Forming strong attitudes: teachers’ attitudes toward children with attention-deficit/hyperactivity disorder

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Forming Strong Attitudes: Teachers’ Attitudes toward Children with Attention-Deficit/Hyperactivity Disorder

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Doctor of Philosophy of the University of New England,
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Declaration

I certify that the substance of this thesis has not already been submitted for any degree and is not currently being submitted for any other degree or qualification.

I certify that any help received in preparing this thesis, and all sources used, have been acknowledged in this thesis.

Donnah Anderson
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This thesis is dedicated to my grandson, Aydin James Boyce.
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Thesis Summary

Attention-deficit/hyperactivity disorder (ADHD) is a childhood condition whose characteristic behaviours of hyperactivity, inattention and impulsivity are salient in school settings. Teachers’ actions and decisions when working with children who demonstrate behaviours consistent with ADHD can be expected to be impacted by their knowledge of ADHD, and their attitude toward teaching such children. Teachers are exposed to numerous sources of inconsistent information about ADHD during their training and classroom experience. The formation of attitudes in response to such complexity is poorly understood. The present research used models of attitude content, structure and strength to investigate the formation of teachers’ knowledge of ADHD and attitudes toward teaching children who display its characteristics. The results are reported in journal article form comprising studies reported in Chapters 2 to 4.

The first article (Chapter 2) surveys how teachers’ knowledge and attitudes develop with increased teaching experience. In-service teachers \((N = 127)\) had stronger objective knowledge, perceived knowledge, and knowledge of characteristics and treatments of ADHD, relative to pre-service teachers with \((N = 218)\) and without \((N = 109)\) teaching experience. While all groups had slightly favourable overall attitudes, they also showed incongruent beliefs, emotions and behaviours, which suggested ambivalent attitudes.

The second article (Chapter 3) surveys how specific types of experience with ADHD (direct, indirect and personal experience) are associated with teachers’ knowledge and attitudes. For pre-service teachers \((N = 327)\), personal experience and four or more instances of indirect exposure to ADHD via training or the media, were associated with stronger objective and perceived knowledge than less experience. For in-service teachers \((N = 127)\), direct experience teaching children with ADHD was associated with stronger perceived knowledge, while direct and indirect experience interacted with personal experience in their
associations with objective knowledge. Increased teaching experience was positively associated with favourable attitudes.

The third article (Chapter 4) extends a model of the formation of attitude certainty (Smith, Fabrigar, MacDougall & Wiesenthal, 2008) that was initially developed using hypothetical scenarios. An experiment (Study 1) and survey (Study 2) applied the model to teaching children with ADHD. Study 1 manipulated the amount of information, thought, and consistency of information delivered to pre-service teachers ($N = 224$) with no prior experience with ADHD. Structural equation modelling (SEM) of Study 1 did not support the original model, in which relationships between attitude certainty and objective knowledge, thought and consistency were mediated by perceived knowledge, thought, and ambivalence. Instead, amount of objective information, thought, and consistency interacted in their effect on attitude certainty. Study 2 ($N = 368$) tested whether experiences with ADHD (personal, direct and indirect) among in-service and pre-service teachers were antecedents of attitude certainty, and whether perceived accessibility, or perceived ease of recalling an attitude, was a mediator. SEM supported both these hypotheses. Together, these results suggest the psychological processes that form strong attitudes differ according to familiarity with the attitude object, and the context and stage of attitude formation.

The findings from this project carry practical implications for teacher training on ADHD, and for school psychologists. Strong attitudes were shown to develop via combinations of direct, indirect and personal experiences with ADHD, and via amount and structural consistency of information and thought about ADHD. The results highlight the need to investigate such complex attitudes in ecologically valid ways. The development of models of attitude strength is important for understanding attitudes toward other social issues that polarise opinions and have enduring consequences, such as global warming or genetic modification of crops. Like ADHD, these topics are based on large amounts of structurally
inconsistent information. Thus, the research reported in this thesis pertains to the formation of complex, real-life attitudes and may generalise to other multifaceted, personally relevant attitude objects.
Chapter 1: Introduction
Chapter 1

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is held as one of the most common childhood behavioural conditions (Barkley, 1997). It is estimated that, on average, at least one child expressing characteristics of ADHD is present in every classroom (Barkley, 1990). This has been supported by a recent meta-analysis of 102 studies comprising 171,756 participants (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007). The meta-analysis showed the worldwide pooled prevalence rate of children and adolescents attracting a diagnosis of ADHD was 5.3% (Polanczyk et al., 2007). This diagnosis was more prevalent in males (10%) than females (4%), and more prevalent in children (7%) than adolescents (3%) (Polanczyk et al., 2007). In Australia, the most recent statistics available are from the 1998 Child and Adolescent component of the National Survey of Mental Health and Wellbeing (Sawyer et al., 2000). For those aged 6-14 years it was reported that 13% of all children, 18% of boys and 8% of girls, met the criteria for ADHD. Sawyer et al. (2000) suggested that these rates were inflated due to the procedures used in the survey. They argued that some children’s symptoms could be accounted for by other conditions that were not included in the survey. The Polanczyk et al. (2007) meta-analysis included six studies from the Oceanic region, including Australia, and estimated the pooled prevalence rate at just under 5%, which is similar to the worldwide rate.

ADHD is a chronic condition characterised by developmentally inappropriate inattention, impulsivity and hyperactivity (Barkley, 1990). The characteristic behaviours associated with ADHD are noticeable in school settings because children are required to behave in ways that are discrepant with the symptoms of the disorder (Kos, Richdale, & Hay, 2006; Salmelainen, 2002). Children who express the symptoms of ADHD are challenging to teach as they cause disruption in the classroom, have problems interacting with their peers, such as acting aggressively, and often show symptoms of other problems such as learning
disorders, anxiety, depression and other developmental disorders (Ohan, Visser, Strain & Allen, 2011; Salmelainen, 2002). To date, the causes of ADHD are unknown, although it is suspected to have a neurological basis, and it treatment with stimulant medication is reported as the most effective intervention (MTA Cooperative Group, 1999a; Salmelainen, 2002).

Often the characteristics of ADHD are first noticed when a child begins formal schooling (Salmelainen, 2002). Not surprisingly, many studies identify teachers as the most frequent initial referral source by recommending to parents that their child receive assessment for ADHD (e.g., Snider, Busch, & Arrowood, 2003; Stroh, Frankenberger, Cornell-Swanson, Wood, & Pahl, 2008). Additionally, teachers’ observations about the child’s functioning in task oriented and social situations are used in classification and treatment decisions (Vereb & DiPerna, 2004). As noted by some scholars, teachers are also often responsible for implementing and evaluating interventions for ADHD in the classroom (Ohan, Cormier, Hepp, Visser, & Strain, 2008; Vereb & DiPerna, 2004). The prevalence and salience of ADHD in school settings, and teachers’ roles in reporting symptoms, advising parents and assisting such children to achieve academically and socially, makes it an important topic for teachers, school psychologists, and teacher trainers at both pre-service and in-service levels.

The likelihood of new graduates teaching a child displaying the characteristics of ADHD early in their career is high. The research reported in this thesis included samples of in-service and pre-service teachers and examined how increased classroom experience and training impacts on knowledge of ADHD and the formation of attitudes towards teaching children who exhibit the characteristics of ADHD. The phrase exhibits the characteristics of ADHD is used throughout the thesis rather than diagnosed with ADHD to reflect the lack of a systematic or formal reporting process of children diagnosed with ADHD to the New South Wales Department of Education (Rachel Weymouth, personal communication, 6th June, 2012). A teacher may not know whether a child in their classroom has a diagnosis of ADHD,
but they would observe the child’s behaviours. The teacher’s belief that a certain child exhibits the characteristics of ADHD is likely to be a crucial factor that influences their attitude and behaviours towards that child, even if they do not know of the child’s diagnostic status.

In the mid-1990s it was suggested that teacher characteristics, such as their knowledge of ADHD, their attitude toward ADHD (Greene, 1995; Power, Hess, & Bennett, 1995), and their training and classroom teaching experiences (Greene, 1995), may impact on academic and social outcomes for children expressing features of ADHD. Thirteen years later, in a review of teacher characteristics and their impact on outcomes, Sherman, Rasmussen and Baydala (2008) stated that empirical research supporting these suggestions was only beginning to emerge. While there is little empirical work so far on the consequences of teacher characteristics for children, several authors have proposed ways that teacher knowledge and attitudes may affect child outcomes. For example, it has been suggested that teachers who lack knowledge about ADHD may overlook behaviours signifying a child in need of assistance (Ohan et al., 2008) and they may provide unreliable information to medical practitioners about the effects of medication (Kasten, Coury, & Heron, 1992). Similarly, a concern of some scholars has been that teachers’ attitudes about ADHD may impact on their selection of a teaching approach (Westwood, 1996), their willingness to implement interventions (Vereb & DiPerna, 2004), their chosen behavioural management strategies, and classmates’ perception of the child (Atkinson, Robinson, & Shute, 1997).

Given this background it is valuable to examine teachers’ knowledge, attitudes and experiences regarding ADHD. The present research program was undertaken in response to Kos, Richdale and Hay’s (2006) call for theoretically guided research on this subject. Teachers’ attitudes have not been clearly measured to date and there is limited literature providing a theoretical understanding of their attitudes and knowledge of ADHD (Kos et al.,
Empirical research would benefit from more systematic and theoretical guidance to assist identification of relevant teacher characteristics, such as knowledge, attitudes and prior experience. Once identified, teacher characteristics may be used as independent variables in future research on outcomes for children and guide curriculum development in teacher training at both the pre-service and in-service levels. A theoretically-grounded and deeper understanding of teachers’ knowledge and attitudes regarding ADHD would also assist school psychologists in their advisory and support roles with teachers and children in schools.

Teachers are exposed to numerous sources of anecdotal evidence and information about the causes, treatments and characteristics of ADHD during training courses, the media, interactions with children, and through personal experience with ADHD. This results in many inconsistencies in information and demonstrates the complexity of attitude formation. To address the issue of how these complex attitudes develop, the present research used models of attitude content, structure and strength from a social psychological perspective to systematically investigate the formation of teachers’ knowledge and attitudes regarding ADHD. The theoretical perspectives relevant to the research program are described below, followed by an introduction to the structure of the research program and how the models were applied in each phase of the study.

**Attitude Models**

Attitudes are the evaluations people make when they meet others, experience events, or receive information (Eagly & Chaiken, 1993). Attitudes may be either favourable or unfavourable evaluations of these people, events and topics, which are referred to as the attitude object (Eagly & Chaiken, 1993). Attitudes manifest as how much we “like a person, favour a brand or support a policy” (Tormala & Rucker, 2007, p. 469). As discussed below, theories and models have been developed by social psychologists to assist understanding of attitude content, structure and strength.
Models of attitude content.

Two main perspectives on attitude content have been theorised. The traditional view was that an attitude reflected a person’s total or overall beliefs about an attitude object (Eagly & Chaiken, 1993). This view was extended in the expectancy-value model (Fishbein & Ajzen, 1975), which posits that overall attitudes are derived from combining the evaluation of each attribute of an attitude object as either favourable or unfavourable with beliefs about the probability that the object possesses each attribute. For example, according to this model, if a teacher believed that children who exhibit the characteristics of ADHD are disruptive, waste valuable teaching time, but motivate the creation of engaging lessons, the evaluation of the first two attributes would be unfavourable, while the latter would be favourable. If the teacher believed that the probability of classroom disruption and wasting time was highly likely, but that motivation for producing engaging lessons was not probable, then their overall attitude would be unfavourable.

The other main perspective on attitude content views attitudes as multifaceted and not based solely on beliefs (Eagly & Chaiken, 1993; Haddock & Zanna, 1998; Maio & Haddock, 2004). This tripartite model identifies three elements of attitude content: cognition, affect and behaviour (Eagly & Chaiken, 1993; Zanna & Rempel, 1988). The cognitive component refers to thoughts and beliefs. Previous authors working with the tripartite model have identified two types of cognitions or beliefs. Stereotypic beliefs refer to beliefs about a group of people’s characteristics (Haddock & Zanna, 1999). For example, stereotypic beliefs about children with ADHD are that they are male, naughty and have short attention spans. Symbolic beliefs refer to beliefs about the values, customs or traditions that are held or practiced by typical members of a target group (Esses & Maio, 2002; Haddock & Zanna, 1999). Teachers’ symbolic beliefs may relate to how children with characteristics of ADHD impact on the teaching process and classroom environment. For example, a teacher may think that teaching
“ADHD children” is too time consuming. Alternatively, they may have positive beliefs, such as thinking that teaching such children creates a vibrant classroom. The affective component of the tripartite model refers to emotional responses, such as feeling frustrated when teaching such a child, or feeling pleased when a child achieves a goal. The behavioural component of the tripartite model refers to past actions, such as a teacher giving a child a special job to do in the classroom, or reprimanding a child for their lack of attention.

Models of attitude structure.

While models of attitude content focus on the nature of an attitude’s constituent elements, models of attitude structure focus on how favourable and unfavourable evaluations combine to form an attitude (Maio & Haddock, 2004). Two key perspectives on attitude structure are the uni-dimensional and bi-dimensional models. Uni-dimensional models view attitudes as overall evaluations that are either favourable or unfavourable, but not both at the same time (Eagly & Chaiken, 1993; Maio & Haddock, 2004). The uni-dimensional model views attitudes on a single favourable-unfavourable continuum. In contrast, a bi-dimensional model of attitude structure theorises that people may hold favourable and unfavourable attitudes simultaneously, that is, they may have ambivalent attitudes (Eagly & Chaiken, 1993).

The tripartite model of attitude content allows for a bi-dimensional structure in that respondents may report mixed favourable and unfavourable evaluations between their cognitions, affect and behaviours. This type of mixed valence is termed inter-component ambivalence (Eagly & Chaiken, 1993). For example, teachers may believe that using behavioural management strategies is beneficial (a favourable cognition) but at the same time feel frustrated about implementing these strategies (an unfavourable affect). They would therefore exhibit conflict between the cognitive and affective components of their attitude and thus report inter-component ambivalence. Similarly, a teacher may experience frustration in
response to teaching a child who is impulsive and inattentive (an unfavourable affect) simultaneously with implementing engaging teaching strategies (favourable actions).

The tripartite model of attitude content is also bi-dimensional in structure because it allows measurement of mixed valence within each component (Eagly & Chaiken, 1993). *Intra-component ambivalence* occurs when a person reports conflicting valence within a single attitude component, such as experiencing simultaneous favourable and unfavourable cognitions, affects or behaviours (Eagly & Chaiken, 1993). Teachers may simultaneously believe that using behavioural management strategies is beneficial (a favourable cognition), but also believe that implementing these strategies requires too much time (an unfavourable cognition). They would therefore exhibit intra-component ambivalence within the cognitive element of their attitude.

The expectancy-value model of attitude content is limited to identifying intra-component ambivalence because it views attitudes as composed solely of beliefs. In contrast, integrating the tripartite model of attitude content and the bi-dimensional model of attitude structure allows measurement of different types of ambivalence that may occur within a complex attitude (Haddock & Zanna, 1998; Maio & Haddock, 2004). It is important to identify teachers’ ambivalent attitudes, as well as their global attitude, as these different perspectives may produce unique consequences (Maio & Haddock, 2004). As described below, ambivalence is thought to have implications for understanding attitude strength (Maio & Haddock, 2004; Thompson, Zanna, & Griffin, 1995), which may also impact on teachers’ roles with children. For example, teachers who have ambivalent attitudes may be inconsistent in their choice and implementation of behavioural and pedagogical strategies, and in their communication and actions toward children.

**Multi-dimensional models of attitude strength.**
Attitudes are of interest to researchers and practitioners because they affect future thoughts, judgements and behaviours. Some attitudes are held more strongly than others; they have greater influence on thoughts and behaviours, they last longer and are more resistant to opposing viewpoints than weaker attitudes (Krosnick & Petty, 1995). Thus, attitude researchers and theorists have been interested in analysing the components of strong attitudes. More than 20 attributes or dimensions of attitude strength have been proposed (e.g., Raden, 1985; Scott, 1968). The dimensions include aspects of the cognitive structure of the attitude, such as extent of knowledge about a topic (Wood, 1982; Wood, Rhodes, & Biek, 1995), how quickly the attitude can be accessed in memory (Fazio, 1995), and its ambivalence: the degree of unfavourable and favourable components of the attitude (Thompson et al., 1995). Other dimensions refer to subjective beliefs about the attitude, such as a sense of personal involvement (Thomsen, Borgida, & Lavine, 1995) and how certain a person is about their attitude (Gross, Holtz, & Miller, 1995). Other attitude strength dimensions include having first-hand experience with the attitude object (Fazio & Zanna, 1978) and experience gained through secondary sources, such as the media, training courses or study (Eagly & Chaiken, 1998). Cognitive elaboration, or the extent of prior thought about the merits and limitations of an attitude object, is another dimension of strength and is based on the extent of information processing (Petty, Haugtvedt, & Smith, 1995). There is general consensus that the various attitude dimensions are distinct constructs rather than reflecting a single underlying one (Visser, Bizer, & Krosnick, 2006). Thus a multidimensional model of attitude strength has been supported.

Bassili (1996) identified two types of attitude strength dimensions based on the way the dimensions are measured. The first comprises operative indices, which measure attitude strength objectively, for example, using an empirically derived questionnaire to measure actual knowledge of a topic, or counting the number of responses on a list of thoughts to
measure actual cognitive elaboration. The second comprises metacognitive indices, which measure attitude strength subjectively, for example using Likert scales to assess perceived knowledge of a topic, or perceived amount of thought about a topic. Generally, objective measures and subjective measures have been found to be only weakly correlated, therefore both types of measures have been recommended to be included in research (Bassili, 1996; Krosnick, Boninger, Chuang, Berent, & Carnot, 1993; Krosnick & Petty, 1995).

A particular focus of the current research program was how teachers’ prior experience related to their knowledge of ADHD and attitudes toward teaching children who exhibit the characteristics of ADHD. The multi-dimensional model of attitude strength guided identification of types of prior experiences that may be relevant to development of knowledge and attitudes. This focus on experience echoed a definition of attitudes by Allport, one of the founders of attitude theory, who stated that an “attitude is a mental and neural state of readiness, organised through experience [emphasis added], exerting directive and dynamic influence upon the individual’s response to all objects with which it is related” (1935, p. 810). Allport’s phrase, “organised through experience” holds attitudes as formed through learning and interactions with the environment. In the education literature, prior experiences are usually treated as demographic variables or as aspects of professional background (e.g., Bekle, 2004; Kos, Richdale, & Jackson, 2004; Ohan, Visser, Strain, & Allen, 2011; Sciutto, Terjesen, & Bender Frank, 2000; Vereb & DiPerna, 2004), however in the multi-dimensional model of attitude strength, different types of prior experience, such as direct experience teaching children who demonstrate the characteristics of ADHD (direct experience, Fazio & Zanna, 1978), indirect experience with ADHD via in-service and pre-service teacher training (indirect experience, Eagly & Chaiken, 1998) and teachers’ personal experience with ADHD (personal involvement, Thomsen et al., 1995), are seen as dimensions of an attitude’s strength that act as antecedents of other dimensions, such as knowledge. The current study extended
Allport’s (1935) definition of an attitude to models of attitude formation that position the experience variables as antecedents of strong attitudes.

**A Model of the Origins of Attitude Certainty**

Recent research on multi-dimensional models of attitude strength have focused on identifying how particular strength dimensions form and become strong. One of the most important and frequently researched dimensions is attitude certainty (Barden & Petty, 2008). Certainty is the level of confidence a person attaches to their attitude (Gross et al., 1995). Attitude certainty is important because attitudes held with high levels of certainty impact on behaviours more strongly than those with low certainty (e.g., Bizer, Tormala, Rucker, & Petty, 2006; Fazio & Zanna, 1978), they are more durable (e.g., Bassili, 1996) and show greater resistance to persuasion (e.g., Tormala & Petty, 2002; Wu & Shaffer, 1987). Low attitude certainty produces psychological aversion, which people are motivated to reduce (Gerard & Greenbaum, 1962). Research that identifies the origins of attitude certainty has theoretical and practical utility and will improve understanding of the psychological processes involved in forming, maintaining and changing attitudes, as well as predicting and intervening in attitudes, choices and behaviours (Tormala, Clarkson, & Henderson, 2011).

