Connection, the individual items were parceled into theoretically-based subscales. Caring, Contribution, and Depression do not have theoretically-predicated subscales, and therefore the items were randomly distributed into three parcels per factor. Intentional self regulation (ISR) was measured as a 9-item latent factor. All outcome measures were regressed on to attachment, commitment, and moral orientation.

The SEM suggested acceptable model fit; $\chi^2(979) = 1415.63, p < .001$, RMSEA = .03, 95% CI [.025, .032]; CFI = .92, TLI = .91. Next, non-significant regression paths were then trimmed in a stepwise manner, beginning with the path

with the highest p value, until all non-significant paths were removed (without a significant change in χ^2 model fit). Model trimming steps are presented in Table 13; twelve paths were removed and the most parsimonious model was retained. Unstandardized and standardized factor loadings for attachment, commitment, and moral orientation are presented in Table 14, and for the Five Cs, Contribution, Depression, and ISR in Table 15. Latent correlations are presented in Tables 16 and 17.

The standardized regression coefficients (see Table 18) indicated that attachment and commitment were positively related to thriving and negatively related to depressive symptomology. Specifically, attachment was positively associated with Connection, Competence, and Caring, while commitment was positively associated with Connection, Character, Caring, and Contribution, and negatively associated with Depression. However, the findings related to the moral orientation factor were mixed. Although moral orientation was positively associated with Character, it was negatively associated with Connection and Contribution, and positively associated with higher levels of depressive symptomology. The findings related to moral orientation may be due in part to the nature of the measure, and they will be further discussed in Chapter 4.

Conclusions

In conclusion, findings from the present study indicated that late adolescents were engaging in a rich array of HAI experiences that, in some cases, are associated with positive developmental outcomes. Furthermore, the results presented in Chapter 3 suggested that the relationship between HAI and thriving

involves understanding the nuanced nature of HAI with regard to the structural features of HAI, emotions and cognitions about animals, and contextual influences. The findings from this chapter will be further discussed in Chapter 4.

CHAPTER 4: Discussion

Human interaction with animals is a ubiquitous phenomenon that has evolved over the arc of human history (e.g., Morey, 2006). Since the emergence of humans, animals have been a prominent part of hominid behavior, health, and development. As predators, as prey, as assistants in the tasks of survival, or as companions, the story of human life has been intermingled with the presence, health, and cultivation of relationships with animals. Today, the presence of animals in the lives of humans reflects these diverse foci. Animals are a ubiquitous part of the ecology of human life, and they can represent sources of companionship, therapy, recreation, food, or disease. In the prototypic life-course of individuals, all of these facets of animal ecology provide a part of the interactions humans have with their world. In addition, humans play an increasingly important role in impacting the treatment and welfare of animals. In fact, the salience of important relationships with animals is aligned with the social nature of biological development, and human affinity for animals is reflected in the number of U.S. households (approximately 62%) that report having at least one animal (APPA, 2012).

The emerging field of youth HAI research aims to explore the potential role of animals in facilitating adaptive individual \leftrightarrow context relations that contribute to putting youth, families, and communities on pathways to thriving. Furthermore, the inherently interesting nature of interacting with animals may provide a unique method of engaging youth in a variety of programs and interventions. However, much of the research in the field of HAI is not

developmentally-predicated, and is limited by small, homogenous samples, lack of replication, and issues of research design (Herzog, 2011).

Therefore, the purpose of this dissertation was to extend the field of youth HAI research by: 1. using a PYD-based theoretical framework as a conceptual basis for creating and refining a developmentally appropriate, psychometrically-sound measure of human-animal experiences intended to index the processes associated with youth \leftrightarrow animal adaptive developmental regulations, and 2. using this measure to assess how developmental regulations involving youth-animal relationships are manifested in adolescence.

Measure Development and Validation

To address the first goal, the purpose of Chapter 2 (*Measure Development and Validation*) was to use data from the Correlates of Positive Youth Development (C-PYD) Study in conjunction with expert rater feedback to pilot test and refine a measure of emotions and cognitions about animals (the ACM-HAI measure). In addition, these data were used to provide initial information about how emotions and cognitions about animals may be related to positive youth development.

Results from the C-PYD Study found empirical support for the theoretically-predicated three-factor structure of the ACM-HAI measure (attachment, commitment, and moral orientation). Information from the exploratory factor analysis (EFA) was used in conjunction with data from the expert raters to empirically and theoretically reduce the measure from 21 items to

16 items. Furthermore, the data suggested that attachment was positively related to overall positive youth development.

The findings from Chapter 2 provided initial support for the validity of the ACM-HAI measure and for the potential relationship between emotions/cognitions about animals and youth thriving. As noted in Chapter 1, there are relatively few developmentally-predicated measurement tools related to HAI, and the development of the ACM-HAI measure represents a step forward in creating such a measure.

However, the pilot findings are limited by the small and selective sample. Data were collected from a small sample of college undergraduates, and while this sample was generally representative of the Tufts University student body, it was not necessarily representative of the entire population of late adolescents/early adults. For example, the experiences, responsibilities, emotions, and cognitions of youth who are attending college may be different than the experiences of youth who are not college students. Furthermore, the C-PYD Study did not include any contextual variables (e.g., socioeconomic status, parental relationships, residential locale) that could provide important information about potential associations between contextual characteristics and HAI participation. Despite these limitations, the findings from Chapter 2 suggested the utility of further exploring emotions and cognitions about animals in a larger sample, as was done in Chapter 3.

HAI and Positive Youth Development

Supported by the pilot data from Chapter 2, Chapter 3 (*HAI and Positive Youth Development*) extended the Chapter 2 findings using data from the post-high school wave of the 4-H Study of Positive Youth Development. These data were used to: 1. assess the patterns of HAI experiences in a sample of late adolescents and young adults from across the nation; 2. identify potential contextual influences (i.e., residential locale) on HAI experiences; and 3. explore in more detail the relations between HAI and positive developmental outcomes.

Research Question 1: Patterns of HAI Experiences

The results from the 4-H Study of PYD suggested a high prevalence of HAI in the sample; over 72% of participants were involved with an animal, and over 40% of individuals who owned an animal reported being “almost always” responsible for that animal. Participants reported interacting with a range of diverse animal species, as well as engaging in a number of different animal-related activities. These findings support the notion that animals are ubiquitous and relevant in the lives of many late adolescents, and further justify the need for high quality research exploring the relationship between human-animal interaction and human development.

In relation to demographic characteristics associated with HAI, results indicated that White/Caucasian participants were more likely to be involved in animal-related activities and to report having an animal in the household. Interestingly, maternal educational level was negatively related to animal ownership, and there were no gender differences in HAI participation. These

findings partially support the idea that there may be issues of individual or family variables related to having and caring for animal, access to the space and time necessary for having an animal or participating in animal-related activities, and cultural attitudes about animal ownership that may be reflected in the relationships between the noted demographic variables and HAI.

Although it was unexpected that maternal education would be negatively related to animal ownership, it may be that this relationship is reflecting several overlapping issues. Maternal education is only a proxy for socioeconomic status, and does not provide specific details about the financial or time resources that would be available to devote to the care of a pet. Furthermore, issues of educational level may be conflated with residential location (e.g., farming families would likely have lower reported maternal education but higher animal ownership), which will be discussed in more detail below. Finally, the measure used to operationalize maternal education is limited in its utility due to the nature of when and how the information was collected. Primarily, the data on maternal education were not collected in the post-high school wave, and therefore the present study used the most recently reported maternal education level, which may mean that this information is not current. Furthermore, participants may be self-supporting in the post-high school years, and therefore maternal education level may not be as relevant to their current financial capacity for animal ownership. In addition, there was a high percentage of missing data for this item (over 42%), and imputing information for maternal education with such a high percentage of missing data is problematic. Overall, the conclusions that can be

drawn from these findings are somewhat limited, and future research should consider the most accurate way to measure the presence of resources that would be directly related to engaging in HAI.