Several antecedents of attitude certainty have been suggested (e.g., Smith, Fabrigar, Macdougall, & Weisenthal, 2008; Tormala & Rucker, 2007) but understanding of their relationship with attitude certainty is far from established. For example, Smith et al. (2008) argue that although theory suggests informational sources, such as the volume of knowledge and amount of thought, should predict attitude certainty, mixed results have been reported. Similarly, empirical studies of the structural consistency of information have failed to clarify its relationship with attitude certainty (Smith et al., 2008). Structural consistency refers to the configuration of favourable and unfavourable valence of information about an attitude object (Chaiken, Pomerantz, & Giner-Sorolla, 1995). That is, information may be consistently
favourable or unfavourable, or it may have mixed valence. Consistent information is thought to lead to greater attitude certainty, while inconsistency is thought to lead to less attitude certainty (Smith et al., 2008). Thus, the research on objectively measured attitude strength dimensions as sources of attitude certainty has produced mixed results.

In their recent review of empirical research on attitude certainty, Tormala and Rucker (2007) argued that metacognitive appraisals (see Bassili, 1996), such as subjective ratings of thought quality and processing effort, are potential antecedents of attitude certainty. Metacognitive appraisals refer to thoughts about other thought processes, such as subjective ratings of thought quality and processing effort (Tormala & Rucker, 2007). For example, if a person perceives that they have thought a lot about a topic, irrespective of how much they have actually thought about it, then they are also likely to perceive themselves to be certain of their attitude. There remains confusion about the extent to which attitude certainty originates from objective cognitive/structural sources or subjective sources, or both (Tormala & Rucker, 2007). There is little understanding of how these dimensions relate to one another and of the psychological processes that underlie the process of forming attitude certainty (Holland, Verplanken, & Knippenberg, 2003).

The first study to test a multi-dimensional model of the antecedents of attitude certainty that clearly distinguished between objective and subjective attitude strength dimensions was by Smith et al. (2008). Subjective dimensions were often previously used as proxies for their objective counterparts or as manipulation checks, but Smith et al. placed them as mediators between cognitive/structural dimensions of attitude strength and attitude certainty. They hypothesised that subjective appraisals of attitude strength were more proximal sources of attitude certainty than structural and cognitive dimensions. They also hypothesised that subjective attitude strength dimensions may produce stronger correlations with attitude certainty than objective dimensions because they may have a joint impact
sourced from more than one objective dimension. For example, perceived amount of knowledge may be sourced from objective or actual knowledge as well as the actual amount of thought. Smith et al.’s model was chosen to inform the present research project as it was the first to test how multiple attitude strength dimensions combine to produce attitude certainty, rather than testing them in isolation, and its factorial design, as described next, ruled out possible reverse causality.

Smith et al. (2008) used a factorial design to manipulate the amount of information (i.e., amount of actual knowledge) provided about a novel construct, the amount of cognitive elaboration of the information and the structural consistency of the information. They measured the concomitant metacognitive attitude strength dimensions of perceived knowledge, perceived thought and perceived ambivalence. Results showed support for a causal model, whereby metacognitive dimensions of attitude strength acted as mediators of objective indices of attitude strength (i.e., actual knowledge, cognitive elaboration and structural consistency) to determine attitude certainty (see Figure 4.1, p. 115). Mediation refers to a sequence of causal relations by which an independent variable (X) affects a dependent variable (Y) by influencing an intervening, or mediator variable (M) (Hayes, 2009).

As shown in Figure 4.1 (p. 115), four full-mediational effects were present: (a) perceived knowledge mediated the relationship between amount of knowledge and attitude certainty; (b) perceived knowledge mediated cognitive elaboration and attitude certainty; (c) perceived ambivalence mediated structural consistency and attitude certainty; and (d) perceived ambivalence mediated amount of knowledge and attitude certainty (Smith et al., 2008). One partial mediation effect was also supported: Perceived thought mediated cognitive elaboration and attitude certainty, however the direct relationship between elaboration and attitude certainty was also significant.
These results aid understanding of the psychological processes by which informational factors and structural consistency influence attitude certainty (Smith et al., 2008). For example, they show that perceived knowledge is a more proximal source of attitude certainty than actual knowledge and that actual knowledge has no direct relationship with attitude certainty (Smith et al., 2008). Additionally, these results suggest possible reasons why attitude certainty impacts on attitude strength. For example, people who are highly certain of their attitudes may be more likely to base their behaviours on their attitudes because their high degree of perceived knowledge about the issue, which is based on the actual amount of information they have been exposed to and their actual amount of thought about that information, enables them to see the relevance of their behaviour (Smith et al., 2008).

**Extensions to Smith et al.’s (2008) model.**

While Smith et al.’s (2008) results develop understanding of how strong attitudes are formed, it is also important to test other potential antecedents and mediators of attitude certainty. For example, Holland et al. (2003) showed that when attitudes were perceived to be easily recalled and readily accessible, they led to greater attitude certainty compared to when they were perceived as difficult to access. Smith et al. suggested future research should explore whether perceived accessibility is another mediator in their model. They suggested that perceived accessibility may mediate the elaboration-attitude certainty relationship, as well as the structural consistency-attitude certainty relationship. To date, no published studies have tested these hypotheses.

Similarly, prior experience with an attitude object in the form of direct experience, indirect experience and personal experience (see above) are likely to influence attitude formation, and also attitude certainty. Smith et al. (2008) acknowledge direct experience may act as a potential antecedent of attitude certainty and suggest it should be added to their model. Direct experience and indirect experience are thought to impact on attitude certainty
by influencing volume of knowledge (Tormala & Rucker, 2007). The relationships between direct experience, indirect experience and attitude certainty would likely be mediated by perceived knowledge. No studies to date have tested these hypotheses.

Barden and Petty (2008) noted that causal inferences based on Smith et al.’s (2008) findings were limited because the impact of the distraction task they used to manipulate elaboration was not checked with a measure of objective elaboration. This critique can be extended to the other manipulated variables, in that measures of objective knowledge and objective ambivalence were not undertaken. While addition of these manipulation checks would improve the internal validity of the findings, perhaps the most important extension of Smith et al.’s laboratory experiment is that the findings have not yet been validated for attitudes formed in natural settings based on complex and real-life attitude objects.

**Ecological Validity of Laboratory Derived Models**

In their seminal guide to attitude theories and research, Eagly and Chaiken (1993) identified the lack of research on how attitudes form and become strong as a serious omission in attitude research. They stated that this limitation was in part due to the restrictions of laboratory experiments, in that “emotion-arousing, value-linked, behaviour-impelling attitudes” that are likely to be important in development of attitudes in natural settings, are difficult to create in a single laboratory session (Eagly & Chaiken, 1993, p. 681). In a recent analysis of 217 studies that reported both laboratory and field results from 82 meta-analyses (Mitchell, 2012), it was reported that laboratory and field effects in social psychology had the lowest correlation ($r = .53$) compared with other sub-fields in psychology (e.g., industrial organisational psychology, $r = .89$). Within social psychology, studies on the topics of social perception and cognition had the lowest correlation between laboratory and field results of ($r = .53$). Moreover, the majority of laboratory results that changed signs (i.e., from positive to negative or vice versa) in the field were from social psychology (Mitchell, 2012).
Specifically, 21 out of 80 (26.3%) social psychology studies changed signs between research paradigms. In comparison, only 1 of 22 (4.5%) studies changed signs in personality psychology, and 2 of 71 (2.8%) changed in industrial-organisational psychology (Mitchell, 2012). These findings demonstrate that Eagly and Chaiken’s call for more extensive use of field research to supplement laboratory studies remains valid. The trade-offs for theory development between internal validity and external validity may be circumvented if both types of study contribute to research (Harackiewicz & Barron, 2004; Hovland, 1959).

Findings from the attitude strength literature provide an indication of how laboratory results may differ from those in more natural settings. Variables that have been found to impact on attitude strength, such as social context (Festinger, 1954; Petrocelli, Tormala, & Rucker, 2007; Visser & Mirabile, 2004), attentional processes (Tormala et al., 2011; Tormala & Rucker, 2007) and self-interest or personal importance (Eaton, Majka, & Visser, 2008; Holbrook, Berent, Krosnick, Visser, & Boninger, 2005), are likely to differ in the laboratory compared to those in field research. Laboratory settings lack the long-term relationships between people that are evident in natural settings, impression management is less likely in laboratories compared to natural settings, and information is presented via written documents, videos or audio files, which adds to the remoteness of relationships compared to face-to-face dialogue in natural settings (Eagly & Chaiken, 1993). Laboratory settings demand a constant, high level of attention to stimuli, participants are often asked to respond in the most “correct” way, and to decide quickly on their attitude toward novel stimuli (Eagly & Chaiken, 1993; Tormala et al., 2011; Tormala & Rucker, 2007). In contrast, in natural settings, attention is more variable (Eagly & Chaiken, 1993), attitudes are formed over longer time periods toward real and complex attitude objects, and they may be expressed repeatedly prior to being measured during research (Tormala et al., 2011). Self-interest or personal significance is also likely to be more prevalent in natural settings than in laboratory experiments in which
hypothetical attitude objects, of which participants have no prior experience, are used as
stimuli.

Eagly and Chaiken (1993) called for use of samples other than psychology
undergraduates to aid generalisation of results to the broader population. Due to their
academic skills, college samples may be more likely to favour cognitive processes over
affective processes when responding to research stimuli (Eagly & Chaiken, 1993). Such
biases may be important when testing models of attitudes, such as the tripartite model
described earlier, which contain cognitive and affective components. Application of attitude
models to applied settings, such as education, enables more diverse samples to be tested.
While recent research has focused on identifying the antecedents of attitude strength
dimensions, including attitude certainty (e.g., Bizer et al., 2006; Haddock, Rothman, Reber, &
Schwarz, 1999; Holland et al., 2003; Smith et al., 2008; Tormala et al., 2011), almost 20 years
after Eagly and Chaiken’s review, there remains a lack of research in applied settings.

Aim

The present research program had two aims, reflecting a perspective that bridged
social, educational and clinical psychology. The aims and accompanying research questions
are elaborated in the remainder of this chapter. The first aim was to provide a theoretical
structure to applied research in the area of attitudes toward teaching children who exhibit the
characteristics of ADHD. The present research program integrated models of attitude content
and structure to provide a detailed and systematic analysis of teachers’ attitudes toward
ADHD. Each study forming the research program also drew on multi-dimensional models of
attitude strength and included both operative and meta-attitudinal indices of attitude strength.
This approach allowed identification of attitudes that may impact on teachers’ roles in
working with the children in question. The second aim addressed Eagly and Chaiken’s (1993)
call for research that tests the ecological validity of laboratory-derived models by applying a
multi-dimensional model of how attitudes form and become strong to samples of pre-service and in-service teachers. Specifically, Smith, Fabrigar, Macdougall and Weisenthal’s (2008) model of the antecedents of attitude certainty was applied to teaching children with characteristics of ADHD, using both survey and experimental methods that tested and extended the scope of the model.

In order to achieve these aims a survey and experiment were conducted. Different aspects of the survey results are presented in Chapters 2, 3 and 4 of this thesis and each chapter builds on the findings of the previous one. Results from the experiment are reported in Chapter 4.

**Research Objectives**

Six research objectives stemmed from these broad aims and the results are reported in Chapters 2 to 4 in journal article format. The article presented as Chapter 2 has been published in a peer reviewed journal, and those presented in Chapters 3 and 4 have been submitted as separate articles to different journals. Chapter 2 reported the findings for the following research objectives:

1. To identify and describe the content, structure, and strength of pre-service teachers’ and in-service teachers’ attitudes toward teaching children showing characteristics of ADHD.

2. To identify whether in-service teachers and pre-service teachers differed in their knowledge and attitudes toward ADHD, thereby identifying the stage of teachers’ careers in which their knowledge and attitudes were formed.

In Chapter 3 the construct of teachers’ prior experience was refined by drawing on the multidimensional model of attitude strength to identify three types of experience with ADHD. The three types were (a) direct experience teaching a child with ADHD; (b) indirect experience gained via pre-service university courses, in-service training or the media; and (c)
personal experience with ADHD. These types of experience were conceptualised as
dimensions of attitude strength. Chapter 3 reported results that addressed the following
objective:

3. To identify how pre-service teachers’ and in-service teachers’ direct, indirect
and personal experiences with ADHD were related to their knowledge of
ADHD and their attitudes toward teaching children who exhibit characteristics
of ADHD.

Chapter 4 applied and extended Smith et al.’s (2008) model of the origins of attitude certainty
using experimental (Study 1) and survey (Study 2) procedures. The following objectives were
addressed:

4. To test the external validity of Smith et al.’s (2008) model of attitude certainty
on a real and complex attitude object (i.e., attitudes toward teaching children
who exhibit the behaviours associated with ADHD) using both survey and
experimental procedures.

5. To extend Smith et al.’s (2008) model by adding perceived accessibility of an
attitude as another mediator in the model.

6. To extend Smith et al.’s (2008) model by adding direct, indirect and personal
experience with ADHD as potential antecedents of attitude certainty.

Methodological Concerns

Methodological limitations in published literature are considered below for the
purpose of identifying methodological concerns that are addressed in the studies reported in
Chapters 2 to 4. This section is followed by an introduction to each chapter in which the
purpose, methodology and theoretical base of each chapter are described.

Measurement of attitudes.
In their review of research on teachers’ knowledge and attitudes toward ADHD, Kos et al. (2006) found that the existing number of studies worldwide on teachers’ attitudes to ADHD was scant and they suffered from mixed results, problematic methodology and an atheoretical perspective (Kos et al., 2006). Several studies have measured teachers’ knowledge about ADHD (i.e., knowing specific information about ADHD) and while some also claim to measure attitudes, they either do not differentiate between attitudes and knowledge (e.g., Hepperlen, Clay, Henly, & Barke, 2002; Jerome, Gordon, & Hustler, 1994), measure narrower constructs such as beliefs about medication (e.g., Kasten et al., 1992), or measure opinions about mainstream versus special education settings for children with ADHD (e.g., Brook, Watemberg, & Geva, 2000). One Australian study measured teachers’ attitudes to ADHD (Bekle, 2004), albeit with a single item and small sample size. Other studies (e.g., Ohan et al., 2008; 2011) have measured teachers’ expectations of children with ADHD, emotional responses to teaching these children, and intention to implement treatments, but these aspects were not conceptualised as attitude components.

The present research program addressed these concerns by drawing on attitude models to guide methodology. Thurstone (1928) acknowledged that attitudes are complicated, and stated “It will be conceded at the outset that an attitude is a complex affair which cannot be wholly described by any single numerical index” (p. 530). As described above, the present research used multiple methods of measurement. Global attitude toward teaching children with ADHD was rated on an attitude thermometer scale (Esses & Maio, 2002; Haddock & Zanna, 1998), where 0 represented an extremely unfavourable attitude and 100 represented an extremely favourable attitude. Thermometer scales correlate highly with multiple-item measures of attitudes, such as semantic differential scales (Haddock & Zanna, 1999; Stangor, Sullivan, & Ford, 1991). Global attitude is an example of a single component model of attitude content, and a uni-dimensional model of attitude structure. Components of attitude
content based on the tripartite model were also measured. Stereotypic and symbolic beliefs (Haddock & Zanna, 1999), affect and behaviour were assessed using open-ended responses and self-reported valence ratings (Esses & Maio, 2002; Haddock & Zanna, 1998). Respondents listed their thoughts, emotions and past behaviours toward children who displayed the characteristics of ADHD and then rated each listed item along a favourable-unfavourable continuum. The present research extended the open-ended response method of measuring attitudes to a new population of interest, thus adding to its generalisation.

As noted above, use of a tripartite model of attitude content and bi-dimensional structure of attitudes allows measurement of attitudinal ambivalence (Maio & Haddock, 2004). In addition, the open-ended responses and self-rated valence data were used to calculate an objective measure of cognitive elaboration (by averaging the frequency of listed stereotypic and teaching beliefs) and objective ambivalence (using a formula provided by Esses & Maio, 2002, pp. 86-87). These objective measures of elaboration and ambivalence were used to check respective manipulations in the experiment, thus extending Smith et al.’s (2008) methods. Additionally, these measures were used to test Smith et al.’s model on survey data in Chapter 4, thus positioning objective elaboration and objective ambivalence as antecedents of attitude certainty in a multi-dimensional model of attitude strength.

Measurement of knowledge of ADHD.

Objective knowledge. The present research program also measured objective knowledge of ADHD by synthesising previous methodologies and extending them to pre-service and in-service teacher samples. Most surveys that measure teachers’ knowledge of ADHD are based on one of two North American questionnaires: Jerome, Gordon and Hustler’s (1994) 20-item untitled scale, or Sciutto, Terjesen and Bender Frank’s (2000) 36-item Knowledge of Attention Deficit Disorders Scale (KADDS). Respondents to Jerome et al.’s questionnaire read statements regarding ADHD and respond either true or false and the
percent of correct answers is calculated. Sciutto et al. improved Jerome et al.’s methodology by including three response options; true, false and don’t know, which reduced the chance of a respondent correctly guessing the answer. They also included three knowledge of ADHD subscales; (a) symptoms (b) general information and causes and (c) treatments. An Australian study by West, Taylor, Houghton and Hudyma (2005) extended Sciutto et al.’s scale to 67 items to improve the content validity of the scale. Sciutto et al.’s and West et al.’s results suggested teachers have differential knowledge of characteristics, causes and treatments regarding ADHD. Another Australian study, by Murray (2009), used a 27-item questionnaire that originated from both Sciutto et al.’s and Jerome et al.’s questionnaires to measure in-service teacher’s knowledge of ADHD. Although this questionnaire was not designed with subscales and inferential analyses were not conducted due to methodological concerns, Murray described teachers as scoring more items correct in regard to characteristics of ADHD than treatments for ADHD. These previous studies suggest knowledge of ADHD is a heterogeneous construct and they support the use of subscales when measuring knowledge of ADHD. Use of subscales allows researchers to detect gaps and strengths in teachers’ knowledge.

West et al.’s (2005) 67 item Knowledge about Attention Deficit Disorder Questionnaire (KADD-Q) was adapted for the research reported in this thesis because the items had been tested and developed in an Australian context. It was shortened to 33 items for the present research to maintain a reasonable overall length for the survey that would not be off-putting for very busy teachers. Eleven items for each for three subscales measuring characteristics, causes and treatments of ADHD were selected (see Appendix A). Items measuring characteristics of ADHD were selected if they pertained to behaviours exhibited in the classroom environment, while those for causes and treatments of ADHD were selected to include a broad range of content and to limit multiple items on similar content.
It appears that no studies to date have identified gaps and strengths in pre-service teachers’ knowledge of the different components of ADHD (causes, characteristics and treatments of ADHD). Furthermore, no previous studies have tested knowledge of these specific components at various stages of pre-service teachers’ careers, or compared them to in-service teachers’ knowledge. Such research would help to identify the stage of teachers’ careers during which their knowledge of characteristics, causes and treatments of ADHD develops, and would have implications for teacher training at both pre-service and in-service levels.

The objective measure of knowledge of ADHD was also used to examine how direct, indirect and personal experience with ADHD are related to knowledge of ADHD (Chapter 3). In addition, the questionnaire was used to check the manipulation of the amount of information provided to pre-service teachers in the experiment (Chapter 4), thereby addressing a limitation of Smith et al.’s (2008) research. The knowledge questionnaire scores were also used to test Smith et al.’s model on survey data, thus positioning objective knowledge as an antecedent of attitude certainty and testing the external validity of a laboratory derived model.