Research Question 2: Residential Locale and HAI

A second goal of the present study was to assess whether there was a relationship between residential location and HAI, based on the hypothesis that type of residential locale may be related to having the physical space and resources necessary to support a lifestyle that involves animals. Participants reported moderately diverse patterns of regional geographic location. Consistent with the hypothesis that living in an urban area may be a barrier to access to animals, individuals in urban areas were less likely than participants in rural areas to participate in HAI.

The findings pertaining to the association between residential locale and being involved with animals provides important initial information that further justifies the need to carefully explore the systemic contextual influences that may be related to individuals' access to animals. In order to optimize any potential positive benefits of engaging with animals, we must better understand the barriers to accessing HAI. Furthermore, it may be that there are different challenges to engaging in various types of HAI; the barriers to having a household pet may be different than barriers related to participating in a 4-H club, or horseback riding, or volunteering at an animal shelter.

Despite the fact that the field of youth HAI research is in its infancy, it is still necessary to make issues of resources and access a priority in HAI

scholarship. If HAI is an important component of supporting adaptive developmental regulations that put youth on a pathway to thriving, then it is important from a social justice perspective that we begin to understand how to make these experiences available to diverse youth. Therefore, future research should focus not only on the features of HAI related to positive outcomes, but also on the contextual strengths that support engagement with animals. For example, it will be important for future research to disentangle the various types of resource availability that may be related to HAI. Accordingly, it will be critical to explore the potentially differential impact of space, time, and financial resources, as these issues likely do not have a unidirectional impact on access to HAI. Such research should also expand beyond residential locale to include more accurate and detailed measures of parental variables (e.g., parental attitudes toward animals, parental monitoring, employment status), socioeconomic status, family composition (e.g., number and spacing of siblings), specific community program offerings, and school characteristics that may be a part of the contextual systems promoting positive human-animal relationships.

Research Question 3: HAI and PYD

A third and final goal of Chapter 3 was to explore the role of HAI in promoting adaptive developmental regulations. To accomplish this goal, I first assessed the relationship between overall categories of HAI (i.e., animal ownership and animal-related activity participation) and positive developmental outcomes. Next, I began to explore how the specific nature of HAI experiences may be associated with emotions and cognitions about animals, focusing on

patterns of types of animal ownership, as well as on the relationship between emotions and cognitions about animals (i.e., attachment, commitment, and moral orientation) and developmental outcomes, as indexed by the Five Cs of PYD, Contribution, intentional self-regulation (ISR), and Depression.

Participation in HAI and PYD. Overall, the results suggested that there were no significant differences (controlling for race/ethnicity, maternal education, and gender, as suggested by the earlier, Chapter 3 findings) between animal owners and non-animal owners in any of the outcome measures. However, individuals who reported participating in animal-related activities had higher Contribution scores than those who did not; this finding makes conceptual sense, given that youth who are involved in an activity are likely more actively involved in other aspects of their lives (as indexed by the Contribution measure). In addition, it may be that there is an increased level of structure present in activity participation as compared to pet ownership, and that this structure is contributing to the outcomes of such participation. For example, if individuals are participating in a sport such as horseback riding or a club such as 4-H, their HAI experience may be characterized by higher levels of adult supervision or structured skill-building activities.

Although these findings suggest a weak overall association between HAI and developmental outcomes, the results may be due in part to the broad nature of the categories of animal ownership and animal activity participation. These categories do not provide any information about the nature of the HAI experiences (e.g., level of structure, type of animal, context of the experience).

The nature of HAI may be driving any relationship between HAI and outcomes, and simply dichotomizing between having animals and not having animals reduces any such variation. These findings justify the need to move beyond conceptualizing HAI as an undifferentiated phenomenon, but instead suggest that it is more useful to explore the specific features of various animal experiences that may be associated with promoting positive development.

For example, one such specific feature may be level of engagement in the animal experience. In fact, among animal owners, participants who reported higher frequencies of being responsible for their animals' care demonstrated significantly higher Character scores and Contribution scores. Similarly, for participants who reported participating in an animal-related activity, intensity, or frequency, of participation significantly predicted Contribution. These findings suggest that individuals who are highly involved in caring for an animal or participating in an animal-focused activity are also contributing more broadly to their families, communities, and schools. Furthermore, the results support the notion that fostering care for another animal may be related to overall Character development, an important aspect of becoming an active and engaged member of the community.

Although these findings involve cross-sectional covariations, and therefore do not provide any information about whether being responsible for the care of an animal directly causes an increase in Contribution or Character, they provide justification for further research that may be able to establish these causal relationships. In addition, these findings suggest the need to continue to explore

issues of intensity or “dosage” of HAI. As suggested by the literature on out-of-school time activity participation (e.g., Mueller, Phelps et al., 2011), the amount of time involved in an activity may be directly related to the kind of outcomes that are associated with that participation. Therefore, future research should explore in more detail the threshold or optimal levels of intensity or engagement in HAI that are necessary to optimize the benefits of such interaction. Finally, a limitation of the measures used in the present study was the categorization of animal-related activities. Due to time and space limitations, activity participation was clustered into broad groups. These categorizations did not facilitate understanding the specific features of animal-focused activities that may be differentially related to developmental outcomes, or differentiate between intense, impactful HAI activity experiences from more superficial experiences. In the future, a more nuanced approach to understanding these activities will be useful in further delineating the benefits that may be associated with participation.

Emotions and cognitions about animals and PYD. The above findings indicated that, in understanding the processes associated with HAI facilitating adaptive developmental regulations, it is important to begin to develop a more nuanced understanding of HAI that moves beyond a simple dichotomization of interacting or not interacting with animals. As such, the analyses aimed to provide further information about the emotions and cognitions related to interacting with animals, how type of animal may be related to these attitudes and, finally, whether emotions and cognitions about animals were related to developmental outcomes.

The ACM-HAI Measure: Confirmatory Factor Analysis (CFA). To extend the findings from Chapter 2, a CFA was used to confirm the factor structure of the ACM-HAI measure using an independent sample. The results provided support for retaining the three-factor structure of attachment, commitment, and moral orientation.

Type of Animal and Cognitions and Emotions about Animals. To better understand the specific features of HAI that may be related to emotions and cognitions about animals, I explored any potential differences in the ACM-HAI measure based on type of animal involved in the interaction. First, I examined type of animal by individual categories, testing differences in attachment, commitment, and moral orientation in individuals who reported having a particular type of animal (e.g., dog) as compared to those who did not report having that animal.

The results indicated that youth who reported having a dog or a horse had significantly higher attachment scores than those who did not report owning these types of animals. It is not surprising that dog owners report high attachment to their pets, given the historically social relationship humans have had with dogs (e.g., Morey, 2006). Dogs are sensitive to human social cues (Serpell, 1986) and, therefore, may be particularly engaging companions. Horses have a similarly unique relationship with humans. Many horse owners are deeply invested in competitive equestrian competition, spending an estimated \$11.6 billion dollars on horse-related products in 2011 (Equestrian Entries Media, 2012). In addition to the monetary investment involved in horse ownership, it may be that the

potentially goal-oriented nature of participating in equestrian sports (even at a non-competitive level) may be associated with increased feelings of attachment toward the horses. In addition, while horses may not have the same ability to respond to human facial cues as dogs, they are still sensitive to human emotion and behavior. Such sensitivity may promote a strong emotional valence for human-equine relationships.

Similarly, the findings also indicated that dog owners reported higher commitment scores than non-dog owners. Again, these findings may be explained by the uniquely social relationship that humans have with dogs, and the intensity of this relationship may be associated with individuals feeling more willing to invest monetary resources and time to supporting their animals. Interestingly, results also indicated that participants who reported having a cow, pig, goat, or other large animal had significantly *lower* commitment scores than those who did not own a non-equine large animal. These findings suggest that relationships with small animals may be qualitatively different than relationships with large animals. The level of emotional involvement with large animals may be different than small animals who are living in the household. Small, household pets and horses often have the primary purpose of being a companion or facilitating recreational activities. On the other hand, large farm animals often have a more concrete or quantifiable function as part of an agricultural system or as a food source.

Therefore, because large animals are not primarily companions, it may be that individuals have very different attitudes about these animals due to their different ecological functions. For example, it may not be adaptive to become

highly emotionally attached to an animal that is ultimately going to be a food source. Similarly, if an animal exists as part of an agricultural business, it may not be financially sustainable to be willing to continually invest monetary resources in the care of such an animal far beyond what the animal is worth to the business.