*Perceived knowledge.* A meta-attitudinal measure of knowledge of ADHD was also used in the present research. Perceived knowledge refers to participants’ subjective ratings of their knowledge (Kos et al., 2004). Perceived knowledge, as well as objective knowledge, is likely to impact on teachers’ decisions and behaviours in the classroom, affecting student outcomes. Discrepancies between teachers’ objective levels of knowledge and perceived knowledge may lead to misguided decisions about behavioural management and pedagogical approaches, or mistakes in reporting children’s symptoms and the effectiveness of treatments. Kos et al. (2004) previously used a 10cm visual analogue scale to measure perceived knowledge. The present research program used four items measuring perceived knowledge on
7-point Likert scales adapted from Smith et al. (2008) to suit teaching children with ADHD characteristics. The use of different methods to Kos et al. enables validation of findings.

In summary, the present research program integrated methodologies based on theories and research of attitude content, structure and strength, as well as applied research in education, to provide new information on attitude formation. The specific research questions, theories and implementation of the above methods in Chapters 2 to 4 are described below.

Chapter Outlines

Chapter 2: Knowledge of attention-deficit/hyperactivity disorder (ADHD) and attitudes toward teaching children with characteristics of ADHD: The role of teaching experience.¹

The research reported in Chapter 2 aimed to identify the stage of their career in which teachers acquire knowledge of ADHD and form attitudes toward teaching children who show characteristics of ADHD. Do knowledge and attitudes develop during formal academic training or as a product of classroom experience? Specifically, Chapter 2 tested whether pre-service teachers with and without practical experience in the classroom and in-service teachers differed in objective knowledge of ADHD, knowledge of aspects of ADHD (characteristics, treatments and causes), perceived knowledge, global attitude and cognitive, affective and behavioural components of attitudes. Survey data from pre-service and in-service teachers were used to test the above research questions. For the pre-service teachers, classroom experience included the record of placements in schools as part of their education degree or having previous or current experience as a teacher’s aide. Classroom experience may be a source of information about ADHD and thus pre-service teachers with and without classroom experience were analysed as separate groups in Chapter 2.

¹ The journal article presented as Chapter 2 is published in a shorter version: Anderson, D.L., Watt, S.E., Noble, W., & Shanley, D.C. (2012). Knowledge of Attention Deficit Hyperactivity Disorder (ADHD) and attitudes towards teaching children with ADHD: The role of teaching experience. Psychology in the Schools, 49, 6, 511-525. doi: 10.1002/pits.21617
Chapter 2 examined knowledge and experience variables within a theoretical perspective based on the multidimensional model of attitude strength. Attitude strength dimensions include the extent of a person’s knowledge about a topic (Wood et al., 1995) and the extent of their prior experience regarding the topic (Eagly & Chaiken, 1998; Fazio & Zanna, 1981). The multidimensional model of attitude strength also differentiates between objective measures of attitude strength (for example, measuring objective knowledge of ADHD using a scale based on empirically supported statements about ADHD) and subjective attitude strength (for example, measuring perceived knowledge of ADHD using Likert scales) (Bassili, 1996). The greater the extent of a person’s objective and perceived knowledge and the more experience they have with a topic the more information they have to guide their evaluations and behaviour and thus their attitudes are stronger (Eagly & Chaiken, 1998; Wood et al., 1995). Chapter two uses objective knowledge, perceived knowledge and classroom experience as dimensions of attitude strength.

Chapter 2 also draws on models of attitude content and structure to address gaps in previous literature and provide a systematic approach to measurement of attitudes toward teaching children with characteristics of ADHD. Measuring global attitudes, as theorised by the uni-dimensional model, provides a broad overview of teachers’ attitudes across their different levels of training and experience. Measuring the finer aspects of attitudes, such as beliefs, emotions and behaviours, as theorised by the tripartite model, provides a detailed analysis of these aspects of attitudes, including identification of ambivalent attitudes. Chapter 2 addresses both global attitudes and attitude components, providing the first comprehensive analysis of teachers’ attitudes, as well as a cohesive framework based on models of attitude content and structure.

Chapter 3: Effects of teachers’ experience on their knowledge and attitudes toward attention-deficit/hyperactivity disorder.
Chapter 3 extends Chapter 2 by undertaking a more refined analysis of different types of experience with ADHD. The aim of Chapter 3 was to identify types of experience that are important in the formation of pre-service and in-service teachers’ knowledge of ADHD and attitudes toward teaching children who exhibit the characteristics of ADHD.

Chapter 3 draws on the multi-dimensional model of attitude strength to identify three types of prior experience with ADHD; direct experience teaching such a child (Eagly & Chaiken, 1993; Fazio & Zanna, 1981), indirect experience gained via secondary sources, such as pre-service or in-service training or the media (Eagly & Chaiken, 1998; Maio, Olson, Bernard, & Luke, 2003), and personal experience with ADHD. Personal experience was exemplified by knowing someone closely, such as a sibling or friend who had either received a diagnosis of ADHD, or who was believed to exhibit the characteristics of ADHD. Personal experience also referred to the person either having a diagnosis of ADHD, or believing that they exhibited the characteristics of ADHD. More experience, either direct, indirect, or personal, provides more information, which then affects future decisions and behaviours and thus leads to stronger attitudes (Eagly & Chaiken, 1998). Direct experience and training have previously been measured in the education literature, but the current program of research was the first to place them in a cohesive theoretical base. Chapter 3 conceptualised direct experience teaching children who express features of ADHD, indirect experience via training and personal experience with ADHD in a social psychological framework.

Chapter 3 used survey data to test whether direct experience, indirect experience and personal experience with ADHD were associated with differences in pre-service and in-service teachers’ objective and perceived knowledge of ADHD and global attitudes to teaching children who express characteristics of ADHD. It was expected that pre-service teachers and in-service teachers who had more direct experience, more indirect experience, and more personal experience would have more objective knowledge of ADHD, more
knowledge of aspects of ADHD (characteristics, causes and treatments), more perceived knowledge and a more favourable overall attitude to teaching children with features of ADHD than those with less experience. Interaction effects of direct experience, indirect experience and personal experience were also explored. The current program extended the education literature by examining the influence of specific types of experience on knowledge and attitudes, while controlling for in-service teachers’ extent of general teaching experience and pre-service teachers’ age in years. Pre-service teachers’ age, and the extent of in-service teachers’ teaching experience were expected to significantly predict knowledge of and attitudes toward ADHD. Using pre-service and in-service samples allowed comparison of knowledge and attitudes across groups with increasing levels of experience, thus allowing identification of the stage of teachers’ careers in which knowledge and strong attitudes were formed.

Chapter 4: A multi-dimensional model of the origins of attitude certainty: teachers’ attitudes toward attention-deficit/hyperactivity disorder.

As noted above, a crucial question for researchers, theorists and practitioners, is whether laboratory-derived models hold in the real world (Eagly & Chaiken, 1993). The aim in Chapter 4 was to test and extend Smith et al.’s (2008) model of attitude certainty by applying it to attitudes toward teaching children who express characteristics of ADHD. In Smith et al.’s study, psychology student participants were provided with information about three departments in a hypothetical general store, such as listing the strengths and limitations of a camera department, a sporting goods department and a gardening supply department (e.g., the department sells a limited range of products). The amount of information provided about the store, the amount of cognitive elaboration, and the structural consistency of the information were manipulated. Participants then responded with their attitude toward the store and their responses to several attitude strength variables. The research reported in Chapter 4
investigated whether this model had external validity for a real and complex attitude issue and used samples of adults from a non-psychology population. It extends research reported in Chapters 2 and 3 by using survey and experimental designs, thereby moving from correlational to causal findings. It also develops theory by providing models of relations between various attitude strength dimensions that show how strong attitudes are formed.

In Chapter 4, the laboratory-derived model of the origins of attitude certainty tested by Smith et al. (2008) was applied to a real attitude object: Teaching children who express characteristics of ADHD. Study 1 in that chapter was an experiment which manipulated the amount of information, thought, and consistency of information delivered to pre-service teachers with no prior experience with ADHD. Structural equation modelling (SEM) was used to test whether relationships between attitude certainty and objective knowledge, thought and consistency were mediated by perceived knowledge, thought, and ambivalence. Study 2 in Chapter 4 tested and extended Smith et al.’s model on survey data from in-service and pre-service teachers. To test the model on survey data, objective measures of knowledge of ADHD, cognitive elaboration and ambivalence were used as antecedent variables of attitude certainty instead of manipulating them, as was done in the experiment. In addition, Study 2 tested whether the three types of experience with ADHD (direct, indirect, and personal) that were identified in Chapter 3, were additional antecedents of attitude certainty. Perceived accessibility was added to the model as a potential mediator.

The models tested in Chapter 4 extend Chapters 2 and 3 by testing objective knowledge of ADHD and ambivalence as antecedents of attitude certainty. They also test perceived knowledge and perceived ambivalence as potential mediator variables. Thus, in Chapter 4, variables reported in Chapter 2 and Chapter 3 were included in a multi-dimensional model of the formation of attitude certainty. Together, the experiment and survey
results reported in Chapter 4 investigate the psychological processes underlying strong attitude certainty.

**Significance of the Research Program**

The present research program focuses on attitudes to teaching children who exhibit the characteristics of ADHD and bridges the domains of educational, social and clinical psychology. It extends an area in education that has lacked theoretical guidance and systematic research (Kos et al., 2006). It tests and extends a social psychological model of attitude formation using an applied setting to supplement laboratory research, thereby helping to address a gap in validation of attitude strength theories (Eagly & Chaiken, 2003; Mitchell, 2012). The results will have practical application for teacher training in the area of special education. For example, results have potential to guide the quality and quantity of information and practical experiences provided by academic institutions and in-service teacher workshops. Results also have relevance for school psychologists in their support roles with teachers, parents and children. The research reported in this thesis is driven by the need to investigate complex attitudes in ecologically valid ways. If ecologically valid models of how attitudes form and become strong are developed, they may be applied more broadly to other topics of social concern in which in which opinions are polarised and there are large amounts of structurally inconsistent and multifaceted information. The research reported in this thesis pertains to the formation of complex, real-life attitudes and may generalise to other multifaceted, personally relevant attitude objects.
Chapter 2: Knowledge of Attention-Deficit/Hyperactivity Disorder (ADHD) and Attitudes toward Teaching Children with ADHD: The Role of Teaching Experience.

The following journal article was published in a shorter version to suit the journal’s word limit as:

Abstract

Knowledge of attention-deficit/hyperactivity disorder (ADHD) and attitudes to teaching children with characteristics of ADHD are compared across stages of Australian teachers’ careers. Relative to pre-service teachers with \( N = 218 \) and without classroom experience \( N = 109 \), in-service teachers \( N = 127 \) show more overall knowledge of ADHD, more knowledge of characteristics and treatments for ADHD and higher perceived knowledge. In-service teachers reported less favourable emotion about teaching children with characteristics of ADHD than pre-service teachers without experience and more favourable behaviours than pre-service teachers with experience. Groups did not differ in knowledge of causes of ADHD, overall attitudes, stereotypic beliefs and beliefs about teaching children with characteristics of ADHD. Identification of knowledge gaps and ambivalent attitudes will guide pre-service and in-service training courses.

Keywords: Attention Deficit Disorder with Hyperactivity, Teacher Attitudes, Attitude Formation, Attitude Measurement, Stereotyped Attitudes, Teacher Education, Disabled (Attitudes Toward)
Knowledge of Attention-Deficit/Hyperactivity Disorder (ADHD) and Attitudes Toward Teaching Children with ADHD: The Role of Teaching Experience

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common childhood mental health disorders and is characterised by sustained inattention, impulsivity and hyperactivity (Barkley, 1997). Estimates that at least one child with ADHD is present in every classroom (Barkley, 1990) are supported by a worldwide meta-analysis estimating that 5.3% of children and adolescents have a diagnosis of ADHD (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007). Thus, the likelihood of new graduates teaching a child diagnosed with ADHD early in their career is high.

Behaviours associated with ADHD, such as inattention, impulsivity and hyperactivity, are noticeable in classrooms because school settings require children to behave in ways that are at odds with the symptoms of the disorder (Kos, Richdale, & Hay, 2006; Salmelainen, 2002). Therefore, not surprisingly, many studies identify teachers as the most frequent initial referral source by recommending to parents that their child receive assessment for ADHD (e.g., Snider, Busch, & Arrowood, 2003; Stroh, Frankenberger, Cornell-Swanson, Wood, & Pahl, 2008). As noted by some scholars, teachers’ observations about the child’s functioning in task oriented and social situations are used in classification and treatment decisions (Vereb & DiPerna, 2004) and teachers are also often responsible for implementing and evaluating interventions for ADHD in the classroom (Ohan, Cormier, Hepp, Visser, & Strain, 2008; Vereb & DiPerna, 2004). Thus, teachers play central roles in reporting symptoms, advising parents to seek assessment and assisting children with ADHD to achieve academically and socially.

Authors of theoretical papers (e.g., Greene, 1995) and reviews of empirical research (e.g., Sherman, Rasmussen, & Baydala, 2008) have argued that teachers’ knowledge and attitudes regarding ADHD are likely to influence their roles and the subsequent behavioural
and learning outcomes for children. While there is little empirical work on the influence of teacher characteristics on child outcomes (Sherman et al., 2008), several authors explicate how teacher knowledge and attitudes may impact several important outcomes. For example, it has been suggested that teachers who lack knowledge about ADHD may overlook behaviours signifying a child in need of assistance (Ohan, et al., 2008) and they may provide unreliable information to medical practitioners about the effects of medication (Kasten, Coury, & Heron, 1992). Similarly, it has been suggested that teachers’ attitudes about ADHD may impact on their selection of a teaching approach (Westwood, 1996), their willingness to implement interventions (Vereb & DiPerna, 2004), their chosen behavioural management strategies and class mates’ perception of the child with ADHD (Atkinson, Robinson, & Shute, 1997).

Given these links between teachers’ knowledge, attitudes and roles, it is important to systematically examine teachers’ knowledge and attitudes regarding ADHD. Teachers’ attitudes have not been clearly measured to date (Kos et al., 2006) and there is little literature providing a theoretical understanding of teachers’ attitudes and knowledge of ADHD in the education system. The current study examines teachers at different stages of their career in regard to their knowledge of ADHD and their attitudes to teaching children who express characteristics of ADHD from within theoretical frameworks of attitude content and attitude strength. It seeks to identify the stage of a teacher’s career at which their knowledge and attitudes develop. Do knowledge and attitudes develop during formal academic training or as a product of classroom experience? Results will potentially guide curriculum development in teacher training at both the pre-service and in-service levels and have implications for school psychologists in their consultative roles with teachers.

Literature on teachers’ knowledge of ADHD is reviewed, followed by an outline of how teachers’ knowledge and experience represent dimensions of attitude strength. An overview of research on attitudes to teaching children with ADHD is presented, followed by
an outline of how the tripartite model of attitude content will extend current understanding of attitudes to teaching children with ADHD.

**Teachers’ Knowledge of ADHD**

Most surveys that measure teachers’ knowledge of ADHD are based on either Jerome, Gordon and Hustler’s (1994) 20-item untitled scale, or Sciutto, Terjesen and Bender Frank’s (2000) 36-item Knowledge of Attention Deficit Disorders Scale (KADDS). Respondents to Jerome et al.’s questionnaire read statements regarding ADHD and respond either *true* or *false* and the percent of correct answers is calculated. Studies based on this scale have found in-service teachers’ average knowledge to range from 76.3% (Ohan, et al., 2008), through 77% (Jerome, et al., 1994) to 82.4% (Bekle, 2004) and pre-service teachers’ knowledge to be slightly lower, ranging from 75.6% (Bekle, 2004) to 77% (Jerome, Washington, Laine, & Segal, 1999).

Sciutto et al. (2000) improved Jerome et al.’s (1994) methodology by including three response options; *true, false* and *don’t know*, which reduced the chance of a respondent correctly guessing the answer. They also included three knowledge of ADHD subscales; (a) symptoms (b) general information and causes and (c) treatments. Sciutto et al.’s results found 149 American in-service teachers’ average overall knowledge was 47.81% correct, which suggests considerably poorer knowledge than studies based on Jerome et al.’s questionnaire. Jerome et al.’s scale may have overestimated knowledge of ADHD due to its true-false response format. Sciutto et al.’s results demonstrated teachers’ knowledge of symptoms ($M = 62.78\%$) was significantly better than their knowledge of treatment ($M = 42.83\%$) and general information/causes of ADHD ($M = 42.87\%$).

An Australian study by West, Taylor, Houghton and Hudyma (2005) extended Sciutto et al.’s (2000) scale to 67 items. West et al. reported good internal consistency, with Cronbach’s alphas of 0.91 for teachers and 0.93 for a sample of parents. The subscales for
causes, characteristics/symptoms and treatments had alphas of 0.86, 0.80 and 0.79 for teachers and 0.85, 0.84 and 0.84 respectively for parents. The mean percentage correct for 256 in-service teachers was 57.33%, which was 10% higher than Sciutto et al.’s results, but still lower than studies based on Jerome et al.’s (1994) scale.

Kos, Richdale and Jackson (2004) and Kos (2004) measured objective knowledge by combining items from Jerome et al.’s (1994) and Sciutto et al.’s scales and found Australian in-service teachers ($N = 120, M = 60.70\%$ correct) knew significantly more about ADHD than final-year pre-service teachers ($N = 45, M = 52.60\%$ correct). Kos et al.’s results suggest teachers’ knowledge of ADHD continues to develop after they gain in-service experience. Differences in results between the Australian studies by West et al. and Kos et al. and the North American study by Sciutto et al. could be due to cultural differences in knowledge of ADHD, or unmeasured differences in the difficulty of each scale. West et al. found teachers knew most about causes of ADHD ($M = 65.20\%$), followed by knowledge of characteristics ($M = 59.80\%$) and least about treatments ($M = 47.80\%$). Sciutto et al.’s and West et al.’s results suggest knowledge of ADHD is a heterogeneous construct and support the use of subscales when measuring knowledge of ADHD. Subscales allow researchers to detect gaps and strengths in teachers’ knowledge.

Kos et al. (2004) and Kos (2004) also measured perceived knowledge of ADHD. Perceived knowledge refers to participants’ subjective ratings of their knowledge. Results from a 10cm visual analogue scale indicated in-service teachers’ perceived knowledge was significantly higher than pre-service teachers’ perceived knowledge, thereby demonstrating each group’s realistic perception of their knowledge. Perceived knowledge, as well as objective knowledge, is likely to impact on teachers’ decisions, teachers’ behaviours in the classroom and student outcomes. Discrepancies between teachers’ objective levels of knowledge and perceived knowledge may lead to misguided decisions about behavioural
management and pedagogical approaches, or mistakes in reporting children’s symptoms and the effectiveness of treatments. The current study measures both objective knowledge and perceived knowledge. It uses Likert scales to measure perceived knowledge and will help to validate Kos et al.’s findings via use of different methods to measure the same construct.

To our knowledge, no studies to date have identified gaps and strengths in pre-service teachers’ knowledge of the different components of ADHD, that is, causes, characteristics and treatments of ADHD. Furthermore, no previous studies have tested knowledge of these specific components at various stages of pre-service teachers’ careers, or compared them to in-service teachers’ knowledge. Such research would help to identify the stage of teachers’ careers during which their knowledge of characteristics, causes and treatments of ADHD develops, and would have implications for teacher training at both pre-service and in-service levels. In order to explore the role of increasing classroom experience on knowledge, the current study will test differences in knowledge (objective and perceived) between pre-service teachers who have no teaching experience, pre-service teachers who have some teaching experience, and in-service teachers. For the pre-service teachers, classroom experience includes placements in schools as part of their education degree or having previous or current experience as a teacher’s aide. The study is also the first to examine knowledge and experience variables within a theoretical perspective based on the multidimensional model of attitude strength, which is described below.