Although the present data did not afford the ability to discern the mechanisms associated with attachment or commitment to a particular species of animal, the findings still suggested the importance of a nuanced approach to understanding the nature of different types of human-animal relationships. As a field, if HAI researchers can better understand the emotions and cognitions that may be associated with different species or types of HAI, then these scholars will be better able to measure the processes associated with HAI as a component of adaptive developmental regulations. Furthermore, understanding the different emotional relationships humans have with different species of animals will help inform best practice in terms of developing effective animal-related programming or interventions geared toward specific outcomes. For example, a relationship with an animal that is associated with high levels of attachment (such as a dog) may be related to emotional support and stress mitigation. On the other hand, caring for a horse or a large animal may be more related to the development of responsibility. The critical implication of the above findings is the need to move away from a “one size fits all” approach to understanding the relationship between HAI and developmental outcomes.

Perhaps related to the above noted differences between large animals and small, companion animals, the results also suggested that individuals who

reported owning any large animal (including a horse) reported *lower* moral orientation scores than those who did not. As will be discussed again, the overall mixed findings for the moral orientation measure may be due, in part, to the nature of the construct being measured. As noted in Chapter 1, moral issues related to animals are complex, and are influenced by a variety of factors including type of animal and function of the animal. It may be that individuals who interact with large animals are exposed to complicated experiences of moral issues related to animals. For example, they may better understand the various, perhaps emotionally conflicting, functions that different types of animals play in human life, such as animals being used as a source of food. Therefore, such people conceptualize animal-related moral issues as nuanced phenomena, and identify that the situations presented in the moral orientation items may be more complicated than they appear. On the other hand, participants who only have exposure to small companion animals (or perhaps even no exposure to animals and therefore just a theoretical understanding of the issues) may have a more “black and white” view of animal-related moral scenarios. It may be that the relationship between moral reasoning and item responses is not, in fact, a linear relationship. Although the present data do not allow for an understanding of the reasoning behind responses to the moral orientation items, it is clear that more detailed inquiry is necessary to fully understand the mechanisms behind moral reasoning about animals, and how to best operationalize high level moral understanding.

Patterns of Animal Ownership and Cognitions About Animals. Although exploring the associations between individual types of animal ownership and emotions and cognitions about animals provides interesting and informative information about the nature of these relationships, it was also important to consider that many participants may be involved with more than one type of animal. Therefore, Latent Class Analysis was used to identify patterns of animal ownership. The results clearly indicated a three class solution, classifying individuals into three patterns of animal ownership: no/few animals, small animals only, and both large and small animals.

The three-class solution was then used to compare scores on attachment, commitment, and moral orientation between the three classes. Interestingly, these findings indicated that class membership did not predict attachment or commitment, but predicted moral orientation. The “large and small animal” class was predictive of lower moral orientation scores as compared with either the “no/few animals” class or the “small animals only” class. These results were consistent with findings from the regression analyses.

Overall, the analyses related to type of animal strengthen support for the notion that type of animal involved in the interaction matters. Furthermore, understanding the specific patterns of animal ownership is important for understanding HAI more generally. For example, the findings from the present sample indicated that there were not many individuals who had large animals only; those who did have large animals typically also had small animals. These patterns help elucidate the findings regarding moral orientation and large animal

ownership. Given that it is unlikely that participants have large animals only, these findings provide further support for the idea that the negative relationship between large animal ownership and moral orientation scores may be reflect a more diverse constellation of experiences with animals, and therefore perhaps a more nuanced understanding of animal-related moral issues.

Cognitions and Emotions about Animals and PYD. Finally, the last goal of this study was to provide initial information about the relationship between cognitions and emotions about animals (as indexed by attachment, commitment, and moral orientation) in predicting positive youth development (as indexed by the Five Cs of PYD, Contribution, and ISR), and depressive symptomology. These relationships were assessed in a latent framework using structural equation modeling (SEM), and results indicated good model fit.

As expected, the latent factor of attachment was positively associated with Connection, Competence, and Caring. The finding that emotional attachment to an animal was related to more global connections to family, peers, and community demonstrates that emotional connectedness to an animal may be related to the various contextual support systems associated with youth feeling engaged in their family and community. Similarly, the positive relationship between attachment and Competence suggests an association between feelings of self-perceived ability in several domains (e.g., social, academic) and emotional attachment to animals. This finding again provides evidence that emotional attachment to an animal may be a part of the contextual features of an individual's

ecology may support feelings of positive self-regard and, more generally, thriving.

More specifically, the relationship between Caring and attachment suggests an interesting potential link between feelings of sympathy and empathy toward humans and similar feelings toward animals. Although a causal relationship cannot be established due to the cross-sectional nature of the data, this finding has important implications for the notion that interactions with an animal may be a way to facilitate the emotions and social skills necessary for developing and maintaining adaptive social relationships with other humans. The connection between human-animal social skills and human-human social skills is one that should be explored longitudinally and in more detail in the future. Such research should explore the potential parallels between physical and verbal social cues used by both humans and animals.

With respect to commitment, results indicated that commitment was positively associated with Connection, Character, Caring, and Contribution, and negatively associated with Depression. These findings may reflect the importance of active investment in a relationship with an animal as a potential mechanism driving HAI-PYD relationships. It may be that youth who are engaged enough in animal relationships to be willing to commit their resources to these animals are getting the most out of their experiences with animals. High commitment scores reflect more than just a passive involvement in HAI, and this engagement may be key to optimizing the positive outcomes associated with HAI.

More specifically, the relationship between commitment and both Connection and Caring may be related to the parallels in the social skills, communication, sympathy, and empathy that may index developing effective relationships with both humans and animals (and, as well, may be related to the negative association between commitment and depressive symptomology). In addition, the relationship between commitment and Character may reflect attenuation of a sense of moral responsibility toward the care of another living creature. Finally, commitment to being responsible for an animal may also be associated with emotions and cognitions that encourage individuals to take responsibility for contributing to the positive functioning of their communities and families.

Although the findings related to the positive associations between attachment, commitment, and PYD are promising, and have important implications for future research, it is critical to underscore that these findings do not provide causal evidence for HAI directly influencing indices of thriving. In fact, it may be that youth who are doing well in all aspects of their lives are better able to optimize and benefit from their interactions with animals. However, the presence of these cross-sectional relationships provides at best support for longitudinal study of the causal pathways involved in HAI-PYD relationships. Exploring the nature of these relationships will help the field better understand the role that animal interaction may play in the iterative, bi-directional relationship between individual strengths and contextual assets that lead to thriving.

Finally, the SEM results indicated mixed findings with regard to moral orientation. Although moral orientation scores were positively associated with Character (a relation that suggests the validity of the moral orientation measure), they were negatively associated with Connection and Contribution, and positively associated with higher levels of depressive symptomology. Similar to the moral orientation results from the analyses involving type of animal, these findings suggest the nuanced and complex nature of moral issues related to animals. As would be expected, higher moral orientations scores were associated with higher Character scores, given that Character measures several domains related to morality. However, it is somewhat unexpected that higher moral orientation scores would be associated with lower Connection and Contribution, and higher Depression scores. With respect to Depression, it may be that the moral orientation items are partially indexing emotional sensitivity; it may be that individuals who are more emotionally sensitive would score high on these items (e.g. “Humans have the right to use animals as we see fit.”). It is possible that individuals who respond to the emotional language in the moral orientation items may also report higher levels of depressive symptomology.

More generally, and as previously noted, moral issues related to animals are complicated, and it may be that the items in the moral orientation scale do not conceptually or methodologically capture the range of complexity in the larger construct of moral orientation related to animals. For example, issues of using animals in research cannot be easily reduced to a simple “yes” or “no” decision; there are complex and interlocking levels of information that are necessary to

determine the range of ethical use of animals in research. Therefore, it may be the case that youth who score on the middle of the Likert scale (i.e., “Neither agree or disagree”) are reflecting a higher level understanding of the complexity of moral issues related to animals than participants who score on the low or high ends of the scale. In the future, the use of qualitative methodology, such as cognitive interviews, would shed additional light on such potential associations.

Overall Implications of Findings

Overall, the findings from both Chapter 2 and Chapter 3 underscore the importance of conducting developmentally-oriented research in the field of HAI. Although the results from the studies conducted in Chapter 2 and Chapter 3 are limited by their cross-sectional derivation and by other limitations that will be subsequently noted, there are still important implications from these findings that are useful in furthering understanding of the nature of youth HAI experiences.

Perhaps most significantly, the analyses consistently pointed to the importance of exploring the nuanced nature of HAI. The results clearly indicated the value of moving away from treating HAI as a global phenomenon, and provided evidence for bringing the field toward theoretical and measurement models that take into consideration the integrated individual and contextual features involved in HAI that may be differentially related to involvement in and benefits from experiences with animals. Taking a global, “wide angle” approach to HAI that assumes that all human-animal relationships are the same is a mistaken approach, as such aggregation will likely obfuscate different meaningful relationships that may exist. To understand how human relationships with animals

can benefit both the individual and the animal, we must understand the contextual systems in which specific instances or types of these relationships are embedded.

That is, the nature of the interaction – with regard to type of animal(s) involved and context of involvement (e.g., pet ownership, activity participation) – is critical to understanding what outcomes are associated with particular experiences. Throughout the analyses, there were some differences in the outcomes associated with pet/animal ownership as compared to animal-related activity participation. Again, these findings suggest a need to understand the various structural features of HAI that may be an important component of the outcomes associated with particular instances of HAI. In addition, type of animal and patterns of animal ownership are other critical elements of understanding the specific outcomes associated with human-animal relationships. Experiences with different types of animals may be related to different emotions, skills, and attitudes. Furthermore, there may even be within-species differences in relationships; an individual who has a backyard horse as a pet may have a very different relationship with the animal than a person who owns a horse strictly for competitive purposes. Therefore, it is critical to understand the multiple facets of the nature of human-animal relationships to develop a comprehensive understanding of the processes involved in adaptive HAI.

It is also crucial to understand the nature of the processes associated with adaptive human-animal relationships, which may be manifested in emotions and cognitions related to animals. The findings from the present study suggested a relationship between these attitudes (e.g., attachment, commitment, and moral

orientation) and indicators of developmental outcomes. These findings provided support for exploring not only the structural, tangible features of HAI, but also the associated emotions and cognitions associated with various patterns of human-animal relationships and how these psychological processes may play a role in facilitating adaptive developmental regulations.

In particular, the various relationships involving moral orientation highlighted the truly complex nature of moral attitudes related to animals. One of the fascinating aspects of co-existing with animals is the diverse and integrated functions that animals serve in human life, and, in turn, that humans serve in animal life. The truly integrated nature of human and animal life provides complex moral issues that are intertwined with individual and contextual variables related to, for instance, emotions, financial needs, and culture. One implication of the present study is the need to integrate the complexity of human attitudes toward animals into the operationalization of animal-related moral issues. For example, the moral orientation items may be refined to better operationalize individuals' understanding of the complexity of moral issues related to animals. It may be useful to adapt the item response format to reflect the presence of such complexity.

In addition to understanding the features of HAI itself, the findings from this dissertation also suggested that it is important to consider the factors impacting access to HAI. Although the contextual indices used in the present study were limited, there were data suggesting that there is clearly a need to explore residential location, cultural attitudes, financial resources, program

availability, and other resource-related variables. These contextual features may afford a more systemic understanding of who becomes involved in HAI, why they become involved, and how they stay involved.

An exciting implication of realizing the complexity of human-animal relationships is the potential for positively influencing animal and human life in a variety of domains. Although HAI is a ubiquitous phenomenon, it takes place in many forms and contexts. These various instantiations of HAI may be associated with a whole host of positive outcomes that can impact, for example, domains of social behavior, character development, sympathy and empathy, mental health, and skill building. While it will be a challenge to the field of HAI research to accurately measure the interrelated factors influencing the nature of HAI, it is stimulating to have such a range of possibilities for promoting mutually beneficial human-animal relationships in the service of fostering a host of positive developmental outcomes. Given the potentially diverse and wide-reaching impact of human-animal experiences on health and well being, HAI may be a tool for engaging youth, families, and communities in a way that places them on pathways to positive development.

Limitations and Future Directions

Although the findings from this dissertation provide useful first steps in addressing several gaps in the youth HAI literature, there are limitations to these findings (in addition to those noted earlier in) that are important in framing directions for future research. Social science research is just beginning to

approach HAI from a developmental perspective, and there is immense potential for growth in the broad field of human-animal relationships.

One of the primary limitations of both the C-PYD Study and the 4-H Study of PYD is related to issues of sampling. Certainly in regard to the assessment of HAI, both studies have relatively small, selective subsamples that have a high percentage of females and are not diverse with respect to race/ethnicity. The small, homogenous nature of the samples limits the ability to generalize the findings to a wider population. Furthermore, there may be additional selection effects that I was unable to control. It may be that there are individual or contextual characteristics, beyond those that were explored in the analyses, that influence the likelihood of a youth to become involved and stay involved in an animal relationship, such as parental support, community programs, and animal individual attitudes about animals. Future research including more diverse and representative samples will provide a more nuanced understanding of how HAI impacts human development more broadly.

Another sampling concern involves the age of the participants in the two studies. The participants for the C-PYD study and the post-high school wave of the 4-H Study are primarily in late adolescence or early adulthood. In order to have a developmental understanding of the processes and outcomes associated with HAI, future research should include a wider range of ages. For example, HAI research should address the developmentally-different needs of young children and early adolescents, and how mutually beneficial human-animal relationships may be different for youth in these age ranges. Furthermore, new measures

indexing HAI (such as the ACM-HAI measure) should be evaluated theoretically and empirically with regard to developmental appropriateness.

In addition, a major limitation of both of the studies is the relative weakness of the findings and the lack of longitudinal data. The findings from this study, while interesting, do not represent strong effect sizes. Furthermore, longitudinal data are necessary to validly begin to understand the dynamic developmental processes associated with HAI. While the cross-sectional data from the present studies provide important initial field-building information, a key next step will be to design and implement longitudinal research studies that can accurately operationalize the role of animals in promoting adaptive individual \leftrightarrow context relations that are associated with positive development. Furthermore, such data would afford the identification of causal relationships between HAI experiences and positive outcomes. Longitudinal data allow for understanding the integrated questions of who becomes involved in HAI, how they become and stay involved, and what developmental outcomes are associated with this involvement.

Beyond sampling and design concerns, there are also several measurement limitations that should be taken into account. The present studies were intended to be a first step in indexing the individual and contextual features that are related to the HAI-PYD relationship. However, future research should focus on measuring additional indices of the individual and contextual bases of HAI to strengthen understanding of the processes associated with HAI as a promoter and product of adaptive developmental regulations.

For example, as previously noted, further exploration of the conceptualization and operationalization of moral orientation is necessary. Given the findings related to moral orientation and large animal ownership, future research should ask questions that specifically explore the nature and structural features of large animal relationships that may differentiate the experiences of these relationships from those with small animals. Furthermore, future measure development should operationalize the levels and types of moral reasoning that individuals use to conceptualize moral issues in animal-related domains. Such research should include not only the expansion of quantitative measures of moral orientation, but should also supplement such quantitative research with qualitative exploration of conceptual and measurement challenges. It will also be important to explore potential curvilinear and multi-directional relationships between level of moral reasoning and responses to moral scenarios.

In addition, more detailed questions related to the specific features of animal ownership and animal-related activity participation would have been useful for understanding how specific instantiations of HAI are related to particular outcomes. The results from the present studies suggested that context of HAI matters, therefore justifying the need for additional details about what human-animal relationships look like in various settings. For example, the assessment of duration (e.g., length of time involved in an animal-related activity or duration of owning a particular animal for animal ownership) will be critical to understanding the development of human-animal relationships. It may be that these relationships deepen over time, and therefore the impact of a relationship

with an animal may change as a function of duration. Furthermore, a limitation of the present research was the broad categorization of domains of HAI, which resulted from grouping together animal species and types of activity participation. As already noted, future research should take a more nuanced approach to examining the various contexts of HAI. Such analysis will afford a deeper understanding of the differences between various contexts of HAI.