**Knowledge and Experience as Dimensions of Attitude Strength**

Attitudes refer to evaluation of people, events, objects or issues as either favourable or unfavourable (Eagly & Chaiken, 1993). Stronger attitudes have greater influence on thought processes and behaviours, they are more durable and are more resistant to opposing viewpoints, compared with weaker attitudes, which tend to be changeable and inconsequential (Krosnick & Petty, 1995). The multidimensional model of attitude strength proposes
numerous distinct dimensions of that strength (Krosnick, Boninger, Chuang, Berent, & Carnot, 1993). Attitude strength dimensions include the extent of a person’s knowledge about a topic (Wood, Rhodes, & Biek, 1995) and the extent of their prior experience with regard to the issue (Eagly & Chaiken, 1998; Fazio & Zanna, 1981). Knowledge refers to the extent of information about an issue that can be recalled. The greater the extent of a person’s knowledge and the more experience they have with an issue the more information available to the person to guide their evaluations and behaviour and thus their attitudes are stronger (Eagly & Chaiken, 1998; Wood et al., 1995).

The multidimensional model of attitude strength also differentiates between objective measures of attitude strength (for example, measuring objective knowledge of ADHD using a scale based on empirically supported statements about ADHD) and subjective attitude strength (for example, measuring perceived knowledge of ADHD). Objective measures and subjective measures are only weakly correlated, therefore both types of measures are recommended for inclusion in research (Bassili, 1996; Krosnick, et al., 1993; Krosnick & Petty, 1995). Higher objective and perceived knowledge and greater amounts of experience are thought to lead to stronger attitudes. This is the first study to identify teachers’ objective and subjective (or perceived) knowledge of ADHD and their classroom experience as dimensions of attitude strength.

**Attitudes toward Teaching Children with ADHD**

Kos et al. (2006) provide a recent review of studies of teachers’ attitudes to ADHD. Some researchers (e.g., Bekle, 2004) use a single item to measure overall or global attitudes toward ADHD. Such measures of global attitude are based on a single evaluative component and a unidimensional model of attitudes. Single component, unidimensional models view attitudes as overall evaluations that are either favourable or unfavourable, but not both at the same time (Eagly & Chaiken, 1993; Maio & Haddock, 2004).
Other studies have focused on specific aspects of teachers’ attitudes, such as their beliefs, evaluations, emotions and behavioural responses to children with ADHD. For example, Ohan et al. (2008) examined how knowledge predicts different aspects of attitudes and behaviour. They found that teachers with average to high knowledge of ADHD reported more helpful behaviours toward children with ADHD and held more favourable beliefs about interventions than teachers with low knowledge. Higher levels of knowledge were also associated with greater predictions of classroom disruption due to children with ADHD’s behaviours and lower confidence in managing these children (Ohan, et al., 2008). Ohan et al.’s study focuses on the relationship between knowledge and attitudes but they do not examine how classroom experience relates to knowledge and attitudes. The current study will address this gap.

Ohan et al.’s (2008) findings indicated that attitudes may need to be analysed with multiple components rather than a single component, as some aspects of attitudes, such as behaviours, were favourable, and others such as emotions and beliefs, were unfavourable. Research informed by theories of multiple components of attitudes would enable systematic identification and measurement of the finer aspects of attitudes, such as beliefs, emotions and behaviours. The current study draws on the tripartite model of attitude content to address this issue. The theoretical background of the research is outlined below.

**The Tripartite Model of Attitude Content**

The tripartite model of attitude content holds that attitudes consist of three correlated but distinct components: cognition, affect and behaviour (Eagly & Chaiken, 1993; Zanna & Rempel, 1988). The *cognitive component* refers to thoughts and beliefs. Previous authors have identified two types of beliefs. *Stereotypic beliefs* refer to beliefs about a group of peoples’ characteristics (Haddock & Zanna, 1999). For example, stereotypic beliefs about children with ADHD are that they are easily distracted and disruptive. *Symbolic beliefs* refer to beliefs
about the values, customs or traditions that are held or practiced by typical members of a
target group (Esses & Maio, 2002; Haddock & Zanna, 1999). In the current study, symbolic
beliefs will be adapted to inquire about teachers’ beliefs about how children with
characteristics of ADHD impact on the teaching process and will be termed teaching beliefs
to reflect this adaptation. A teacher may hold negative beliefs about the impact of children
with characteristics of ADHD on the teaching process, for example, thinking that teaching
such children is too time consuming. Alternatively, they may experience positive beliefs, such
as thinking that teaching these children challenges them to create engaging lessons.

The second component of the tripartite model is affect, which refers to emotions. For
example, a teacher may experience negative affect by feeling frustrated about teaching
children who express characteristics of ADHD, or alternatively may experience positive affect
by feeling pleased when a child with ADHD achieves a goal. The third component of the
tripartite model is behaviour. Behaviours refer to actions, such as a teacher who praises a
child with ADHD for completing a task, or a teacher who raises their voice in response to off-
task behaviours.

The current study tests whether teachers with different levels of general classroom
experience differ in their knowledge of ADHD and their attitudes to teaching children who
express characteristics of ADHD. Four research questions emerge from this overarching aim:
(a) Do in-service teachers and pre-service teachers with and without classroom experience
differ in their total knowledge of ADHD and their perceived knowledge of ADHD?; (b) Do
in-service teachers and pre-service teachers with and without classroom experience differ in
their knowledge of aspects of ADHD, specifically characteristics, treatments and causes of
ADHD?; (c) Do in-service teachers and pre-service teachers with and without classroom
experience differ in their overall attitude to teaching children with characteristics of ADHD,
their stereotypic beliefs about children with characteristics of ADHD, their beliefs about the
impact of these children on the teaching process, and their affect about teaching such children?; and (d) Do in-service teachers and pre-service teachers with classroom experience differ in their past behaviours in the classroom toward children who expressed characteristics of ADHD?

Method

Participants

In-service teachers. One hundred and twenty seven teachers employed in government schools in New South Wales (NSW), Australia, voluntarily completed an online survey. Ages ranged from 22 to 60 years ($M = 41.04, SD = 10.65$). Years of teaching service ranged from 1 year to 37 years ($M = 15.76, SD = 10.78$). Respondents believed that they had taught between zero and 200 children with ADHD, ($M = 20.23, SD = 27.21$). Approximately one third of teachers ($n = 43$ or 33.9%) reported personal experience with ADHD. Table 2.1 shows frequencies and percentage of participants in demographic categories.

Pre-service teachers. Three hundred and twenty seven education students from the University of New England (UNE; $n = 167$) and Southern Cross University (SCU; $n = 160$) in NSW, Australia, voluntarily completed an online survey. Education students were grouped according to whether they had teaching experience, that is, placements in schools as part of their education degree or previous or current experience as a teacher’s aide. Table 2.1 shows frequencies and percentages of pre-service teachers with ($n = 218$) and without ($n = 109$) practical experience in demographic categories. For pre-service teachers with no experience, ages ranged from 18 years to 61 years ($M = 29.78, SD = 10.13$). Forty two (38.5%) pre-service teachers with no classroom experience had some personal experience with ADHD. Pre-service teachers with practical experience ages ranged from 18 years to 62 years ($M = 30.81, SD = 10.56$), and 87 (39.9%) participants in this group had some personal experience.
with ADHD. The total number of children taught that pre-service teachers with practical experience said they believed had ADHD ranged from zero to 30 ($M = 2.76, \, SD = 4.11$).

**Materials**

All participants completed an online survey consisting of an information page and seven sections presented in the following order.

**Demographic items.** Both pre-service and in-service versions of the questionnaire (see Appendix B and Appendix C, respectively) contained items that asked about participants’ sex, age, completion of university studies that covered information about ADHD, exposure to information about ADHD in the last 12 months, and primary versus secondary teacher status. The pre-service questionnaire also asked which university was attended and how many semesters of study were completed. The in-service version of the questionnaire asked what grade/s (or year/s) was/were currently taught, whether employment was full-time, part-time or casual, whether teachers had previous experience teaching a special education class and whether they had any in-service training regarding ADHD.

**Teaching experience.** Two items asked whether participants had experience teaching a child they believed to have ADHD and how many children they had taught who they believed had ADHD.

**Global attitude.** Overall attitude toward teaching children with ADHD was rated on a vertical 11-point attitude thermometer scale (Esses & Maio, 2002; Haddock & Zanna, 1998). Participants rated their attitude towards teaching children who have ADHD on a scale from 0 (extremely unfavourable) to 100 (extremely favourable). Thermometer scales correlate highly with multiple-item measures of attitudes, such as semantic differential scales (Haddock & Zanna, 1999; Stangor, Sullivan, & Ford, 1991).
## Table 2.1

### Frequencies and Percentages (%) of Participants in Demographic Categories

<table>
<thead>
<tr>
<th>Demographic variables</th>
<th>Pre-service teachers without experience</th>
<th>Pre-service teachers with experience</th>
<th>In-service teachers</th>
<th>Total sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-service teachers without experience</td>
<td>Pre-service teachers with experience</td>
<td>In-service teachers</td>
<td>Total sample</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>30</td>
<td>27.5</td>
<td>29</td>
<td>13.3</td>
</tr>
<tr>
<td>Females</td>
<td>79</td>
<td>72.5</td>
<td>189</td>
<td>86.7</td>
</tr>
<tr>
<td>Teacher type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>40</td>
<td>36.7</td>
<td>158</td>
<td>72.5</td>
</tr>
<tr>
<td>Secondary</td>
<td>69</td>
<td>63.3</td>
<td>59</td>
<td>27.1</td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Part-time</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Ever taught special education?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>No</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Studied ADHD at university?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>18</td>
<td>16.5</td>
<td>128</td>
<td>58.7</td>
</tr>
<tr>
<td>No</td>
<td>91</td>
<td>83.5</td>
<td>88</td>
<td>40.4</td>
</tr>
<tr>
<td>In-service training on ADHD?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>No</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Ever taught children you believed to have ADHD?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>--</td>
<td>--</td>
<td>168</td>
<td>77.1</td>
</tr>
<tr>
<td>No</td>
<td>--</td>
<td>--</td>
<td>49</td>
<td>22.5</td>
</tr>
</tbody>
</table>

Note. Percentages may not add to 100% due to missing data.

**Perceived knowledge.** Four items measuring perceived knowledge on 7-point Likert scales were re-phrased from Smith, Fabrigar, Macdougall and Weisenthal (2008) to suit teaching children with ADHD. The items are: (a) How much information do you feel you have about ADHD? (from ‘Very little’ to “A great deal’); (b) How knowledgeable do you
feel about ADHD? (from ‘Not at all knowledgeable’ to ‘Extremely knowledgeable’); (c) How well informed are you about ADHD? (from ‘Completely uninformed’ to ‘Completely informed’); and (d) If you had to write a list of everything you knew about ADHD, how long a list could you produce? (from ‘Very short’ to ‘Very long’). Average scores were calculated for each participant. Inter-item correlations ranged from .78 to .90 and Cronbach’s alpha was .95.

**Objective knowledge.** West et al.’s (2005) 67-item Knowledge about Attention Deficit Disorder Questionnaire (KADD-Q) was shortened to 33 items, with 11 items each for the three subscales measuring characteristics, causes and treatments of ADHD. The number of items was reduced due to concerns about the overall length of the survey, to have equal number of items on each sub-scale and to prevent repetition of content. The 11 items measuring characteristics of ADHD were selected that pertained most strongly to behaviours exhibited in the classroom environment, while those for causes and treatments of ADHD were selected to include a broad range of content and to limit multiple items on similar content. Participants responded to each item by selecting either True, False or Don’t know. Total scores were formed by summing correct responses (see Appendix A), with a maximum score of 33 representing high knowledge of ADHD and a minimum score of zero representing low knowledge of ADHD. Subscale scores were formed by summing correct scores on 11 items for each subscale. Cronbach’s alpha for the whole scale was .88 and for the subscales it was .82 for causes, .79 for characteristics and .73 for treatments, which is similar to West et al.’s results.

**Attitude content.** Open-ended responses were adapted from Haddock and Zanna (1999) to measure the three components of attitudes as proposed by the tripartite model of attitude content; (a) beliefs (stereotypic and teaching), (b) affect and (c) behaviour. Previous authors have reported good reliability and validity for open ended responses (Eagly, Mladinic,
Open-ended responses for each attitude component were presented on separate pages in the following order: (a) stereotypic beliefs, (b) teaching beliefs, (c) affect and (d) past behaviour. Participants were asked to list up to 12 words or short phrases for each attitude component. After completing each of the four open response items, participants rated each word or phrase they had written on a 5-point scale representing the valence of each listed belief, affect or behaviour. The scale ranged from very positive (++), positive (+), neutral (0), negative (-) to very negative (--). Participants’ self-rated valence scores were summed to form total scores for each attitude component and to calculate average inter-component ambivalence scores between cognition and affect following Esses and Maio (2002). Average inter-component ambivalence scores could potentially range from 0 to 96, where a low score indicated low ambivalence and a high score indicated high ambivalence.

**Personal experience.** Four items asked about personal experience with ADHD. The items were: ‘Do you believe that you have ADHD?’; ‘Have you been diagnosed with ADHD?; ‘Do you believe that anyone close to you has ADHD (such as your own child, a sibling, partner, parent, friend or work colleague)?, and ‘Has anyone close to you been diagnosed with ADHD?’. All four items presented three possible responses, ‘Yes’, ‘No’ or ‘Unsure’.

**Procedure**

Ethics approval was acquired from the UNE Human Research Ethics Committee (HREC) and the NSW State Education Research Approval Process (SERAP).

*In-service teachers.* Schools were located using the NSW Department of Education school locator website (http://www.schools.nsw.edu.au/schoolfind/locator/). Schools were selected to include a range of school sizes (from one teacher schools to large schools with more than 100 teachers) and to include a range of coastal, inland, rural and urban schools. Ten secondary
school principals and 20 primary school principals were contacted in each of the North Coast and New England regions of NSW. Contact was made via a telephone call to each school’s administrative assistant and a follow-up email was sent, which was requested to be passed onto the Principal. Five secondary schools and 15 primary schools from the North Coast region, and five secondary schools and eight primary schools from the New England region agreed to participate. Principals sent an email to all teachers at their schools. The email contained a hyperlink to the in-service version of the survey. The total number of teachers at schools who were invited to participate is estimated to be 1228, thus the response rate for in-service teachers was 10.3%. Although this seems low, teachers are very busy and for a 45 minute survey this rate was expected and acceptable. Seventy eight percent of the teachers who visited the survey website completed it.

Pre-service teachers. Education Heads of Schools at UNE and SCU were asked for permission to recruit education students via email and during lectures. The email contained a hyperlink to the pre-service version of the online survey. Seventy four percent of pre-service teachers who entered the website for the survey completed it. The total number of pre-service teachers invited to participate was estimated to be 1400, thus the response rate was approximately 23%.

In both in-service and pre-service surveys, participants opened the hyperlink and read two information pages. If they agreed to continue, participants completed the seven remaining sections of the questionnaire. Submission of responses was taken as consent. The online survey took approximately 45 minutes to complete. Participating school principals and individual pre-service teachers were offered a summary of key results (see Appendix D).

Design

This survey was a between-subjects design testing differences between teachers with varying levels of general classroom experience in their knowledge of ADHD and their
attitudes to teaching children with ADHD. The independent variable (IV) for all analyses was *teacher group* with three levels (pre-service teachers without teaching experience, pre-service teachers with classroom experience and in-service teachers). There were ten dependent variables (DVs): (a) total knowledge, (b) perceived knowledge, (c) knowledge of characteristics of ADHD, (d) knowledge of treatments for ADHD, (e) knowledge of causes of ADHD, (f) global attitude, (g) stereotypic beliefs, (h) teaching beliefs, (i) affect and (j) past behaviours. Three multivariate analyses of variance (MANOVAs) were conducted to separately analyse overall knowledge (objective and perceived; MANOVA 1), knowledge of characteristics, causes and treatments of ADHD (MANOVA 2), and the attitude variables (MANOVA 3). Past behaviours were analysed using a planned contrast between the in-service teachers and pre-service teachers who had teaching experience.

**Results**

**Descriptive Statistics**

Table 2.2 shows means, standard deviations and sample sizes for total knowledge, knowledge subscales, perceived knowledge, global attitude and attitude components. Pre-service teachers without experience scored 52.2% on total knowledge on average, pre-service teachers with experience scored 52.9% on average and in-service teachers scored 60.2% on average.

**Inferential Analyses**

Three one-way between groups multivariate analyses of variance (MANOVAs) were conducted to test the first three research questions respectively. The IV for each MANOVA was *teacher group* with the three levels of (a) pre-service without experience, (b) pre-service with experience, and (c) in-service teachers. MANOVA 1 had two DVs: total knowledge and perceived knowledge. MANOVA 2 had three DVs; knowledge of characteristics, causes and treatments of ADHD. The three knowledge subscale total scores were tested in a separate
MANOVA from total knowledge due to their singularity with the total scale score. That is, the total knowledge score is the sum of the subscale scores and should not be tested in the same MANOVA (Tabachnick & Fidell, 2007). MANOVA 3 had four DVs: global attitude and three of the attitude component scores, stereotypical beliefs, teaching beliefs and affect. The behaviour attitude component was not included as a DV in the third MANOVA because the pre-service teachers without experience have no past behaviours toward children with characteristics of ADHD. Instead, a planned contrast was used to test research question four, which asked whether pre-service teachers with experience and in-service teachers differed in their past behaviours toward children with characteristics of ADHD.

**Assumptions.** For all MANOVAs no univariate outliers were detected using z scores at $p < .001$. Linearity, multicollinearity, and homogeneity of variance-covariance assumptions were met as shown in bivariate scatterplots, Tolerance values (all were >.20), and Box’s tests, $p > .05$, respectively (Field, 2009). Normality was met for MANOVAs 1 and 3. For MANOVA 2, knowledge of treatments was normally distributed, however z tests ($p < .001$) and histograms of knowledge of characteristics and causes indicated negative skew. The non-normal variables were transformed using reflection and square root and were re-reflected to preserve the original direction of scores. No multivariate outliers were found for MANOVAs 1 and 2. Two multivariate outliers were detected for MANOVA 3. MANOVA results showed no differences when these scores were included or excluded, therefore they were included in the analysis.
Table 2.2

Descriptive Statistics for Pre-service and In-service Teachers’ Knowledge of ADHD and Attitudes to Teaching Children with Characteristics of ADHD

<table>
<thead>
<tr>
<th>DVs</th>
<th>Pre-service teachers without experience</th>
<th>Pre-service teachers with experience</th>
<th>In-service teachers</th>
<th>Total sample</th>
</tr>
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<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$n$</td>
<td>$M$</td>
</tr>
<tr>
<td>Total knowledge</td>
<td>17.21</td>
<td>5.41</td>
<td>108</td>
<td>17.45</td>
</tr>
<tr>
<td>Perceived knowledge</td>
<td>3.28</td>
<td>1.49</td>
<td>109</td>
<td>3.64</td>
</tr>
<tr>
<td>Characteristics</td>
<td>6.35</td>
<td>2.40</td>
<td>108</td>
<td>6.68</td>
</tr>
<tr>
<td>Treatments</td>
<td>3.66</td>
<td>2.02</td>
<td>108</td>
<td>3.35</td>
</tr>
<tr>
<td>Causes</td>
<td>7.20</td>
<td>2.83</td>
<td>108</td>
<td>7.41</td>
</tr>
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*Note.* Descriptive statistics for knowledge subscales are untransformed. Total attitude component scores are the sum of stereotype beliefs, teaching beliefs, affect and past behaviour for the in-service teachers and pre-service teachers with experience. Total attitude component scores are the sum of stereotype beliefs, teaching beliefs and affect for the pre-service teachers without experience.
**MANOVA 1: Total knowledge of ADHD and perceived knowledge.** The two DVs were correlated positively, moderately and significantly, $r (447) = .47, p < .001$, two-tailed. The large sample size protects against any reduction in power due to this correlation (Tabachnick & Fidell, 2007).