Finally, a limitation of the present dissertation was the lack of information on potential negative correlates of HAI. Although the literature predominately suggests that HAI is associated with positive outcomes, it is also important to note that human-animal relationships are not always beneficial. For example, there are health concerns involved with interacting with animals, such as infectious disease transmission, allergies, and injuries caused by an animal (e.g., dog bites, horseback riding injuries). Many individuals develop strong fear associations with certain types of animals, and have negative emotions and cognitions related to HAI. Future research should acknowledge the potential negative instantiations of HAI and develop measurement tools to index such phenomena.

Furthermore, interacting with humans is not always beneficial to an animal. Particularly when considering interventions involving HAI, researchers must take caution to ensure that the animals are in a context where they are adequately cared for and that their emotional and physical needs are being met. With the goal of fostering adaptive, mutually beneficial human-animal relationships, HAI research should include serious consideration of the ethical and welfare issues related to human interaction with animals, particularly in research

or intervention settings. Researchers in HAI must also take care not to imply that practitioners should be “prescribing” animals as an antidote to various physical and mental challenges. First, treating animals as a panacea is counter to the findings from this study, which suggest that the individual and contextual factors contributing to mutually-beneficial human-animal relationships vary widely. In addition, and more important, such “prescription” without care for the animals’ welfare would be counter to our ethical responsibilities as animal caretakers.

On a broader level, the ultimate goal of future work involving carefully crafted theoretically-based empirical research is to then use such scholarship to create and evaluate evidence-based intervention, prevention, and promotion programs. Methodologically-sound developmental research will afford practitioners, educators, and parents the evidence base necessary to make informed and effective choices about how to involve youth in animal-related experiences in ways that will optimize the likelihood of promoting positive developmental outcomes. Such initiatives may include animal education programs, obesity-reduction/nutrition-promotion interventions, structured animal-related extracurricular activities, or animal sports. The potential contexts for involving youth in HAI are vast, and using empirical evidence to undertake prudent actions and to maximize resources will be crucial to optimizing youth and animal experiences.

Conclusions

Although the field of HAI research is in its infancy, the existing research regarding the ubiquity of animals in the lives of youth and the potential benefits of

HAI points to the importance of developing this area of scholarship. Despite the limitations of the findings of this study, the results suggest that the field of youth HAI research is a valuable domain of inquiry. Our relationships with animals are a fundamental part of human life, and understanding the nature of these relationships is critically important. Research that explores the individual and contextual bases of mutually beneficial human-animal relationships may be a powerful means of promoting health and positive development for both humans and animals, and therefore is a worthy area of scholarship.

By capitalizing on the current media attention bringing visibility to HAI topics such as animal welfare (Bogdanich et al., 2012) and ethical issues (Grimes, 2012), as well as the increasingly complex and diverse roles that animals play in human lives (Glaberson, 2011; Greene, 2012), the time is right to garner the attention and resources necessary for further exploration of the role of HAI in youth development. By maximizing these resources and developing high quality, theoretically-predicated programs of research that make use of integrated, interdisciplinary knowledge, HAI researchers can bring this area of scholarship into the forefront of applied developmental science.

Finally, there are diverse ways in which animals are integrated into human lives. Given this variation, evidence-based programs, practices, and policies derived from HAI research have the potential to influence a wide array of domains of human psychological and physical health and functioning. Within the context of a continuing concern for the welfare of the participating animal (see Figure 1), the future of HAI scholarship may yield both new therapeutic

approaches to human health and, as well, a rich means to enhance thriving across the human life span.

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Footnotes

¹ Standardized betas (i.e., β) and p-values only are reported for the present analyses. Raw metric coefficients do not provide meaningful information and the R^2 values conflate variance explained by the target predictor(s) with variance explained by the covariates.

² Due to the nature of the attachment scale, only individuals who report having an animal respond to the attachment items. Therefore, participants who do not own an animal were dropped from the attachment analyses.

Table 1

Patterns of HAI experiences in the C-PYD Study (N=196)

Pet or Animal Ownership (<i>N</i> = 77, 39.3% total sample)	<i>N</i>	% of pet owning sample*
Dog	61	79.2%
Cat	30	39.2%
Horse	10	13%
Fish	6	7.8%
Bird	5	6.5%
Rabbit, hamster, guinea pig, other rodent	4	5.2%
Lizard, snake, or other reptile	4	5.2%
Other	4	5.2%
Goat	3	3.9%
HAI Activity Participation (<i>N</i> = 32, 16% total sample)	<i>N</i>	% of activity sample*
Horseback riding	19	59.4%
Work in an animal shelter	8	25.0%
Animal assisted therapy (recipient)	7	21.9%
Other	6	18.8%
Animal-assisted therapy (volunteer)	5	15.6%
Dog showing	3	9.4%
Livestock competitions	3	9.4%
Animal-related 4-H clubs	3	9.4%
Combined HAI experiences: pet/animal ownership and/or activity participation	<i>N</i> = 85	43.4% of total sample

*Note: Participants were allowed to select more than one pet/animal type or activity, therefore percentages do not sum to 100%.

Table 2

Model fit for the two, three, and four factor EFA solutions

# Factors	χ^2	<i>df</i>	<i>p</i>	RMSEA
2	299.00	169	<.001	.07-.09
3	216.57	150	<.001	.05-.07
4	169.71	132	.02	.04-.05

Table 3

*Factor structure for three factor HAI model in the C-PYD Study**

Original Subscale	1 Attachment	2 Commitment	3 Moral Attitudes
Attachment			
HAI01: My animal provides me with companionship.	0.78		
HAI02: I confide in my animal.	0.67		
HAI03: My animal makes me feel needed.	0.74		
HAI04: I feel that my animal is part of the family.**	0.64	0.31	
HAI07: I love my animal because it never judges me.**	0.79		
HAI10: My animal understands me.	0.81		
HAI11: My animal knows when I am feeling bad.	0.82		
HAI13: My animal makes me feel loved	0.78		
Commitment			
HAI05: If an animal destroyed \$4000 worth of furniture or personal items, I would get rid of the animal ^r .		0.66	
HAI06: I would do almost anything to take care of my animal.**	0.79		
HAI08: If an adult dog or cat was having problems with destructiveness, I would get rid of it ^r .		0.75	
HAI09: If a young animal required extensive veterinary care, I would get rid of it ^r .		0.72	
HAI12: If an adult dog or cat was having problems with housebreaking, I would get rid of it ^r .		0.84	

Moral Attitudes

HAI14: I think it is acceptable for cattle and hogs to be raised for human consumption ^r .	0.48
HAI15: Much of the scientific research done with animals is unnecessary and cruel.	0.80
HAI16: It is morally wrong to hunt wild animals for sport.	0.49
HAI17: Humans have the right to use animals as we see fit ^r .	0.35
HAI18: I do not think that there is anything wrong with using animals in medical research ^r .	0.66
HAI19: I believe that animals should have the same rights and privileges as humans.	0.44
HAI20: Animals deserve as much respect as humans do.**	
HAI21: Too much fuss is made over the welfare of animals these days when there are so many human problems ^r .**	

*Factor loadings <0.3 are suppressed.

**Item targeted for removal.

^r indicates reverse-coded items.

Table 4

Correlations among latent factors for the three factor HAI EFA model

	1	2	3
1	1.00		
2	0.347	1.00	
3	0.313	0.209	1.00

Table 5

Animal/pet ownership in the 4-H Study of PYD (N = 567)

	<i>N</i>	% of pet owning sample*	% of total sample*
Overall pet/animal ownership	391	100%	69.0%
Dog	308	78.8%	54.3%
Cat	208	53.2%	36.7%
Horse	66	16.9%	11.6%
Fish, bird, reptile, rabbit, small rodent	122	31.2%	21.5%
Cow, pig, goat, other large animal	90	23.0%	15.9%
Other	18	4.6%	3.2%

*Note: Participants were allowed to select more than one pet/animal type therefore percentages do not sum to 100%.