The MANOVA showed a significant difference with a small to medium effect size between teacher groups on the combined dependent variable, Pillai’s Trace = .08, $F (4, 892) = 8.88, p < .001, \eta_p^2 = .04$. To maintain familywise error at $p < .05$, a Bonferroni adjusted alpha of .025 was used to interpret the two follow-up analysis of variance (ANOVAs). Significant differences with medium effect sizes were found between the three groups in regard to their total knowledge of ADHD, $F (2,446) = 10.82, p < .001, \eta_p^2 = .05$, and their perceived knowledge, $F (2,446) = 14.41, p < .001, \eta_p^2 = .05$. Post-hoc Games-Howell comparisons were interpreted due to unequal sample sizes (Field, 2005). In-service teachers had significantly higher total knowledge of ADHD and higher perceived knowledge than pre-service teachers without experience ($p = .001$ and $p < .001$ respectively), and pre-service teachers with practical experience ($p < .001$ and $p < .001$, respectively). The two groups of pre-service teachers did not differ in their total knowledge ($p = .93$) or their perceived knowledge of ADHD ($p = .12$).

**MANOVA 2: Knowledge of characteristics, causes and treatments of ADHD.**

Knowledge of treatments was correlated moderately with knowledge of causes, $r (447) = .36, p < .01$, two-tailed, and knowledge of characteristics, $r (447) = .32, p < .01$, two-tailed. Knowledge of characteristics and causes were weakly correlated, $r (447) = .12, p < .01$, two-tailed. The MANOVA showed a significant difference with medium effect size between groups on the combined dependent variable, Pillai’s Trace = .14, $F (6, 890) = 10.76, p < .001, \eta_p^2 = .07$. A Bonferroni adjusted alpha of .017 was used for interpretation of the three follow-up ANOVAs. There was a significant difference with a medium effect size between the three
groups of teachers in their (re-reflected square root) knowledge of characteristics of ADHD, $F(2, 446) = 21.99, p < .001, \eta_p^2 = .09$, and in their knowledge of treatments for ADHD, $F(2,446) = 14.92, p < .001, \eta_p^2 = .06$. The (re-reflected square root) knowledge of causes of ADHD did not differ significantly between groups and a very small effect size was found, $F(2,446) = 0.36, p = .70, \eta_p^2 < .01$.

Games-Howell post-hoc comparisons indicated that in-service teachers had significantly better knowledge of (re-reflected square root) characteristics of ADHD and treatments for ADHD than pre-service teachers without experience ($p < .001$ and $p = .002$, respectively) and pre-service teachers with experience ($p < .001$ and $p < .001$ respectively). The two groups of pre-service teachers did not differ in their (re-reflected and square root) knowledge of characteristics ($p = .41$) or their knowledge of treatments of ADHD ($p = .42$).

**MANOVA 3: Global attitude, stereotypic beliefs, teaching beliefs and affect.**

MANOVA 3 showed a significant difference with small effect size between groups on the combined DVs, Pillai’s Trace = .06, $F (8, 656) = 2.53, p = .01, \eta_p^2 = .03$. A Bonferroni adjusted alpha of .013 was used to test the significance of the four follow-up ANOVAs. Non-significant results were found for global attitude, $F (2,330) = 0.73, p = .48, \eta_p^2 = .01$, stereotype beliefs, $F (2,330) = 0.95, p = .39, \eta_p^2 < .01$, and teaching beliefs, $F (2, 330) = 0.15, p = .86, \eta_p^2 < .01$. The only difference to reach statistical significance was affect, $F(2,330) = 7.01, p = .001, \eta_p^2 = .04$. The effect size is small to medium. Games Howell post-hoc tests using an alpha of $p = .013$ showed that in-service teachers reported significantly less favourable affect than pre-service teachers with no experience ($p < .001$). The pre-service group with experience did not differ in their affect compared to the in-service teachers ($p = .26$), nor the pre-service teachers without experience ($p = .04$), although there was a trend for pre-service teachers with experience to have less favourable affect than those without experience.
**Planned contrast: Past behaviours toward children with ADHD.** Levene’s test of homogeneity of variance was violated \((p < .001)\) so a planned contrast for unequal variances was conducted. This showed that in-service teachers reported significantly more favourable behaviours towards children with ADHD than pre-service teachers with experience, \(t (197) = -2.55, p = .012\), two-tailed, \(\eta^2_p = .03\). The effect size was small to medium.

**Supplementary Analyses**

**Demographic variables.** There were no significant differences between males and females on any of the dependent variables, \(p > .05\). Primary and secondary teacher status had inconsistent and few effects. Primary pre-service teachers without classroom experience had fewer unfavourable stereotype beliefs \((M = -2.88, SD = 5.93)\) than those training to be secondary school teachers \((M = -6.05, SD = 6.87)\), \(t(88) = 2.20, p = .03\), Cohen’s \(d = 0.49\), and more favourable affect \((M = 2.40, SD = 5.11)\) than their secondary peers \((M = -0.27, SD = 5.74)\), \(t(79) = 2.11, p = .038\), Cohen’s \(d = 0.49\). The effect size for both differences was medium. Primary pre-service teachers with classroom experience had significantly lower perceived knowledge \((M = 3.51, SD = 1.46)\) than their secondary peers \((M = 3.96, SD = 1.22)\), \(t (215) = -2.09, p = .038\), Cohen’s \(d = .33\). The effect size was small. Primary in-service teachers had significantly higher total knowledge \((M = 21.01, SD = 4.47)\), and higher knowledge of treatments \((M = 5.20, SD = 2.21)\) than secondary teachers \((M = 18.80, SD = 4.29; M = 4.02, SD = 2.03)\), \(t (122) = 2.81, p = .006\), Cohen’s \(d = 0.50\) and \(t(122) = 3.35, p = .001\), Cohen’s \(d = 0.56\), respectively. Both effect sizes were medium.

There were no significant correlations between age and the dependent variables for pre-service teachers with classroom experience, and the only significant relationship for pre-service teachers without experience was between age and perceived knowledge, \(r(107) = .26, p = .005\). In-service teachers’ age was correlated significantly but weakly with overall attitude, \(r (123) = .19, p = .039\), and perceived knowledge, \(r(123) = .30, p = .001\). Age was
correlated strongly and significantly with number of years of teaching experience, \( r(100) = .80, p < .001 \). Years of teaching experience was significantly correlated with overall attitude, \( r(100) = .28, p = .004 \), and with perceived knowledge, \( r(100) = .29, p = .003 \).

The relationship between global attitude and attitude components. Global attitude did not correlate significantly with any of the attitude components for the total sample or for the three groups of teachers tested separately. Attitude component scores were summed to form a total attitude score, so that it could be correlated with global attitude as measured by the thermometer scale. Descriptive statistics are shown in Table 2.2. None of the correlations between total attitude component scores and global attitude were significant, \( p > .05 \) (see Table 2.3).

Overall attitudes and attitude components: Difference from the mid-point. Single sample t-tests showed that for pre-service teachers without experience, pre-service teachers with experience and in-service teachers all reported overall attitudes that were significantly higher than 50, the thermometer scale’s mid-point, \( p < .001 \). Thus, all groups reported favourable overall attitudes. Single sample t-tests also showed that the only attitude component score that was not significantly different from the midpoint of zero, was pre-service teachers without classroom experience’s affect, \( p = .256 \). Thus, all groups had significant unfavourable stereotypical beliefs and teaching beliefs. Pre-service teachers with classroom experience and in-service teachers had significant unfavourable affect and significant favourable past behaviours.

The relationships between variables. Table 2.3 shows the Pearson’s correlations between all dependent variables and inter-component ambivalence scores. As shown in Table 2.3, for both groups of pre-service teachers, global attitude was not related to any of the measures of objective knowledge, but was positively related to perceived knowledge. For in-
service teachers, global attitude was positively related to total knowledge, knowledge of treatments, knowledge of causes and perceived knowledge.

Also in Table 2.3, for both groups of pre-service teachers, stereotypic beliefs and teaching beliefs were not related to any knowledge variables or past behaviours. For in-service teachers, stereotype beliefs were negatively correlated with perceived knowledge, suggesting that teachers who had more negative stereotypic beliefs also had lower perceived knowledge. In-service teachers’ past behaviour was positively related to their teaching beliefs.

An index for average inter-component ambivalence between beliefs and affect (cognitive-affective ambivalence) was calculated for all groups. There were no significant differences between groups in their ambivalence scores, $p = .651$, and mean scores (see Table 2.2) indicated a moderate degree of ambivalence for all groups. As Table 2.3 shows, cognitive-affective ambivalence was not related to any other variables for pre-service teachers without classroom experience, but it was positively and significantly related to perceived knowledge among pre-service teachers with classroom experience. Thus, pre-service teachers with classroom experience who perceived themselves as knowing more about ADHD also reported more actual ambivalence between their beliefs and feelings about teaching children who express characteristics of ADHD. In-service teachers who had higher inter-component ambivalence between their cognitions and affect had higher knowledge of causes of ADHD and more favourable global attitudes towards teaching children who exhibit characteristics of ADHD.
Table 2.3

*Pearson’s Correlations between all Dependent Variables and Ambivalence*

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

This study tested differences in knowledge of ADHD and attitudes toward teaching children with ADHD across different levels of teaching experience. Results show that teachers with more experience in the classroom had greater knowledge of ADHD, less favourable affect and more favourable past behaviours toward teaching children with ADHD than those with less experience.

**Research Question 1: Total Knowledge of ADHD and Perceived Knowledge**

In-service teachers had significantly higher total knowledge of ADHD and higher perceived knowledge than both groups of pre-service teachers. Results aligned with previous Australian studies on total knowledge (i.e., Bekle, 2004; Kos, 2004; Kos, et al., 2004) and perceived knowledge (Kos, 2004; Kos, et al., 2004). Results indicated that perceived knowledge reflected actual knowledge, thus suggesting that in-service teachers and pre-service teachers have realistic perceptions of their knowledge. Pre-service teachers with experience did not differ in total knowledge or perceived knowledge from those without experience. Although the design of the study was cross-sectional and not longitudinal, thus limiting what can be said about development of knowledge and attitudes over time, results suggested that knowledge of ADHD develops after teachers gain full-time/continuing classroom experience rather than during their university education, and as such, support Kos et al. (2004). Continuing classroom experience may evoke greater knowledge of ADHD due to contact with children who have ADHD, in-service training on ADHD and information gained from parents, other teachers or personal study. Analyses of these more specific experience variables are planned for future studies.

The percentages of correct responses in the current study were similar to those reported by Kos et al. (2004) and West et al. (2005), two other Australian studies based on Sciutto et al.’s (2000) scale. Percentages of correct responses were lower than studies based
on Jerome et al.’s (1994) scale which may have inflated knowledge scores by increasing the chance of correctly guessing the correct true-false answer.

**Research Question 2: Knowledge of Characteristics, Treatments and Causes of ADHD**

In-service teachers’ and pre-service teachers’ were compared across knowledge subscales. In-service teachers had significantly higher knowledge of characteristics and treatments for ADHD than both groups of pre-service teachers. The lack of significant differences in knowledge of causes may reflect an emphasis on the etiology of ADHD in university training courses. Pre-service teachers’ highest scoring subscale was causes of ADHD, similar to West et al.’s (2005) in-service group, whereas current in-service teachers scored highest on characteristics. Items on the characteristics subscale were chosen because they represented characteristics that would be evident in classrooms. Thus, in-service teachers’ better knowledge of characteristics of ADHD compared to pre-service teachers may reflect their direct contact with the behaviours of children who have ADHD.

All groups’ mean scores were lowest on the treatments subscale, confirming West et al.’s (2005) results. Scores on the treatment subscale may be low due to neglect of this aspect of information about ADHD in university courses and in-service training. Treatment information may not be taught to teachers because technically they do not treat ADHD.

During the research project one participating university provided their teaching manual for the course. The emphasis was on characteristics of ADHD in the classroom and pedagogic and behavioural management strategies, rather than treatment generally. While school psychologists devise behavioural interventions for ADHD and medical practitioners prescribe medication, it is teachers who are implementing these behavioural strategies and observing medication effects throughout the school day. It is important that educational institutions and in-service trainers increase coverage of information about treatments for ADHD so that teachers know more about the interventions that they are administering. School psychologists
may be a vital link between medical practitioners and teachers in their role in conveying information about medication to teachers, and in helping teachers implement and monitor the effects of behavioural and medical interventions.

**Psychometric properties of the subscales.** All subscales had acceptable internal consistency (> .70), with the treatment subscale showing the lowest internal consistency of .73. Results for the characteristics subscale support its validity because teachers with more experience and greater contact with children who have ADHD would be expected to score higher on this subscale than those with less experience. A possible limitation of the findings concerns the internal validity of the subscales. The treatment subscale had a mix of true and false correct answers. The majority of correct answers for the characteristics subscale are true, while for the causes subscale they are false. The different patterns of correct responses across subscales may confound results due to a response bias. Participants may have a propensity to answer either true or false more readily, for some unmeasured reason. Future research would benefit from developing subscales with a consistent number of true/false correct responses.

Notwithstanding these methodological issues, the use of subscales to measure knowledge of ADHD is supported and shows that subscales are useful to indicate strengths and gaps in teachers’ knowledge. Given the high likelihood of new graduates teaching a child diagnosed with ADHD in their first class, pre-service training institutes need to foster development of sound knowledge of characteristics, treatments and causes of ADHD prior to entry into a teaching career. In-service trainers need to focus on developing comprehensive knowledge, with an emphasis on improving knowledge of treatments.

**Research Questions 3 and 4: Attitudes to Teaching Children with ADHD**

Overall attitudes measured with the thermometer scale were slightly favourable and significantly different from the scale mid-point for all groups, while all groups’ mean stereotypic and teaching beliefs were significantly unfavourable. Pre-service teachers with
classroom experience and in-service teachers had significant unfavourable affect and
significant favourable past behaviours. Pre-service teachers without classroom experience
reported slightly favourable affect, but this did not differ significantly from zero. Pre-service
and in-service teachers did not differ in their beliefs or overall attitudes. However, in-service
teachers reported more favourable behaviours toward children with ADHD than pre-service
teachers with experience, but less favourable affect compared to pre-service teachers without
experience.

The correlations between variables reported in Table 2.3 showed that for teachers with
in-service experience, knowledge of ADHD (objective and perceived) was positively related
with global attitude, whereas for both groups of pre-service teachers this relationship was only
significant for perceived knowledge. These correlations, when combined with those of the
MANOVA results, suggest that in-service teachers’ attitudes are based on their greater actual
knowledge of ADHD, while for less experienced teachers, their attitudes are based only on
their perception of their knowledge, which is significantly lower than in-service teachers.

All attitude components were unrelated to both pre-service groups’ knowledge of
ADHD, however in-service teacher’s stereotype beliefs were negatively correlated with their
perceived knowledge, suggesting that lower subjective impressions of knowledge of ADHD
were associated with holding more unfavourable stereotypic beliefs about children with
ADHD. In-service teachers’ beliefs about how children with ADHD impact on the teaching
process were positively related to their past behaviours. Although the behaviour ratings were
retrospective, these results suggest that there is a link between beliefs and behaviours for in-
service teachers.

The lack of significant relationships of overall attitude with the attitude components
and with the total attitude component score suggested the thermometer scale and open-ended
component items were measuring different constructs. The thermometer scale was likely to be
a more subjective measure that involved self-inference or meta-judgement of attitudes (Bassili, 1996) than the open-ended component measures. When there is ambivalence between components the overall attitude evaluation may not relate to any one specific attitude component. Instead, it may reflect a broader evaluation. The lack of correlation between overall attitude and the total attitude component score suggests that when reporting an overall attitude, participants do not summate the various aspects of their attitude in a linear fashion, but rather come to an overall evaluation using other processes. It could be that the various attitude components are weighted unequally when global attitude is formed, due to individual differences, such as valuing feelings and passion over rational thoughts, or actions over thoughts and feelings. If affect is particularly salient or important to a person, they may weight it more strongly than cognition, even though the total scores for each component may be similar and this may inform the overall attitude. Or alternatively, if the person has a role where they performed past actions in relation to the attitude object and this action produced salient or valued consequences, then the behaviour component may be weighted more strongly than affect, which may be viewed as an inconsequential internal reaction. While these suggestions are speculative, the lack of relationship between global attitude and total attitude component scores does warrant further investigation to explore the psychological processes of attitude formation. As stated by Esses and Maio (2002), open-ended measures and closed-ended measures (such as the thermometer scale) both contribute to our understanding of attitudes and should be included by researchers interested in fully assessing attitudes.

One of the most interesting findings was that pre-service teachers at the beginning of their university education initially reported favourable affect about teaching children with ADHD, but pre-service teachers who had some classroom experience had less favourable affect. These results supported Ohan et al. (2008) who found teachers with higher knowledge
were feeling less confident than teachers with lower knowledge. It is possible that as teachers gained more classroom experience and knowledge of ADHD they also gained more awareness of the problems faced by children with ADHD. They may have developed greater negative affect as a result of this raised awareness. Children with ADHD take up teachers’ time, are often distracting to other children and cause disruptions in class. It is therefore not surprising that teachers’ affect became increasingly negative with increased classroom experience. Consequently, in-service training and school psychologists need to foster awareness of emotional responses to teaching children with ADHD and development of coping skills.

The self-reported mean valence of past behaviour was favourable for in-service teachers and pre-service teachers with experience. A social desirability interpretation of the behaviour component scores appeared unlikely because negative affect and beliefs had already been reported. However, the possibility of social desirability having more influence on self-reported behaviour compared to thoughts and emotions needs to be considered. Alignment of current results with Ohan et al. (2008), who used different methods to measure behaviour, adds convergent validity to the open-ended measure of behaviour. Thus, it is likely that significant differences between in-service teachers’ and pre-service teachers’ past behaviours are reflected in-service teachers’ greater skills in behaviour management.

The pattern of results across the attitude component scores produced an important finding that has implications for future research, practice and theory. Unfavourable beliefs and affect accompanied by favourable behaviours aligned with Ohan et al.’s (2008) findings and suggested that teachers were ambivalent about teaching children with ADHD. Inter-component ambivalence occurs when a person simultaneously reports conflicting valence between attitude components, such as unfavourable cognitions or affect alongside favourable behaviours (Eagly & Chaiken, 1993). Ambivalence is another dimension of attitude strength.
(e.g., Scott, 1968; Thompson, Zanna, & Griffin, 1995) along with knowledge and experience. Ambivalence is thought to result in weaker attitudes (see Eagly & Chaiken, 1993). There is growing support that ambivalent attitudes are less stable over time, are less likely to guide information processing and behaviours, and are more pliable under persuasive communication than attitudes that are low in ambivalence (see Armitage & Conner, 2000; Jonas, Broemer, & Diehl, 2000).

The correlations reported in Table 2.3 showed that for in-service teachers, greater knowledge of causes of ADHD was positively associated with greater ambivalence between their beliefs and affect. This may reflect conflict between the head and the heart when more is known of the complexities of understanding what causes ADHD. For example, if one knows that the precise causes of ADHD are unknown but are likely to be neurological, then a teacher may feel helpless, anxious or frustrated about how they can best help the child in the classroom. For pre-service teachers, inter-component cognitive-affective ambivalence was positively associated with perceived knowledge. This is likely to reflect that trainee teachers are exposed to mixed and complex information about ADHD and that those who perceive themselves as knowing more information may also experience conflicted beliefs and affect.

The ambivalent attitude component results add support to the use of multidimensional attitude strength models in the study of attitudes to teaching children with ADHD. Single component models of attitudes may not be refined enough to detect the subtle aspects of attitudes towards complex issues such as ADHD. However, the lack of significant correlations of overall attitude with attitude components and the total attitude component score suggested it was important to measure both overall attitude and attitude components, as they appear to be measuring separate constructs. Researchers need to look at why unfavourable affect and beliefs develop, when at the same time, positive behaviours are reported. In practical terms, burnout may be a risk if negative emotions and thoughts go on unchecked while continuing to
teach in a professional manner as indicated by the favourable behaviour component scores. School psychologists may consult with teachers to help prevent burnout by raising teachers’ awareness of ambivalence and to identify and implement coping strategies. In addition, holding unfavourable cognition and affect may have as yet unmeasured impact on outcomes for children with ADHD.