Table 6

HAI activity participation 4-H Study of PYD (N = 567)

	<i>N</i>	% of HAI activity sample*	% of total sample*	Mean intensity of involvement (days/month)
Overall HAI activity participation	178	100%	31.4%	--
Horseback riding	89	50.0%	15.7%	6.12
Dog showing/livestock competitions	64	36.0%	11.3%	1.70
Animal-related clubs or activities	106	59.6%	18.7%	5.09
Animal-related volunteering	62	34.8%	10.9%	3.21

*Note: Participants were allowed to select more than one type of activity participation, therefore percentages do not sum to 100%.

Table 7

Logistic regression results for gender, race, and maternal education predicting HAI participation

	β (SE)	Wald's χ^2	df	p	e^β (odds ratio)
Pet/Animal Ownership					
Constant	.36 (.33)	1.17	1	.28	1.43
Gender (1=Female; 0=Male)	.27 (.17)	2.47	1	.12	1.31
White (1=White; 0=Other)	.98 (.23)	19.15	1	<.001	2.68
Maternal Ed: 2 yrs of college*	-.55 (.38)	2.15	1	.14	.58
Maternal Ed: at least 4 yrs college*	-.66 (.32)	4.16	1	.04	.52
Missing Maternal Ed information*	-.29 (.32)	.84	1	.36	.75
Animal-Related Activity Participation					
Constant	-2.18 (.36)	35.83	1	<.001	.11
Gender (1=Female; 0=Male)	.51 (.17)	9.24	1	.002	1.67
White (1=White; 0=Other)	.90 (.26)	11.70	1	.001	2.47
Maternal Ed: 2 yrs of college*	.21 (.36)	.33	1	.57	1.23
Maternal Ed: at least 4 yrs college*	.05 (.31)	.03	1	.87	1.05
Missing Maternal Ed information*	.50 (.30)	2.88	1	.09	1.65

* Less than 2 years of college as reference group

Table 8

Geographic region, locale type, and HAI participation

	Involved in HAI (N)	Not involved in HAI (N)	Total (N)
Geographic Region¹			
West	117	35	152
North Central	174	73	247
South	45	18	63
Northeast	62	29	91
Locale Type²			
Urban	61	38	99
Rural	118	54	172
Suburban	199	57	256

¹ 14 participants were missing geographic region information.

² 40 participants were missing locale type information.

Table 9

Logistic regression for residential locale predicting participation in HAI

Predictor	β (SE)	Wald's χ^2	<i>df</i>	<i>p</i>	e^β (odds ratio)
Constant	1.25 (.18)	48.83	1	<.001	3.50
Urban*	-.70 (.26)	7.39	1	.007	.50
Suburban*	-.29 (.23)	1.57	1	.210	.75

*Rural as reference group

Table 10

Regression parameter estimates, standard errors, and approximate p-values for type of animal predicting attachment, commitment, and moral orientation

	Attachment ¹	Commitment	Moral Orientation
	B (SE)	B (SE)	B (SE)
Dog	.28* (.11)	.31** (.12)	.10 (.10)
Cat	-.02 (.09)	.11 (.10)	-.12 (.08)
Horse	.30* (.12)	-.07 (.13)	-.27* (.11)
Fish, bird, reptile, rabbit, small rodent	.16 (.10)	.07 (.10)	.07 (.09)
Cow, pig, goat, other large animal.	-.20 (.11)	-.34** (.11)	-.47*** (.10)
Other	.26 (.20)	.05 (.22)	.07 (.19)
R ² (df)	.05 (371)	.04 (380)	.11 (380)

* $p < .05$; ** $p < .01$; *** $p < .001$

¹ Individuals who did not report having an animal or pet were excluded from answering the attachment questions, given that the questions related to “your animal.”

Table 11

Model fit statistics for latent class analysis with two through four classes

Classes	Model Fit Statistics						
	<i>df</i>	Entropy	AIC	BIC	SaBIC	LMR	BLRT
Two	50	.63	2801.04	2848.79	2813.87	1	<.0001
Three	43	.66	2788.30	2862.09	2808.12	.0001	<.0001
Four	36	.69	2794.35	2894.18	2821.16	.23	>.99

Table 12

Regression parameter estimates and standard errors for class membership predicting attachment, commitment, and moral orientation.

	Attachment	Commitment	Moral Orientation
	B (SE)	B (SE)	B (SE)
No or few animals class ¹	-.34 (.2)	-.21 (.22)	1.45 (.31)***
Small animals only class ¹	-.18 (.44)	.28 (.40)	1.42 (.44)**

** $p < .01$; *** $p < .001$

¹ Compared to small and large animals class

Table 13

Model trimming steps for HAI structural equation model

Step	Path Removed	Path <i>p</i> value	$\Delta\chi^2$	Δdf	<i>p</i>
0	Original Model				
1	SOC on Attachment	.907	.013	1	.91
2	SOC on Moral	.774	1.08	1	.30
3	Confidence on Commitment	.674	.179	1	.67
4	Competence on Attachment	.666	.184	1	.67
5	Caring on Attachment	.634	1.23	1	.27
6	Competence on Moral	.623	.239	1	.63
7	Character on Attachment	.448	.570	1	.45
8	Depression on Attachment	.193	1.71	1	.19
9	Contribution on Attachment	.123	2.47	1	.12
10	SOC on Commitment	.083	3.98	1	.05
11	Confidence on Moral	.073	3.26	1	.07
12	Confidence on Attachment	.054	3.61	1	.06

Table 14

Unstandardized and standardized factor loadings and standardized errors for attachment, commitment, and moral orientation

Scale	Unstandardized Factor Loading	SE	Standardized Factor Loading	SE
Attachment				
HAI01	.66	.03	.86	.02
HAI02	.93	.07	.78	.03
HAI03	.79	.05	.85	.03
HAI10	.91	.06	.88	.02
HAI11	.86	.05	.85	.02
HAI13	.78	.04	.90	.02
Commitment				
HAI05	.84	.07	.70	.04
HAI08	.89	.06	.80	.03
HAI09	.88	.06	.84	.04
HAI12	.79	.05	.75	.04
Moral Orientation				
HAI14	.57	.05	.56	.04
HAI15	.63	.06	.55	.04
HAI16	.63	.07	.49	.04
HAI17	.74	.06	.67	.04
HAI18	.82	.06	.74	.03
HAI19	.77	.06	.67	.04

Note: All factor loadings significant at $p < .001$.

Table 15

Unstandardized and standardized factor loadings and standardized errors for the Five Cs, Contribution, Depression, and ISR

Scale	Unstandardized Factor Loading	SE	Standardized Factor Loading	SE
Competence				
Academic	.42	.03	.61	.03
Social	.49	.03	.60	.03
Peer Connection*	.17	.01	.21	.02
Confidence				
Self-Worth	.66	.03	.86	.02
Positive Identity	.53	.02	.88	.02
Physical Appearance	.46	.03	.57	.03
Character				
Social Conscience	.58	.04	.70	.03
Values Diversity	.41	.05	.45	.04
Conduct Behavior	.27	.03	.42	.05
Personal Values	.36	.03	.55	.04
Caring				
Care 1	.54	.03	.87	.03
Care 2	.57	.03	.83	.03
Care 3	.60	.03	.80	.03
Connection				
Family	.53	.03	.64	.03
Neighborhood	.54	.04	.64	.03
Peer Connection*	.17	.01	.21	.01
School	.49	.03	.64	.03
Contribution				
Contribution 1	.55	.03	.88	.03
Contribution 2	.53	.03	.71	.03
Contribution 3	.44	.03	.65	.03
Depression				
Depress 1	.44	.02	.85	.02
Depress 2	.48	.02	.96	.02
Depress 3	.39	.02	.83	.02
ISR				
SOC03	.80	.06	.81	.06
SOC05	.58	.06	.59	.06
SOC07	.35	.07	.35	.07
SOC08	.67	.06	.67	.06
SOC10	.69	.06	.69	.06
SOC13	.58	.06	.58	.06
SOC15	.61	.06	.62	.06
SOC17	.47	.07	.47	.07
SOC18	.41	.07	.41	.07

Note: All factor loadings significant at $p < .001$.