Overall, external validity of the results is supported by the large sample size and representation of a wide range of ages, both primary and secondary school teachers, and teachers from very large to very small rural and urban schools. As noted above, cultural differences in education settings may produce different results from the current sample. Medium effect sizes for total knowledge, perceived knowledge, knowledge of characteristics and knowledge of treatments of ADHD support the practical significance of these findings. The small to medium effect sizes obtained for affective and behavioural attitude components suggest that other unmeasured variables need to be identified in future studies. More specific types of experience, such as direct experience teaching a child with ADHD, formal or informal study of ADHD, or personal experience with ADHD may produce effects on knowledge and attitudes.

Limitations

As noted earlier, a limitation of the study was that the design was cross-sectional rather than longitudinal and thus developmental statements about the effect of classroom experience could not be made directly. Discussion has been limited to differences between groups and all comments about development of knowledge and attitudes are necessarily speculative. The effect of demographic variables cannot be fully ruled out. Although sex had no effect, primary/secondary status and age had some effects, although these were different for each teacher group and they appeared to have inconsistent effects on knowledge and attitudes.
Conclusion

Given the high likelihood of new graduates teaching a child with ADHD coupled with the central roles played by teachers with children who have ADHD, it is important that pre-service and in-service teachers have a sound knowledge of ADHD and maintain favourable attitudes toward teaching children with ADHD. Results indicate teachers’ knowledge develops after they gain classroom experience. In addition, teachers have reasonable knowledge of characteristics and causes of ADHD, but have limited knowledge of treatments for ADHD. Teacher training institutes need to provide accurate and comprehensive information about the characteristics, causes and treatments for ADHD. Results for attitude components show that in-service teachers hold ambivalent attitudes toward teaching children with ADHD, as indicated by their unfavourable emotions and beliefs and favourable behaviours. A striking finding is that ambivalence appears to develop with increasing teaching experience. It indicates that training and support from school psychologists should be provided to raise teachers’ awareness of the potential for developing unfavourable emotions and beliefs and to develop coping skills for dealing with these responses. Research on why unfavourable affect and beliefs develop, when at the same time positive behaviours are reported, would aid understanding of attitudes to teaching children with ADHD and foster development of preventative measures.
Statement of Originality

We, the PhD candidate and the candidate’s Principal Supervisor, certify that the following text, figures and diagrams are the candidate’s original work.

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We, the PhD candidate and the candidate’s Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate’s contribution as indicated in the *Statement of Originality*.

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Chapter 3: Effects of Teachers’ Experience on their Knowledge and Attitudes Toward Attention-Deficit/Hyperactivity Disorder
Abstract
An Australian survey of 327 pre-service teachers and 127 in-service teachers investigated whether direct experience teaching children with symptoms of attention-deficit/ hyperactivity disorder (ADHD), indirect experience gained via training or media exposure, and personal experience with ADHD produced differences in knowledge of ADHD and attitudes toward teaching children showing characteristics of ADHD. Pre-service teachers with personal experience and greater indirect experience had significantly stronger objective and perceived knowledge of ADHD than those with less experience. In-service teachers’ who had greater direct experience had stronger perceived knowledge, while direct, indirect and personal experiences combined to produce differences in aspects of objective knowledge. In-service teachers with more teaching experience had more favourable attitudes. Results suggest more varied teacher training would foster comprehensive knowledge and favourable attitudes toward children who express characteristics of ADHD.

Key words:
Attention-Deficit/Hyperactivity Disorder, Teacher Characteristics, Teacher Attitudes, Teacher Education, Teaching Experience, Attitude Strength.
Effects of Teachers’ Experience on their Knowledge and Attitudes Toward Attention-Deficit/Hyperactivity Disorder

Attention-deficit/hyperactivity disorder (ADHD) is diagnosed in just over 5% of children and adolescents worldwide (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007), thus approximately one student per classroom is diagnosed with the disorder (Barkley, 1990). The characteristic behaviours of ADHD, such as developmentally inappropriate inattention, impulsivity and hyperactivity, are noticeable in school settings (Kos, Richdale, & Hay, 2006; Salmelainen, 2002). The prevalence and salience of ADHD in schools renders it an important topic for teacher trainers at both pre-service and in-service levels.

In the mid-1990s a small body of literature suggested that teachers’ characteristics, such as their knowledge of ADHD and their experience in training and practical settings, may impact on outcomes for children diagnosed with ADHD. For example, Power, Hess and Bennett (1995) and Greene (1995) argued that teachers’ attitudes towards interventions for ADHD may influence educational and social outcomes for children. Greene also suggested that teachers’ personal beliefs about the disorder and their prior experience teaching children with a diagnosis of ADHD may impact on students’ learning and social functioning. Thirteen years later, in a review of teacher characteristics and their impact on outcomes for children with ADHD, Sherman, Rasmussen and Baydala (2008) stated that empirical research supporting these suggestions was only beginning to emerge.

Empirical research would benefit from systematic and theoretical guidance to assist identification of relevant teacher characteristics. Once identified, teacher characteristics may be used as independent variables in future research on outcomes for children and guide curriculum development in teacher training at both the pre-service and in-service levels. Social psychological models, such as multi-dimensional models of attitude strength, provide a useful theoretical guide to aid in identifying the types of experiences that may impact on
teachers’ knowledge and attitudes toward ADHD. This focus on experience echoes a definition of attitudes by Allport, one of the founders of attitude theory, who stated that an “attitude is a mental and neural state of readiness, organised through experience [emphasis added], exerting directive and dynamic influence upon the individual’s response to all objects with which it is related” (1935, p. 810). Allport’s phrase, “organised through experience” holds attitudes as formed through learning and interactions with the environment. In the education literature, prior experiences are usually treated as demographic variables and aspects of professional experience (e.g., Bekle, 2004; Kos, Richdale, & Jackson, 2004; Ohan, Viser, Strain & Allen, 2011; Sciutto, Terjesen, & Bender Frank, 2000; Vereb & DiPerina, 2004), however in the multi-dimensional model of attitude strength, different types of prior experience are seen as dimensions of an attitude’s strength that act as antecedents of other dimensions, such as knowledge. An introduction to the multidimensional model is presented below.

**Multiple Dimensions of Attitude Strength**

When people meet others, when they experience events, or receive information, they may form favourable or unfavourable evaluations or attitudes in response to these experiences (Eagly & Chaiken, 1993). Attitudes affect future thoughts, judgements and behaviours. Some attitudes are held more strongly than others; they have greater influence on thoughts and behaviours, they last longer and are more resistant to opposing viewpoints compared to weaker attitudes (Krosnick & Petty, 1995). A large body of research in social psychology has identified numerous dimensions of attitude strength. These dimensions include a person’s knowledge of facts about an issue (Wood, 1982; Wood, Rhodes, & Biek, 1995), their self-interest in the issue (Eaton, Majka, & Visser, 2008; Holbrook, Berent, Krosnick, Visser, & Boninger, 2005; Thomsen, Borgida, & Lavine, 1995), their direct experience with the issue
(Fazio & Zanna, 1978), and whether they have received information about the issue via indirect or secondary sources, such as media or training courses (Eagly & Chaiken, 1998).

The multi-dimensional model of attitude strength identifies both direct experience and indirect experience as sources of information that influence attitude formation (Eagly & Chaiken, 1998; Fazio & Zanna, 1981). Direct experience refers to first-hand interaction with an issue, such as teaching a child who has ADHD. Indirect experience refers to information gained via secondary sources such as the media, other people, or study, for example preservice and in-service training on ADHD (Eagly & Chaiken, 1998). More experience, either direct or indirect, provides more information, which then informs future decisions and behaviours and thus leads to stronger attitudes (Eagly & Chaiken, 1998).

The above model identifies other types of experience that may shape teachers’ knowledge and attitudes toward ADHD. Personal relevance (Thomsen, Borgida, & Lavine, 1995) or personal importance (Eaton, Majka, & Visser, 2008; Holbrook, Berent, Krosnick, Visser, & Boninger, 2005) of an issue will initiate involvement and increased attention, giving rise to stronger attitude-behaviour relations, attitude persistence and stability over time (Thomsen, et al., 1995). With a prevalence rate of approximately one in 20 children and adolescents diagnosed with ADHD (Polanczyk, et al., 2007), it is likely that teachers would know someone close to them, such as their own child, a sibling, friend, colleague, partner or other relative, who has either been diagnosed with ADHD or who they believe exhibits the characteristics of ADHD. Similarly, teachers themselves may have been diagnosed with ADHD or believe that they exhibit its characteristics. This personal experience would logically evoke personal relevance and would likely have an impact on teachers’ knowledge and attitudes regarding ADHD. There does not seem to be any previous study measuring how teachers’ personal experience is linked with knowledge or attitudes in relation to ADHD.
The current study was the first to situate direct experience teaching children with characteristics of ADHD, indirect experience via training, and personal experience with ADHD in a social psychological framework. The impact of teaching experience (i.e., from pre-service to in-service) on attitudes and knowledge was also assessed. The experience of teaching a child who has ADHD (direct experience), undertaking training on ADHD (indirect experience) and personal experience with ADHD are likely to be sources of information about ADHD that would impact on components of knowledge about ADHD, such as its characteristics, causes and treatments. Specifying the types of experience associated with development of knowledge would be of use for teacher training institutions in planning their degree structures and in-service workshops. As shown below, a review of the existing research from an education perspective on the relations between teachers’ experiences and their knowledge and attitudes in regard to ADHD confirms not only a need to clarify results, but also that this body of literature would benefit from a cohesive model to guide identification of relevant teacher experiences.

Direct Experience Teaching Children with ADHD

Knowledge of ADHD. Questionnaires that contain empirically supported factual statements about ADHD (i.e., objective measures of knowledge of ADHD) have found that prior experience teaching children with ADHD was associated with greater knowledge of ADHD (Kos, Richdale, & Jackson, 2004; Sciutto, Terjesen, & Bender Frank, 2000). Similarly, teachers with direct experience had higher perceived knowledge, that is, higher subjective ratings of their knowledge (Kos, et al., 2004), than those without direct experience. Studies of specific aspects of objective knowledge found no relationship between direct experience and knowledge of treatments, but mixed results for knowledge of symptoms, etiology and prognosis of ADHD (Sciutto, et al., 2000; Vereb & DiPerna, 2004). Sciutto et al., (2000) found a positive relationship between the estimated number of children with
ADHD taught and objective knowledge of ADHD, but others found no such relationship for objective knowledge (Kos, et al., 2004; Ohan, Cormier, Hepp, Visser, & Strain, 2008) or perceived knowledge (Kos, et al., 2004). Inconsistent outcomes emphasise the need for theoretical guidance.

**Attitudes Toward ADHD.** Research has generally supported a positive relationship between direct experience and attitudes toward teaching children with ADHD. Teachers who had direct experience reported greater confidence about teaching children with ADHD (Bussing, Gary, Leon, Garvan, & Reid, 2002; Reid, Vasa, Maag, & Wright, 1994) and more favourable attitudes toward medication treatments (Vereb & DiPerna, 2004) compared to those without direct experience. Direct experience was a significant positive predictor of pre-service teachers’ attitudes toward their intended behaviours toward children diagnosed with ADHD (Oh, Rizzo, Chung, Park & Lei, 2010). In-service teachers with greater direct experience were found to be less influenced by the label “ADHD” in their support of classroom-based behavioural interventions than those with less direct experience (Ohan et al., 2011). However, another study found direct experience was unrelated to in-service teachers’ attitude toward behavioural management techniques (Vereb & DiPerna, 2004). These mixed results emphasise the need for theoretical guidance.

**Training to Teach Children with ADHD: Indirect Experience**

**Knowledge of ADHD.** Several studies have focused on identifying how teacher training programs, in the form of pre-service university studies and in-service workshops, are associated with knowledge of ADHD. Barbaresi and Olsen (1998) tested 44 in-service teachers before and after a 2.5-hour intervention that provided information about ADHD, a case study and a discussion. They found teachers’ objective knowledge of ADHD was higher than pre-intervention scores one month after the intervention. A follow-up study by Jones and Chronis-Tuscano (2008) that included a wait-list control group (N = 68) and a treatment group
(\(N = 74\)) found a similar intervention also increased in-service teachers’ objective knowledge of ADHD. These experimental designs show that training increases knowledge of ADHD; however non-experimental studies show mixed findings. Surveys of in-service teachers by Sciutto et al. (2000) and Bekle (2004) found no relationship between participation in special education classes at university and objective knowledge of ADHD. In contrast, other surveys found significant, positive but weak relationships between in-service teachers’ training in ADHD, their objective knowledge of ADHD (Jerome, Gordon, & Hustler, 1994; Kos, et al., 2004), and their perceived knowledge of ADHD (Kos, et al., 2004). A survey of in-service teachers by Vereb and DiPerna (2004) found training in ADHD was positively related to knowledge of aetiology, symptoms and prognoses of ADHD, but not related to knowledge of treatments of ADHD. Bekle’s and Sciutto et al.’s items that measured prior study did not specify whether the special education coursework included content relating to ADHD. This methodological feature may have affected their non-significant results.

**Attitudes Toward ADHD.** The relationship between training and attitudes has also been examined, however results are more mixed than those for direct experience. Zentall and Javorsky (2007) assessed the effectiveness of two types of in-service programs on ADHD over a three month period using both observation and self-reports (\(N = 49\)). Results for both programs indicated significant improvements in teachers’ willingness to learn about ADHD, confidence in teaching children with ADHD, favourable attitudes to inclusion, and favourable changes in use of behavioural management techniques. Ohan et al. (2011) also found in-service teachers with more training in ADHD were less influenced by the label “ADHD” in their willingness to support a broad range of interventions for ADHD, than teachers with less training. This suggested that training increased teachers’ support for administration of treatments regardless of whether they knew a child had received a diagnosis. In contrast, Oh et al. (2010) surveyed pre-service teachers and reported that special education coursework
was associated with less favourable attitudes to behaviours toward children with ADHD. Oh et al. did not discuss this unexpected finding. It may be that exposure to information regarding children with high behavioural management needs evokes negative thoughts (e.g., “I'm not ready to manage difficult behaviour”) and negative emotions (e.g., anxiety) and therefore, unfavourable attitudes were reported. This interpretation is supported by Ohan et al.’s findings that in-service teachers who had more training in ADHD were more emotionally reactive to the diagnostic label of ADHD, than teachers who had less training.

In sum, it appears that training about ADHD can impact on attitudes in some circumstances, however the direction of the effect is mixed. Clarity would be enhanced by designing studies that include other aspects of experience as independent variables that may act directly, or interact in combination, on teachers’ knowledge and attitudes. For example, indirect experience may be independently associated with more favourable attitudes and more knowledge of ADHD, or combinations of strong indirect experience, strong personal experience and strong direct experiences may shape attitudes and knowledge. The addition of potential covariates, such as the extent of teaching experience, would also enhance clarity.

**Teaching Experience**

Teaching experience has typically been measured by the number of years of teaching experience in schools. Pre-service teachers, who necessarily have little teaching experience, have consistently been found to have less objective knowledge about ADHD compared to in-service teachers (Anderson, Watt, Noble & Shanley, 2012a; Bekle, 2004; Kos, et al., 2004). Thus, teaching experience appears to be related to objective knowledge. Furthermore, in-service teachers with greater number of years of service have more objective knowledge of ADHD (Sciutto, et al., 2000) and higher perceived knowledge (Kos, et al., 2004) than those earlier in their careers. Given these significant findings, research on specific types of in-service teacher experiences with ADHD needs to control for teaching experience. Similarly,
among pre-service teachers, general life experience may impact on knowledge and attitudes. Oh et al. (2010) found pre-service teachers’ age was positively and significantly predicted attitudes associated with intended behaviours toward children with ADHD, thus age needs to be controlled.

**Aim and Hypotheses**

The current study aimed to test whether pre-service and in-service teachers’ knowledge of ADHD and attitudes toward teaching children who express characteristics of ADHD differed depending on their direct experience, personal experience and indirect experience with ADHD. It was predicted that both pre-service teachers and in-service teachers who had more direct experience, more personal experience, and more indirect experience would have more objective knowledge of ADHD, more knowledge of aspects of ADHD (characteristics, causes and treatments), stronger perceived knowledge and a more favourable overall attitude to teaching children with characteristics of ADHD than those with less experience. Interactions between direct experience, indirect experience and personal experience on knowledge and attitudes were explored. Pre-service teachers’ age, and the extent of in-service teachers’ teaching experience were used as covariates and were expected to significantly predict knowledge of ADHD and attitudes toward teaching children with characteristics of ADHD.

**Method**

**Participants**

**Pre-service teachers.** Three hundred and twenty seven education students (59 males and 268 females) from two Australian universities voluntarily completed an online survey. Their mean age was 30.44 years ($SD = 10.43$). The majority of pre-service teachers were in their first semester at university ($N = 80, 24.5\%$). The maximum number of semesters reported was nine ($N = 1, 0.3\%$) (Median = 3.00, $M = 2.99$, $SD = 2.39$). Pre-service teachers
were recruited during lectures and via email. Of the pre-service teachers who entered the website for the survey, 73.7% completed it. The total number of pre-service teachers invited to participate was estimated to be 1400, thus the response rate was approximately 23%.

**In-service teachers.** One hundred and twenty seven teachers (35 males and 92 females) employed in government schools in the North Coast and New England regions of New South Wales, Australia, voluntarily completed an online survey. Teachers were recruited via an email invitation sent to school principals in both geographic regions. Schools were selected to include a range of sizes (from one teacher schools to those with more than 100 teachers) and to include a range of coastal, inland, rural and urban regions. Ten secondary school principals and 20 primary school principals were contacted in each geographic region. Five secondary schools and 15 primary schools from the North Coast region, and five secondary schools and eight primary schools from the New England region agreed to participate. The total number of teachers at schools that were invited to participate was estimated to be 1228, thus the response rate was 10.3%. Of the teachers who entered the survey website, 78.3% completed it. Teachers’ mean age was 41.04 years ($SD = 10.65$, range 20 to 60 years) and the mean number of years of teaching experience was 15.75 years ($SD = 10.78$, range one to 37 years).

**Materials**

Both the pre-service and in-service versions of the survey (see Appendix B and C, respectively) consisted of eight sections presented in the following order: (a) introductory information sheet, (b) demographics, (c) teaching experience, (d) global attitude, (e) perceived knowledge, (f) objective knowledge, (g) attitude content, and (h) personal experience with ADHD. Data from section (g) were analysed in a separate paper.

**Demographic items.** Both versions of the survey contained items that asked about participants’ sex, age, completion of university studies covering information about ADHD,
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exposure to information about ADHD in the last 12 months, and primary versus secondary teacher status. The pre-service survey also asked which university was attended and how many semesters of study were completed. The in-service version of the survey asked how many years of service they had, what grade/s (or year/s) was/were currently taught, whether employment was full-time, part-time or casual, whether teachers had previous experience teaching a special education class and whether they had had any in-service training regarding ADHD.

**Direct Teaching experience.** One item asked whether participants had experience teaching a child they believed to have ADHD and another asked how many children they had taught who they believed had ADHD.

**Global attitude.** Overall attitude toward teaching children with ADHD was rated on a vertical 11-point attitude thermometer scale (Esses & Maio, 2002; Haddock & Zanna, 1998). Participants rated their attitude towards teaching children who have ADHD on a scale from 0 (extremely unfavourable) to 100 (extremely favourable). Thermometer scales have been shown to correlate reliably with multiple-item measures of attitudes, such as semantic differential scales (Haddock & Zanna, 1999; Stangor, Sullivan, & Ford, 1991).

**Perceived knowledge.** Four items measuring perceived knowledge on 7-point Likert scales were adapted from Smith, Fabrigar, Macdougall and Weisenthal (2008) to suit teaching children with ADHD. The items were: (a) How much information do you feel you have about ADHD? (from ‘Very little’ to ‘A great deal’); (b) How knowledgeable do you feel about ADHD? (from ‘Not at all knowledgeable’ to ‘Extremely knowledgeable’); (c) How well informed are you about ADHD? (from ‘Completely uninformed’ to ‘Completely informed’); and (d) If you had to write a list of everything you knew about ADHD, how long a list could you produce? (from ‘Very short’ to ‘Very long’). Average scores were calculated for each participant. Inter-item correlations ranged from .78 to .90 and Cronbach’s alpha was .95.
Objective knowledge. West et al.’s (2005) 67-item Knowledge about Attention Deficit Disorder Questionnaire (KADD-Q) scale was shortened to 33 items, with 11 items each for the three subscales measuring characteristics, causes and treatments of ADHD. The KADD-Q items were derived from empirically supported factual statements about ADHD (West et al., 2005). Items measuring characteristics of ADHD were selected if they pertained to behaviours exhibited in the classroom environment, while those for causes and treatments of ADHD were selected to include a broad range of content and to limit multiple items on similar content. Participants responded to each item by selecting either True, False or Don’t know. Total scores were formed by summing correct responses (see Appendix A), with a maximum score of 33 representing high knowledge of ADHD and a minimum score of zero representing low knowledge of ADHD. Subscale scores were formed by summing correct scores on 11 items for each subscale. Cronbach’s alpha for the whole scale was .88 and for the subscales it was .82 for causes, .79 for characteristics and .73 for treatments, which was similar to West et al.’s (2005) results.

Personal experience. Four items asked about personal experience with ADHD. The items were: (a) Do you believe that you have ADHD?; (b) Have you been diagnosed with ADHD?; (c) Do you believe that anyone close to you has ADHD (such as your own child, a sibling, partner, parent, friend or work colleague)?, and (d) Has anyone close to you been diagnosed with ADHD? All four items presented three possible responses, Yes, No or Unsure.

Procedure

Ethics approval was acquired from the university Human Research Ethics Committee (HREC) and the NSW State Education Research Approval Process (SERAP). Education Heads of Schools were asked for permission to recruit education students via email and during lectures. School principals were contacted via email and telephone and asked for their school’s participation in the online survey of in-service teachers. Principals who agreed to
participate forwarded an invitation via email to all their teaching staff. The email to both education students and in-service teachers contained a hyperlink to the appropriate version of the online survey. Submission of responses was taken as consent. The online survey took approximately 45 minutes to complete. Participating school principals and individual pre-service teachers were offered a summary of key results (see Appendix D).

Design

The present study investigated the effect of three types of prior experience (direct experience, indirect experience and personal experience) on both pre-service teachers’ and in-service teachers’ knowledge of ADHD and attitude to teaching children with characteristics of ADHD. So that multiple dependent variables (DVs) could be tested in a parsimonious manner, two multiple analyses of covariance (MANCOVAs) were run for both pre-service and in-service teacher samples. Pre-service and in-service teachers were tested separately because it was expected that direct experience and indirect experience may have played different roles for each sample.

Dependent variables. The same dependent variables (DVs) were used for both pre-service teachers and in-service teachers. In both cases, the DVs for the first MANCOVA were objective knowledge, perceived knowledge and global attitude, and the DVs for the second MANCOVA were the three knowledge subscales; knowledge of characteristics, treatments and causes of ADHD.

Covariates and Independent Variables. The covariate for pre-service teachers’ was their age in years as it was anticipated that general life experience may impact on knowledge and attitudes. In-service teachers’ age in years was significantly and positively correlated with their number of years of teaching experience, \( r (100) = .80, p < .001 \) Due to the strong correlation between age and years of teaching experience and the need to avoid multicollinearity problems in analyses, only years of teaching experience was used as a
covariate in the analyses (Tabachnick & Fidell, 2007). Years of teaching experience was chosen over age because it was a key variable in prior literature (e.g., Kos et al., 2004; Sciutto et al., 2000) and because years of teaching experience had a stronger correlation with overall attitude than age.

For all analyses there were three independent variables (IVs); direct experience teaching a child with ADHD, personal experience with ADHD, and indirect experience with ADHD. Operational definitions of these three IVs as they applied to pre-service and in-service samples are described below.

**Pre-service teachers.** Two categories for direct experience were formed based on respondents’ yes/no answers to the item ‘Did you teach any children who you believed who had ADHD?’ Two categories for personal experience were formed based on responses to the four personal experience items. Affirmative responses to any of the four items formed a category that indicated personal experience, while no or unsure responses indicated a lack of personal experience. A tertile split was used to create three categories of indirect experience were formed based on the sum of affirmative responses to items that asked about various forms of indirect experience, such as whether ADHD was covered in university courses or in-service training, and if participants had any exposure to ADHD from books, journal articles or other media, (e.g., magazine articles, television programs, movies, websites) in the previous 12 months. Low indirect experience indicated either no indirect experience or one instance of indirect experience. Medium indirect experience indicated either two or three instances of indirect experience and high indirect experience indicated four or more instances of indirect experience, with the maximum number of instances reported as 15.

**In-service teachers.** Because the large majority of in-service teachers (96%) had some experience teaching a child who had ADHD and the continuous variable that measured the extent of direct experience (number of children taught believed to have with ADHD) was
extremely non-normal ($z_{skew} = 16.21, z_{kurtosis} = 38.72$) and unable to be transformed satisfactorily, two categories of the extent of direct experience were formed based on a median split at 10 children taught. Teachers with low direct experience had taught between 0 - 10 children with ADHD, while those with high direct experience had taught 11 or more children with ADHD. Indirect experience was collapsed into two groups at the median for the in-service teachers to create adequate cell sizes. A tertile split for indirect experience to match the pre-service teachers was not possible due to the smaller sample size of the in-service teachers. If a tertile split was used, some cells in the three-way factorial design had zero cases. Instead, a dichotomous split was used at the median score of 3. In-service teachers with low indirect experience had 0 – 3 instances of exposure to information about ADHD, while those with high indirect experience had 4 four more exposures to information about ADHD. Personal experience categories for in-service teachers were the same as for the pre-service teachers.

**Results**

Table 3.1 shows the frequencies of in-service and pre-service teachers in demographics, indirect experience, direct experience and personal experience categories. Almost all in-service teachers said they had taught a child they believed to have ADHD, with the number of children with ADHD taught ranging from 0 to 200, ($M = 20.23, SD = 27.21$). Of the 327 pre-service teachers, 218 (66.7%) had some teaching experience, and 168 (77.1%) of these said they had taught a child they believed to have ADHD. The number of children with ADHD taught by pre-service teachers ranged from 0 to 30 ($M = 2.76, SD = 4.11$).

**Inferential Analyses**

As described in the design section above, two 2 x 2 x 3 (i.e., direct experience x personal experience x indirect experience, respectively) multiple analyses of covariance (MANCOVAs) were conducted for pre-service teachers. Two 2 x 2 x 2 (i.e., direct experience
x personal experience x indirect experience, respectively) MANCOVAs were conducted for in-service teachers. Untransformed cell means and standard errors adjusted for the covariate are reported in Table 3.2 (pre-service teachers) and Table 3.3 (in-service teachers). Unadjusted descriptive statistics are available from the first author. For all analyses, Cohen’s (1988) guidelines for interpreting eta squared effect sizes were used (i.e., small = .01, medium = .06, and large = .138).

Assumption tests. Sample size for pre-service teachers ($N = 320$ for analysis one and $N = 321$ for analysis two) and in-service teachers ($N = 101$) produced high statistical power above .95. For pre-service teachers the smallest cell size was 12 and the largest was 54; for in-service teachers the smallest cell size was 3 and largest was 19 (see Tables 3.2 and 3.3). The small cell sizes impact only on the three-way interaction. Field (2005) advised that when cell sizes were unequal, Pillai’s Trace may be assumed to be accurate if homogeneity of covariance was satisfied and if there were no multivariate normality problems. For both samples the assumptions regarding univariate outliers, multivariate outliers, multivariate normality, multicollinearity, linearity, homogeneity of variance/covariance and homogeneity of regression slopes were met. Thus, Pillai’s Trace was assumed to be accurate and was used to interpret MANCOVA results (Field, 2005). Univariate normality was met for all pre-service DVs ($p < .001$), except knowledge of characteristics and knowledge of causes, which were negatively skewed ($z_{skew} = -4.21$ and $z_{skew} = -4.74$). The covariate, age was positively skewed ($z_{skew} = 4.44$). For in-service teachers, univariate normality was met for all variables except knowledge of characteristics, ($z_{skew} = -4.50$). Transformation of negatively skewed variables consisted of reflection and square root, then re-reflection to preserve the original direction of the scores. Pre-service teachers’ age was transformed using square root. Transformed variables were no longer significantly skewed at the $p < .001$ level (pre-service
knowledge of causes: $z_{\text{skew}} = -1.25$, characteristics: $z_{\text{skew}} = -0.74$ and age: $z_{\text{skew}} = 2.96$; in-service knowledge

Table 3.1

*Frequencies and Percentages of Participants in Demographic Categories*

<table>
<thead>
<tr>
<th>Categorical variables</th>
<th>Pre-service</th>
<th>In-service</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>198 (60.7%)</td>
<td>64 (50.4%)</td>
<td>262 (57.7%)</td>
</tr>
<tr>
<td>Secondary</td>
<td>128 (39.3%)</td>
<td>61 (48.0%)</td>
<td>189 (41.6%)</td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full time</td>
<td>--</td>
<td>121 (95.3%)</td>
<td>--</td>
</tr>
<tr>
<td>Part time</td>
<td>--</td>
<td>6 (4.7%)</td>
<td>--</td>
</tr>
<tr>
<td>Have you ever taught special education?</td>
<td>Yes</td>
<td>--</td>
<td>37 (29.1%)</td>
</tr>
<tr>
<td>No</td>
<td>--</td>
<td>90 (70.9%)</td>
<td>--</td>
</tr>
<tr>
<td>Have you studied ADHD at university?</td>
<td>Yes</td>
<td>146 (44.9%)</td>
<td>67 (52.8%)</td>
</tr>
<tr>
<td>No</td>
<td>179 (55.1%)</td>
<td>60 (47.2%)</td>
<td>236 (52.0%)</td>
</tr>
<tr>
<td>Have you participated in in-service training on ADHD?</td>
<td>Yes</td>
<td>--</td>
<td>45 (35.4%)</td>
</tr>
<tr>
<td>No</td>
<td>--</td>
<td>59 (46.5%)</td>
<td>--</td>
</tr>
<tr>
<td>Do you believe that you have ADHD?</td>
<td>Yes</td>
<td>15 (4.6%)</td>
<td>5 (3.9%)</td>
</tr>
<tr>
<td>No</td>
<td>300 (91.7%)</td>
<td>118 (92.9%)</td>
<td>418 (92.1%)</td>
</tr>
<tr>
<td>Have you been diagnosed with ADHD?</td>
<td>Yes</td>
<td>7 (2.1%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>No</td>
<td>320 (97.9%)</td>
<td>127 (100%)</td>
<td>447 (98.5%)</td>
</tr>
<tr>
<td>Do you believe that anyone close to you has ADHD?</td>
<td>Yes</td>
<td>114 (34.9%)</td>
<td>37 (29.1%)</td>
</tr>
<tr>
<td>No</td>
<td>192 (58.7%)</td>
<td>83 (65.4%)</td>
<td>275 (60.6%)</td>
</tr>
<tr>
<td>Has anyone close to you been diagnosed with ADHD?</td>
<td>Yes</td>
<td>82 (25.1%)</td>
<td>24 (18.9%)</td>
</tr>
<tr>
<td>No</td>
<td>232 (70.9%)</td>
<td>96 (75.6%)</td>
<td>32872.2</td>
</tr>
</tbody>
</table>
| Note. Percentages may not add to 100% due to missing data.
Table 3.2

Pre-service Teachers: Age Adjusted Means and Standard Errors for Objective Knowledge, Perceived Knowledge and Global Attitude (MANCOVA 1 DVs) and Knowledge Subscales (MANCOVA 2 DVs) across Direct Experience, Indirect Experience and Personal Experience Groups (IVs)

<table>
<thead>
<tr>
<th>Personal Experience</th>
<th>Level of indirect experience</th>
<th>With direct experience</th>
<th>Without direct experience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low (n =12)</td>
<td>Medium (n =12)</td>
<td>High (n =35)</td>
</tr>
<tr>
<td>Dependent variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objective knowledge</td>
<td>15.7</td>
<td>1.5</td>
<td>17.6</td>
</tr>
<tr>
<td>Perceived knowledge</td>
<td>3.0</td>
<td>0.4</td>
<td>3.5</td>
</tr>
<tr>
<td>Global attitude</td>
<td>69.8</td>
<td>6.1</td>
<td>55.3</td>
</tr>
<tr>
<td>Characteristics</td>
<td>5.9</td>
<td>0.7</td>
<td>6.0</td>
</tr>
<tr>
<td>Treatments</td>
<td>2.1</td>
<td>0.6</td>
<td>3.8</td>
</tr>
<tr>
<td>Causes</td>
<td>7.6</td>
<td>0.8</td>
<td>7.7</td>
</tr>
</tbody>
</table>
Table 3.2 continued

<table>
<thead>
<tr>
<th>Without Personal Experience</th>
<th>With direct experience</th>
<th>Without direct experience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level of indirect experience</td>
<td>Level of indirect experience</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>$(n = 15)$</td>
<td>$(n = 21)$</td>
</tr>
<tr>
<td>Objective knowledge</td>
<td>18.0</td>
<td>1.4</td>
</tr>
<tr>
<td>Perceived knowledge</td>
<td>3.0</td>
<td>0.3</td>
</tr>
<tr>
<td>Global attitude</td>
<td>64.2</td>
<td>5.5</td>
</tr>
<tr>
<td>Characteristics</td>
<td>6.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Treatments</td>
<td>4.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Causes</td>
<td>7.2</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Note. All variables are untransformed. $M_{age} = 30.46$ years.
Table 3.3

*In-service Teachers: Means and Standard Errors (Adjusted for Years of Overall Teaching Experience) for Objective Knowledge, Perceived Knowledge and Global Attitude (MANCOVA 1 DVs) and Knowledge Subscales (MANCOVA 2 DVs) across Direct Experience, Indirect Experience and Personal Experience Groups (IVs)*

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Low direct experience</th>
<th>High direct experience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low (n = 3)</td>
<td>High (n = 9)</td>
</tr>
<tr>
<td>Objective knowledge</td>
<td>21.7 2.6</td>
<td>22.0 1.5</td>
</tr>
<tr>
<td>Perceived knowledge</td>
<td>4.4 0.6</td>
<td>4.4 0.3</td>
</tr>
<tr>
<td>Global attitude</td>
<td>64.1 11.7</td>
<td>80.7 6.8</td>
</tr>
<tr>
<td>Characteristics</td>
<td>6.9 1.2</td>
<td>7.8 0.7</td>
</tr>
<tr>
<td>Treatments</td>
<td>5.0 1.2</td>
<td>6.5 0.7</td>
</tr>
<tr>
<td>Causes</td>
<td>9.7 1.5</td>
<td>7.7 0.9</td>
</tr>
</tbody>
</table>
Table 3.3 continued

<table>
<thead>
<tr>
<th>Experience</th>
<th>Low direct experience</th>
<th>High direct experience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low (n = 18)</td>
<td>High (n = 19)</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>SE</td>
</tr>
<tr>
<td>Objective knowledge</td>
<td>19.8  1.1</td>
<td>20.3  1.0</td>
</tr>
<tr>
<td>Perceived knowledge</td>
<td>3.7   0.2</td>
<td>4.0   0.2</td>
</tr>
<tr>
<td>Global attitude</td>
<td>56.4  4.8</td>
<td>53.9  4.7</td>
</tr>
<tr>
<td>Characteristics</td>
<td>8.4   0.5</td>
<td>7.4   0.5</td>
</tr>
<tr>
<td>Treatments</td>
<td>4.6   0.5</td>
<td>4.8   0.5</td>
</tr>
<tr>
<td>Causes</td>
<td>6.8   0.6</td>
<td>8.1   0.6</td>
</tr>
</tbody>
</table>

Note. All variables are untransformed. \( M_{\text{overall teaching experience}} = 15.57 \) years.
of characteristics: \( z_{\text{skew}} = -2.09 \). Analyses were run using both transformed and untransformed variables. Some results that were significant using transformed variables became non-significant without transformation. Transformed variables were used in the analyses as recommended by Tabachnick and Fidell (2007) to maintain reliability of the results. Homogeneity of variance was satisfied for all follow-up tests, \( p > .05 \).

**Pre-service Teachers**

**Objective knowledge, perceived knowledge and global attitude.** The 2 x 2 x 3 Factorial MANCOVA results are shown on Table 3.4. Significant results were found for the multivariate main effects of personal experience and indirect experience. Age (square root), also significantly predicted the combined DVs. Follow-up ANCOVAS using Bonferroni adjusted alphas of .017 were conducted. The only significant result was that pre-service teachers with personal experience (\( n = 127, M = 3.70, SE = 0.12 \)) reported higher perceived knowledge compared to those without personal experience (\( n = 193, M = 3.35, SE = 0.10 \)), \( F(1, 307) = 7.12, p = .008, \eta^2_p = .02 \), after controlling for age (square root).

Indirect experience was associated with significant differences in objective knowledge, \( F(2,307) = 6.86, p = .001, \eta^2_p = .04 \), and perceived knowledge, \( F(2, 307) = 24.86, p < .001, \eta^2_p = .14 \). Post-hoc t-tests (\( \alpha = .017 \)) showed pre-service teachers with low indirect experience had significantly less objective knowledge of ADHD (\( n = 103, M = 16.37, SE = 0.60 \)) than those with high indirect experience (\( n = 125, M = 18.78, SE = 0.47 \), \( p = .006 \), while those with medium indirect experience (\( n = 92, M = 17.17, SE = 0.60 \)) did not differ from either low or high indirect experience groups (both \( p = .10 \)). These means show that on average, participants with high amounts of indirect experience are achieving two more items correct on the 33-item knowledge questionnaire than those with low indirect experience. Post hoc t-tests (\( p < .017 \)) for perceived knowledge adjusted for age (square root) showed pre-service teachers with low indirect experience (\( n = 103, M = 3.02, SE = 0.15 \)) and medium
indirect experience \((n = 92, M = 3.34, SE = 0.15)\) had significantly lower perceived knowledge than those with high amounts of indirect experience \((n = 125, M = 4.21, SE = 0.12)\) at \(p < .001\).

**Knowledge of characteristics, causes and treatments of ADHD.** The second factorial MANCOVA results are shown on Table 3.4. The only significant effects were the multivariate main effects for personal experience and indirect experience. Two follow-up ANCOVAs were conducted using a Bonferroni adjusted alpha of .025. Pre-service teachers with personal experience \((n = 127, M = 10.08, SE = 0.06)\) had significantly more knowledge of causes (re-reflects square root) compared to those without personal experience, \((n = 193, M = 9.85, SE = 0.05)\), \(F(1,308) = 10.15, p = .002, \eta^2_p = .03\). Knowledge of treatments and knowledge of characteristics (re-reflects square root) were not significantly affected by personal experience.