*Peer Connection loaded significantly on to both Competence and Connection.

Therefore, the factor loadings were equated.

Table 16

Latent correlations among attachment, commitment, and moral orientation

	Attachment	Commitment
Attachment	--	
Commitment	0.33***	
Moral Orientation	0.35***	0.52***

*** $p < .001$

Table 17

Latent correlations among indicators of developmental outcomes

	Competence	Confidence	Character	Caring	Connection	Contribution	Depression
Competence	--						
Confidence	.89***	--					
Character	.51***	.45***	--				
Caring	.33***	.18***	.51***	--			
Connection	.90***	.75***	.57***	.33***	--		
Contribution	.55***	.38***	.73***	.46***	.60***	--	
Depression	-.53***	-.52***	-.28***	.03	-.51***	-.23***	--
ISR	.55***	.40***	.51***	.11*	.46***	.44***	-.30***

* $p < .05$, *** $p < .001$

Table 18

Standardized regression coefficients from trimmed HAI structural equation model

	Attachment	Commitment	Moral Orientation
Connection	.13*	.19**	-.19**
Competence	.14*	--	--
Confidence	--	--	--
Character	--	.21**	.18**
Caring	.13*	.23***	--
Contribution	--	.33***	-.14*
Depression	--	-.16**	.16**
ISR	--	--	--

* $p < .05$, ** $p < .01$, *** $p < .001$

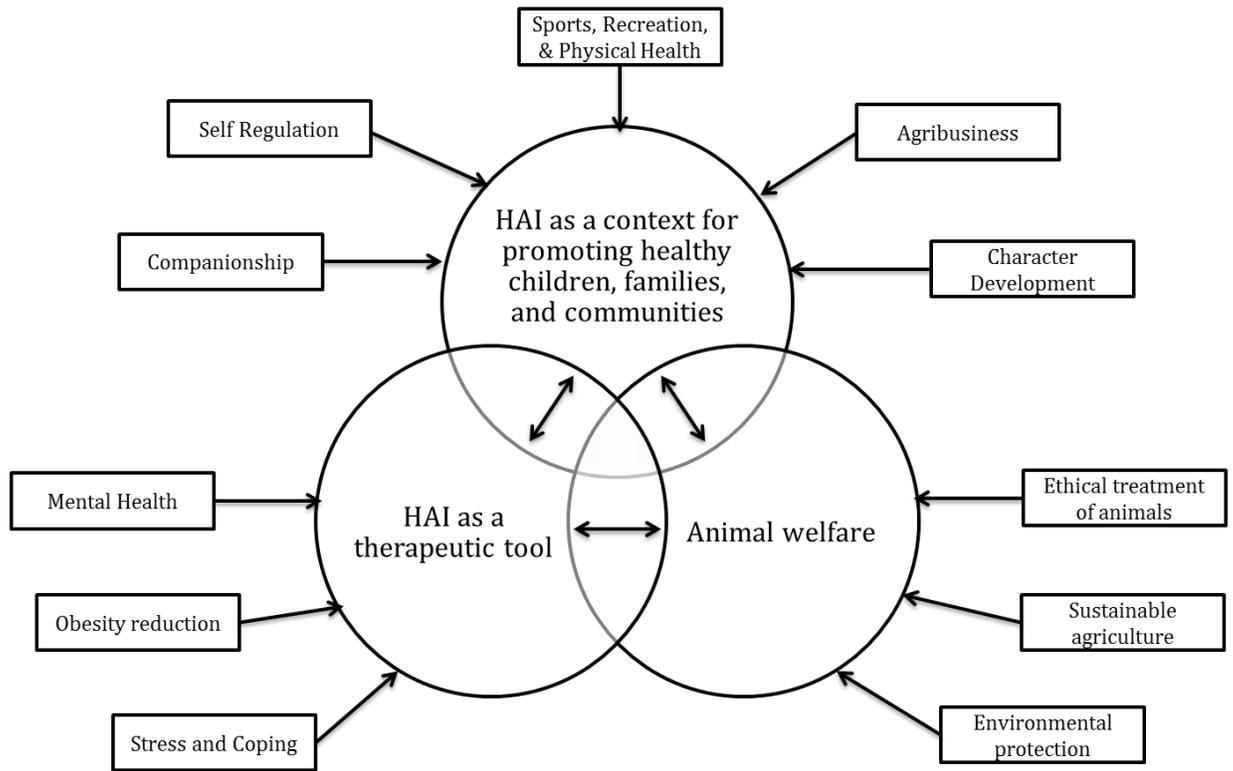


Figure 1. A model of the roles of HAI in human behavior and animal welfare.

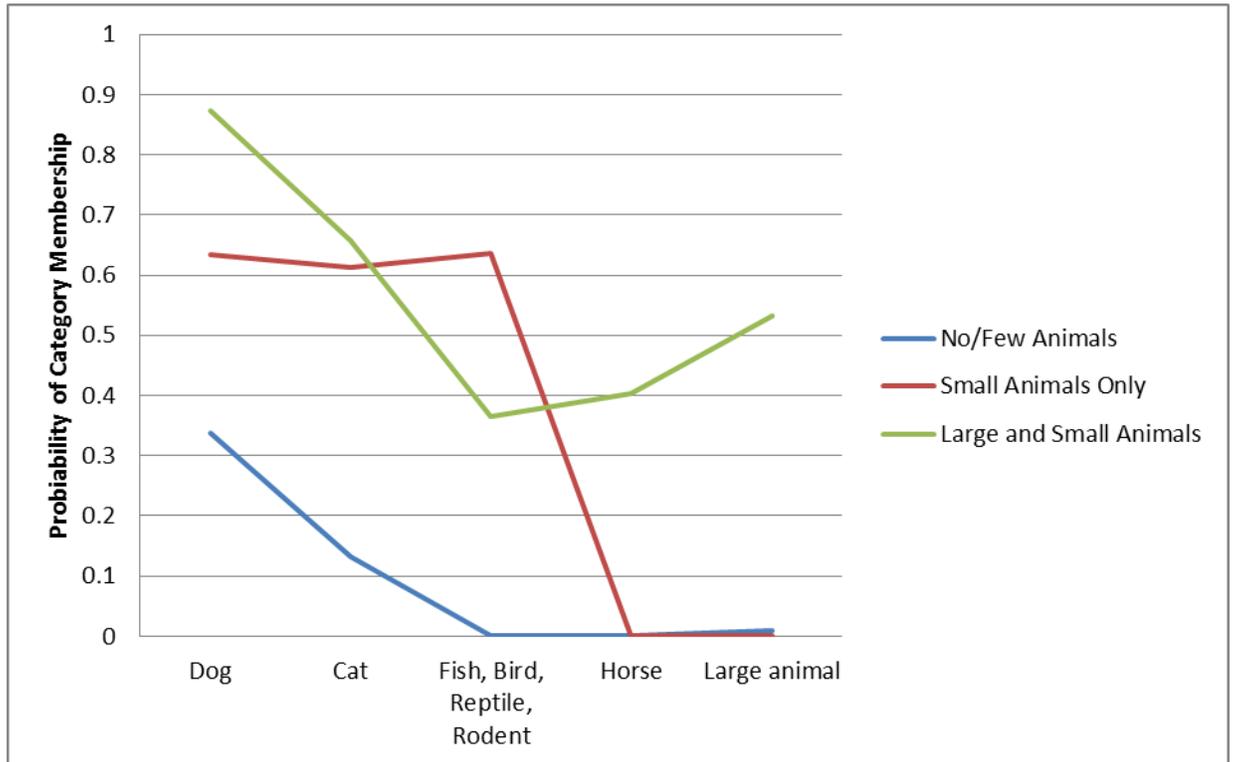


Figure 2. Three class solution for latent class mixture model of type of animal ownership

Appendix A

Expert Rater Review Form

Thank you for participating as an expert reviewer for the development of a measure of human-animal interaction. Your feedback will be critical in the development of high-quality survey items for this project.

Please read the definitions presented below of various aspects of human-animal interaction. For each item, please how well each item fits in the four definitions.

Definitions of Domains of Human-Animal Interaction

- 1. Nature of the experience:** The quantity and quality of the animal-relationship, including the setting in which an individual interacts with an animal and the intensity and duration of this experience.
- 2. Emotional Attachment:** An individual's feelings about his or her animal related to connectedness, emotional support, friendship, and closeness of relationship.
- 3. Commitment:** An individual's feelings about how much he or she is willing or able to devote financial or emotional resources to an animal.
- 4. Moral Attitudes:** An individual's feelings and thoughts about moral issues related to animals; the rights of animals in relation to the rights of humans.*

		Please indicate how well each item represents the four above noted definitions on a scale from 0 (does not fit at all) to 10 (fits extremely well).			
		Nature of the experience	Emotional Attachment	Commitment	Moral Attitudes
1.	My animal provides me with companionship ¹				
2.	I confide in my animal. ²				
3.	How often are you responsible for your animal's care?				
4.	I think it is acceptable for cattle and hogs to be raised for human consumption. ³				
5.	My animal makes me feel needed. ¹				
6.	Much of the scientific research done with animals is unnecessary and cruel. ³				
7.	I feel that my animal is a part of my family. ²				
8.	Do you currently have any animals? If yes, what kinds of pet(s)/ animal(s) do you have?				
9.	It is morally wrong to hunt wild animals for sport. ³				

		Nature of the experience	Emotional Attachment	Commitment	Moral Attitudes
10.	If an animal destroyed \$4000 worth of furniture or personal items, I would get rid of the animal. ⁴				
11.	I would do almost anything to take care of my animal. ²				
12.	I love my animal because it never judges me. ²				
13.	Humans have the right to use animals as we see fit. ³				
14.	If an adult dog or cat was having problems with destructiveness, I would get rid of it. ⁴				
15.	I do not think that there is anything wrong with using animals in medical research. ³				
16.	How frequently do you participate in the following activities? (Response options: Horseback riding, dog showing, livestock competitions, animal therapy (recipient), animal therapy (volunteer), work in animal shelter, animal-related club or extra-curricular activity, other.)				
17.	How many years have you participated in the following activities? (Response options: Horseback riding, dog showing, livestock competitions, animal therapy (recipient), animal therapy (volunteer), work in animal shelter, animal-related club or extra-curricular activity, other.)				
18.	If a young animal required extensive veterinary care, I would get rid of it. ⁴				
19.	My animal understands me. ²				
20.	I believe that animals should have the same rights and privileges as humans. ²				
21.	My animal knows when I'm feeling bad. ²				
22.	Animals deserve as much respect as humans do. ²				
23.	If an adult dog or cat was having problems with house breaking, I would get rid of it. ⁴				
24.	My animal makes me feel loved. ¹				
25.	Too much fuss is made over the welfare of animals these days when there are so many human problems that need to be solved. ³				

Additional comments:

¹Items adapted with permission from the Comfort from Companion Animals Scale (CCAS; Zasloff, 1996).

²Items adapted with permission from the Lexington Attachment to Pets Scale (LAPS; Johnson, Garrity, & Stalones, 1992).

³Items adapted with permission from the Animal Attitudes Scale (AAS; Herzog, Betchart, & Pittman, 1991).

⁴Items adapted with permission from the Miller-Rada Commitment to Pets Scale (Staats et al., 1996).

**Note:* Subsequent to the feedback from the expert raters, the “moral attitudes” scale was re-labeled “moral orientation” to better reflect the content of the domain. As noted in Chapter 2, the moral orientation scale aims to measure youth orientation to moral issues related to animals, not levels of moral behavior.

Appendix B

Pilot Study HAI Questionnaire

Do you currently have any animals? Yes No

If yes, please select what kinds of pet(s)/animal(s) you have:	
Dog	<input type="radio"/>
Cat	<input type="radio"/>
Horse	<input type="radio"/>
Fish	<input type="radio"/>
Bird	<input type="radio"/>
Lizard, snake, turtle, or other reptile	<input type="radio"/>
Hamster, guinea pig, or other rodent	<input type="radio"/>
Rabbit	<input type="radio"/>
Goat	<input type="radio"/>
Pig	<input type="radio"/>
Cow	<input type="radio"/>
Other (please specify) _____	

	Almost Always	Often	Sometimes	Rarely	Almost Never
How often are you responsible for your animal's care?	<input type="radio"/>				

How frequently do you participate in the following activities?

	Never or Rarely	Once a month	Twice a month	Once a week	Twice a week	Almost every day
Horseback riding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dog showing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Livestock competitions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Animal-related 4-H clubs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Animal therapy (recipient)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Animal therapy (volunteer)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work in an animal shelter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Animal-related club or extracurricular activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (specify) _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How many years have you participated in the following activities? Please select “0 Years” if you have never participated in this activity.

	Drop down menu
Horseback riding	0-30 years
Dog showing	0-30 years
Livestock competitions	0-30 years
Animal-related 4-H clubs	0-30 years
Animal therapy (recipient)	0-30 years
Animal therapy (volunteer)	0-30 years
Work in an animal shelter	0-30 years
Animal-related club or activity	0-30 years
Other (specify) _____	0-30 years

How much do you agree or disagree with the following?

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Does Not Apply
1. My animal provides me with companionship. ¹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I confide in my animal. ¹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. My animal makes me feel needed. ¹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I feel that my animal is a part of my family. ¹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. If an animal destroyed \$4000 worth of furniture or personal items, I would get rid of the animal. ²	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I would do almost anything to take care of my animal. ²	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I love my animal because it never judges me. ¹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. If an adult dog or cat was having problems with destructiveness, I would get rid of it. ²	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. If a young animal required extensive veterinary care, I would get rid of it. ²	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. My animal understands me. ¹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. My animal knows when I'm feeling badly. ¹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. If an adult dog or cat was having problems with house breaking, I would get rid of it. ²	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. My animal makes me feel loved. ¹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

¹Attachment subscale

²Commitment Subscale

How much do you agree or disagree with the following?

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
14. I think it is acceptable for cattle and hogs to be raised for human consumption. ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Much of the scientific research done with animals is unnecessary and cruel. ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. It is morally wrong to hunt wild animals for sport. ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. Humans have the right to use animals as we see fit. ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. I do not think that there is anything wrong with using animals in medical research. ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. I believe that animals should have the same rights and privileges as humans. ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. Animals deserve as much respect as humans do. ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. Too much fuss is made over the welfare of animals these days when there are so many human problems that need to be solved. ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

³Moral Orientation Subscale

How many years have you participated in the following activities? Please select “0 Years” if you have never participated in this activity.

Drop down menu	
Horseback riding	0-25 years
Dog showing or livestock competitions	0-25 years
Livestock competitions	0-25 years
Animal-related club or extracurricular activity	0-25 years
Volunteering in an animal shelter or animal therapy program.	0-25 years

Note: Duration items not retained for Chapter 3 study due to space restrictions.

How much do you agree or disagree with the following?

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Does Not Apply
1. My animal provides me with companionship. ¹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I confide in my animal. ¹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. My animal makes me feel needed. ¹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. My animal understands me. ¹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. My animal knows when I'm feeling bad. ¹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. My animal makes me feel loved. ¹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

¹Attachment subscale

How much do you agree or disagree with the following?

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
1. I think it is acceptable for cattle and hogs to be raised for human consumption. ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Much of the scientific research done with animals is unnecessary and cruel. ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. It is morally wrong to hunt wild animals for sport. ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Humans have the right to use animals as we see fit. ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I do not think that there is anything wrong with using animals in medical research. ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I believe that animals should have the same rights and privileges as humans. ³	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. If an animal destroyed \$4000 worth of furniture or personal items, I would get rid of the animal. ²	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. If an adult dog or cat was having problems with destructiveness, I would get rid of it. ²	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. If a young animal required extensive veterinary care, I would get rid of it. ²	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. If an adult dog or cat was having problems with house breaking, I would get rid of it. ²	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

²Commitment Subscale

³Moral Orientation Subscale

Note: Commitment subscale was moved on questionnaire to be grouped with moral orientation response format (no “does not apply” option), given that the questions are able to be answered by participants who do not have an animal.