Indirect experience was associated with a significant difference in knowledge of characteristics (re-reflects square root), \(F(2, 308) = 4.46, p = .012, \eta^2_p = .03\), and knowledge of treatments, \(F(2, 308) = 6.60, p = .002, \eta^2_p = .04\), but not knowledge of causes (re-reflects square root). Using an alpha of .025, post-hoc Bonferroni t-tests showed pre-service teachers with high indirect experience \((n = 125, M = 3.96, SE = .18)\), had significantly higher knowledge of treatments than those with low indirect experience \((n = 103, M = 3.10, SE = .23)\), \(p = .009\). Pre-service teachers’ knowledge of characteristics (re-reflects square root) was not significantly affected, \(p = .038\).
Table 3.4

Pre-service Teachers: The Effects of Direct Experience, Indirect Experience and Personal Experience adjusted for Age (Squareroot, M = 5.44) on Objective Knowledge, Perceived Knowledge and Global Attitude, (MANCOVA 1 DVs) and Knowledge of Characteristics, Causes and Treatments (MANCOVA 2 DVs)

<table>
<thead>
<tr>
<th></th>
<th>Pillai’s Trace</th>
<th>F</th>
<th>df_hypothesis</th>
<th>df_error</th>
<th>p</th>
<th>Partial η²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MANCOVA 1:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (square root)</td>
<td>.03</td>
<td>2.85</td>
<td>3</td>
<td>305</td>
<td>.04</td>
<td>.03</td>
</tr>
<tr>
<td>Direct experience</td>
<td>.01</td>
<td>0.68</td>
<td>3</td>
<td>305</td>
<td>.57</td>
<td>.01</td>
</tr>
<tr>
<td>Indirect experience</td>
<td>.14</td>
<td>7.94</td>
<td>6</td>
<td>612</td>
<td>&lt; .001</td>
<td>.07</td>
</tr>
<tr>
<td>Personal experience</td>
<td>.03</td>
<td>3.26</td>
<td>3</td>
<td>305</td>
<td>.02</td>
<td>.03</td>
</tr>
<tr>
<td>Direct x indirect</td>
<td>.03</td>
<td>1.71</td>
<td>6</td>
<td>612</td>
<td>.12</td>
<td>.02</td>
</tr>
<tr>
<td>Direct x personal</td>
<td>.01</td>
<td>0.51</td>
<td>3</td>
<td>305</td>
<td>.68</td>
<td>.01</td>
</tr>
<tr>
<td>Indirect x personal</td>
<td>.01</td>
<td>0.71</td>
<td>6</td>
<td>612</td>
<td>.64</td>
<td>.01</td>
</tr>
<tr>
<td>Direct x indirect x personal</td>
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<td>0.81</td>
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<td>612</td>
<td>.56</td>
<td>.01</td>
</tr>
<tr>
<td><strong>MANCOVA 2:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (square root)</td>
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<td>1.45</td>
<td>3</td>
<td>306</td>
<td>.23</td>
<td>.01</td>
</tr>
<tr>
<td>Direct experience</td>
<td>.01</td>
<td>1.23</td>
<td>3</td>
<td>306</td>
<td>.30</td>
<td>0.01</td>
</tr>
<tr>
<td>Indirect experience</td>
<td>.06</td>
<td>3.03</td>
<td>6</td>
<td>614</td>
<td>.01</td>
<td>.03</td>
</tr>
<tr>
<td>Personal experience</td>
<td>.04</td>
<td>4.28</td>
<td>3</td>
<td>306</td>
<td>.01</td>
<td>.04</td>
</tr>
<tr>
<td>Direct x indirect</td>
<td>.01</td>
<td>0.62</td>
<td>6</td>
<td>612</td>
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<td>.01</td>
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In-service Teachers

**Objective knowledge, perceived knowledge and global attitude.** Results for the 2 x 2 x 2 factorial MANCOVA are shown in Table 3.5. Direct experience was significantly associated with the combined DVs after controlling for teaching experience. Other main effects and the interaction effects were not significant. Teaching experience positively and significantly predicted global attitude and perceived knowledge.

Three follow-up ANCOVAs using a Bonferroni adjusted alpha of .017 for the significant multivariate main effect of direct experience were conducted. In-service teachers with low direct experience \((n = 49, M = 4.13, SE = 0.19)\) had significantly lower perceived knowledge than those with high direct experience \((n = 52, M = 4.66, SE = 0.15)\), \(F(1, 92) = 7.63, p = .007, \eta^2_p = .08\). Direct experience had no effect on objective knowledge and global attitude. Teaching experience significantly predicted global attitude, \(F(1, 92) = 6.40, p = .013, \eta^2_p = .07\), however its relationship with perceived knowledge and objective knowledge was not significant.

**Knowledge of characteristics, causes and treatments of ADHD.** Results for the second factorial MANCOVA for in-service teachers are shown in Table 3.5. The only significant results were 2 two-way interaction effects: Personal experience x indirect experience and personal experience x direct experience. Follow-up ANCOVAs using a Bonferroni adjusted alpha of .017 found that the personal experience x indirect experience interaction was significant for knowledge of causes of ADHD, \(F(1, 92) = 6.21, p = .015, \eta^2_p = .06\) (Figure 3.1). The personal experience x direct experience interaction was significant for knowledge of treatments, \(F(1, 92) = 6.16, p = .015, \eta^2_p = .06\) (Figure 3.2). Other effects were not significant.
Table 3.5

**In-Service Teachers: The Effects of Direct Experience, Indirect Experience and Personal Experience adjusted for Teaching Experience (M = 15.57) on Objective Knowledge, Perceived Knowledge and Global Attitude, (MANCOVA 1DVs) and Knowledge of Characteristics, Causes and Treatments (MANCOVA 2 DVs)**

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Simple effects analyses were conducted on the significant interaction effects.

Two ANCOVAs (alpha = .025) were used to test each level of personal experience across indirect experience and direct experience. Figure 3.1 shows that for in-service teachers
without personal experience, those with low indirect experience had significantly lower knowledge of causes than those with high indirect experience, $F(1, 63) = 6.02, p = .017, \eta_p^2 = .09$. For in-service teachers with personal experience, those with low or high levels of indirect experience showed no difference in knowledge of causes. Teaching experience did not significantly predict knowledge of causes for teachers with or without personal experience.

![Graph](image)

**Figure 3.1.** Adjusted cell means and standard errors for the interaction of personal experience and indirect experience on knowledge of causes of ADHD for in-service teachers.

Figure 3.2 shows that for in-service teachers with personal experience, low amounts of direct experience were counter-intuitively associated with significantly higher knowledge of treatments than high direct experience, $F(1, 32) = 7.01, p = .012, \eta_p^2 = .18$. For in-service teachers without personal experience, those with low and high levels of direct experience did not differ in knowledge of treatments. Teaching experience did not significantly predict knowledge of treatments for teachers with and without personal experience.
Further analyses

To enable comparison with previous literature (e.g., Barbaresi & Olsen, 1998; Jerome, et al., 1994; Jones & Chronis-Tuscano, 2008; Kos, et al., 2004) and to delineate the role of indirect experience on objective knowledge and perceived knowledge, one way ANOVAs were run on in-service teachers’ indirect experience without the covariate of teaching experience included. Results showed teachers with more indirect experience ($M = 20.95, SD = 4.58$) had significantly more objective knowledge of ADHD than those with less indirect experience ($M = 18.84, SD = 4.23$), $F(1,125) = 7.29, p = .008, \eta^2 = .06$. Similarly, in-service teachers with more indirect experience ($M = 4.58, SD = 1.12$) had significantly higher perceived knowledge than those with less indirect experience ($M = 3.90, SD = 1.24$), $F(1,125) = 10.56, p = .001, \eta^2 = .08$.

To enable comparison of current pre-service results to previous literature (e.g., Oh et al., 2010), a Pearson’s correlation was conducted on the relationship between age and attitudes toward teaching children with characteristics of ADHD, without controlling for other
types of experience. Pre-service teachers’ age (square root) was positively and significantly associated with their global attitude, \( r(322) = .12, p = .03. \)

**Discussion**

This study tested pre-service teachers’ and in-service teachers’ knowledge of ADHD and attitudes toward teaching children who express characteristics of ADHD across three different types of experience; direct experience teaching children with ADHD, personal experience with ADHD and indirect experience via exposure to information about ADHD through training or the media. The main effects for direct experience, personal experience and indirect experience are discussed first, followed by the interaction of these types of experience, and then implications for theory and practice.

**Main Effects**

**Direct experience.** For pre-service teachers, direct experience produced no differences in attitudes on any of the knowledge variables after controlling for age. Results probably reflected pre-service teachers’ lack of direct experience and thus its weak relationship with these outcomes. In contrast, for in-service teachers, direct experience was the only significant main effect after taking their teaching experience into account. Similar to Kos et al. (2004), in-service teachers with more direct experience perceived themselves as being more knowledgeable about ADHD than teachers who had low direct experience. However, unlike previous research, direct experience did not produce significant differences in objective knowledge for total scores (Kos et al., 2004; Sciutto et al., 2000), subscales (Sciutto et al., 2000; Vereb & DiPerna, 2004) or attitudes to teaching children with ADHD (Bussing et al., 2002; Ohan et al., 2011; Reid et al., 1994). Teachers who had direct experience perceived themselves as having good knowledge of ADHD, but this knowledge may not be accurate (see discussion of the interaction effects below).
**Personal experience.** Pre-service teachers who had personal experience reported significantly higher perceived knowledge and higher knowledge of causes of ADHD than those without personal experience. This suggests that personal experience may involve discussion and thinking about causes of ADHD, which aligns with attitude strength research that found personal importance motivated the seeking of information about issues that were of self-interest (Holbrook et al., 2005). For in-service teachers, the main effect of personal experience did not impact on any knowledge variables or attitudes. As discussed below, personal experience has a more complex relationship with knowledge of ADHD once teachers gain general teaching experience.

**Indirect experience.** For pre-service teachers, those with four or more instances of exposure to information about ADHD (i.e., high levels of indirect experience) had greater objective knowledge of ADHD and greater knowledge of treatments than those with low indirect experience (i.e., zero or one instance of exposure to information about ADHD). They also had higher perceived knowledge than those with less than four instances of exposure to information (i.e., medium and low indirect experience). Our pre-service results suggested that when overall and direct teaching experience was lacking, indirect experience was an important source of knowledge about ADHD. In particular, it was associated with stronger knowledge of treatments, although knowledge of treatments was low overall. Pre-service teachers’ perceived knowledge reflected this increase in objective knowledge and aligns with Kos et al. (2004), who found that training was positively associated with perceived knowledge.

For in-service teachers, the main effects for indirect experience were not significant after controlling for teaching experience. This was discrepant with previous studies that did not include such controls and that showed training increased knowledge of ADHD (e.g., Barbaresi & Olsen, 1998; Jerome, et al., 1994; Jones & Chronis-Tuscano, 2008; Kos, et al.,
Chapter 3

When the covariate and the other IVs were omitted in our analyses (see further analyses above), in-service teachers with more indirect experience reported higher objective knowledge scores and higher perceived knowledge compared to those with less indirect experience. Inclusion of the covariate and other IVs may account for the difference between our MANCOVA results and results from previous research that did not include these variables. Future research would benefit from including direct and personal experience variables and controlling for teaching experience. Our results suggest that as teachers gained more experience with children who exhibit characteristics of ADHD and other children, their indirect experience became less important in shaping their knowledge of ADHD.

Unlike Zentall and Javorsky (2007) and Oh et al. (2010), our results found indirect experience was not related to overall attitude for either the pre-service or in-service teachers. We found that global attitude was associated with broader measures of experience, such as teaching experience (see below), rather than specific types of experience, such as indirect experience.

**Interaction Effects**

None of the interaction effects were significant for pre-service teachers. For in-service teachers, personal experience interacted significantly with both indirect experience and direct experience in their effects on knowledge of causes of ADHD and knowledge of treatments of ADHD, respectively. For in-service teachers without personal experience of ADHD, those with high indirect experience knew more about causes of ADHD than those with low indirect experience. Training and self-study may compensate for lack of personal experience in regard to knowledge of causes of ADHD. In-service training programs, similar to those reported by Barbaresi and Olsen (1998) and Jones and Chronis-Tuscano (2008), which are aimed at increasing teachers’ knowledge of ADHD, in particular knowledge of its causes, are supported for teachers who do not have personal experience with ADHD.
The second significant interaction effect was between personal experience and direct experience. In-service teachers with personal experience reported teaching more than 11 children believed to have ADHD had lower knowledge of treatments than those who reported teaching ten or fewer children believed to have ADHD. These highly experienced teachers represent a knowledgeable group that should score highly on all subscales. One possible explanation for this counterintuitive result is that personal experience and direct experience may combine to interfere with accurate knowledge of treatments for ADHD. For example, if a teacher has knowledge of treatments based on personal experience, such as their own child having ADHD, and they also teach many other children with characteristics of ADHD, they may observe a variety of responses to treatments. Individual differences in treatment outcomes for ADHD are indicated by studies which show characteristics, such as socioeconomic status (Rieppi et al., 2002) and co-morbid anxiety disorder (MTA Cooperative Group, 1999b), moderate the relations between treatments and outcomes. Memories of children recently taught or who are salient in memory due to personal connections with the child, may trigger primacy and recency biases in the way information about treatments is recalled and processed (Atkinson & Shiffrin, 1968). For example, a memory of a specific child who did not respond well to medication may trigger ‘don’t know’ or incorrect responses to the knowledge items regarding the benefits of medication. Similarly, a recent or salient memory of a child for whom medication was helpful may trigger ‘don’t know’ or incorrect responses to items that state negative side effects of medication. Thus, personal and direct experience may trigger information processing biases about knowledge of treatments for ADHD, which may produce low scores on this subscale for highly experienced teachers.

Another possible explanation for the counterintuitive interaction between personal experience and direct experience relates to concerns surrounding medication of children. While medication has been shown to be one of the best treatments for ADHD (e.g., MTA
Cooperative Group, 1999a), there are also concerns about over-prescription of methylphenidate and dexamphetamines used to treat ADHD, side-effects of medication and mis-use of prescribed medication (Salmelainen, 2002; Wilens et al., 2008). Teachers with personal experience and extensive experience teaching children with characteristics of ADHD may be more aware of these concerns than those without this experience. This awareness may lead to greater ambivalence about treatments, and thus greater likelihood of responding to all-inclusive treatment items with a don’t know response, thus leading to their lower knowledge scores. Notwithstanding these methodological issues, the use of subscales to measure knowledge of ADHD is supported and shows that subscales are useful to indicate strengths and gaps in teachers’ knowledge.

**Age and the Extent of Teaching Experience**

Pre-service teachers’ age did not predict knowledge or attitudes after controlling for direct experience, personal experience and indirect experience. Our results aligned with studies that found age was unrelated to objective knowledge of ADHD (Kos, et al., 2004; Sciutto, et al., 2000), perceived knowledge (Kos, et al., 2004) and attitudes to ADHD (Rizzo & Vispoel, 1991). Results differed from Oh et al. (2010), who found pre-service teachers’ age positively predicted attitudes toward intended behaviours toward children with ADHD. When the effects of experience were not included in our analysis (see further analyses above), our results aligned with Oh et al.’s findings, in that age was positively and significantly associated with attitudes. Inclusion of direct, personal and indirect experiences is warranted in future studies, but inclusion of age is not supported.

In-service teachers’ extent of teaching experience was positively related to their attitude toward teaching children with characteristics of ADHD and their perceived knowledge of ADHD, after accounting for the effect of direct, indirect and personal
experience. Our results supported Kos et al. (2004), who used a different measure of perceived knowledge, which suggested that their finding was robust.

Overall, the pattern of results show relatively few main and interaction effects, modest effect sizes, but substantial differences in patterns between groups. Pre-service teachers’ with greater personal and indirect experiences had significantly stronger objective and perceived knowledge of ADHD. In contrast, in-service teachers’ who had greater direct experience had stronger perceived knowledge, while direct, indirect and personal experiences combined to produce differences in objective knowledge. These results have theoretical and practical utility, as discussed below, but some limitations are noteworthy.

Limitations

One of the key limitations of the study was its cross-sectional design and lack of control of individual differences. This design limits the findings to between-group differences, and thus development of knowledge and attitudes with increasing direct, indirect, personal and teaching experience can only be speculated on from the differences between groups. The nature of the variables under examination do not avail themselves to ethical manipulation, thus experiments to establish casual relationships are not practical. Longitudinal studies would control for individual differences and allow developmental statements to be made about how knowledge and attitudes form with increased experience over time.

One of the problems with analysing the data was dealing with extremely non-normal variables, especially for the extent of direct experience, that is, the item that asked participants how many children they had taught who they believed had ADHD. Because no time frame was added to this item, the scores ranged from 0 to 300 for the in-service teachers, with most teachers reporting 10 children taught and the mean being approximately 20 children. For pre-service teachers, this variable was extremely non-normal as well, with 200 participants reporting not having taught any children they believed to have ADHD. The data was not able
to be satisfactorily transformed and thus the type of analyses was limited. For example, multiple regression could have been used but was not due to its sensitivity to non-normal data (Field, 2009; Pallant, 2007). Instead, after consulting Tabachnick and Fidell (2007), the continuous data was collapsed into categories and between groups analyses were conducted. It is recommend that this item be phrased to include a time frame of 2 to 5 years for the in-service teachers to prevent the large estimates of children with ADHD taught over an entire career. For pre-service teachers, this variable is best kept dichotomous; either having taught children believed to have ADHD or not.

Pre-service teachers’ age and in-service teachers’ extent of teaching experience were used as covariates, respectively, however other demographic variables, such as primary/secondary teacher status could also have been used as a covariates.

**Theoretical and Practical Implications**

Notwithstanding the methodological limitations raised above direct, indirect and personal experiences were differentially related to pre-service and in-service teachers’ knowledge of ADHD. Thus, multi-dimensional models of attitude strength appear useful in guiding applied research in education that aims to identify teacher characteristics that may impact on outcomes for children. Our results also carry potential benefits for researchers working with multi-dimensional models of attitude strength. We applied dimensions of attitude strength to a new population of interest with a new, real-life attitude object, thereby adding to what is known of the ecological validity of this perspective. For example, results for in-service teachers showed that direct experience was associated with perceived knowledge in an applied context. When in-service teachers gained direct experience, their indirect experience became unimportant in guiding their perceived knowledge of ADHD. Our results supported findings from the attitude strength literature which found that direct experience increased other strength variables more than indirect experience (see Ajzen & Fishbein, 2000;
The present pre-service teachers’ results complemented those of in-service teachers. For pre-service teachers, indirect experience was associated with objective and perceived knowledge in the absence of direct experience, in an applied context. This supports attitude models that position indirect experience as an antecedent of strong attitudes (e.g., Eagly & Chaiken, 1998; Maio et al., 2003) and provides an example of circumstances in which indirect experience is important. These different results for pre-service and in-service teacher samples suggest that strong knowledge forms from different antecedents for populations with varying degrees of teaching experience. Future research may benefit from developing models of strong knowledge in which populations with and without teaching experience are catered for separately, or in which teaching experience is a moderator variable.

The significant relationships found in our study between personal experience and aspects of objective knowledge also add to what is known of the ecological validity for models that posit self-interest and personal involvement as antecedents of strong attitudes (e.g., Eaton et al., 2008; Holbrook et al., 2005; Thomsen et al., 1995). While replication of results is required, the significant interaction effects between in-service teachers’ direct and indirect experiences with personal experience suggest that future research on the antecedents of strong knowledge should test models that predict moderated relationships between experience variables and knowledge, and also distinguish between components of objective knowledge.

In practical terms, our results suggested it was important to provide pre-service and in-service teachers with both direct and indirect experiences so that teachers have a comprehensive knowledge of ADHD. For pre-service teachers, knowledge was associated with indirect experience, thus our results supported the provision of courses and training on ADHD at pre-service level. Post-hoc results implied that four or more instances of exposure
to information about ADHD was required to impact on objective knowledge, perceived knowledge and knowledge of treatments for ADHD. The pattern of our results for the three knowledge subscales was also informative. Training at pre-service level appeared to foster knowledge of characteristics, while pre-service teachers with personal experience had more knowledge of causes than those without personal experience. Knowledge of treatments, although stronger in pre-service teachers with more indirect experience, was poor across all groups, with participants scoring between approximately 2 to 4 out of a possible 11. Pre-service training may currently focus on exposure to information about the behavioural manifestations of ADHD in the classroom, while information about causes and treatments may not be viewed as important for teachers’ roles with children. In contrast, personal experience may involve considerable discussion of causes and thus promote retention of information about aetiology. Pre-service training courses would benefit from inclusion of all three knowledge components so that when entering their profession teachers are equipped to take on their roles with children who have ADHD.

For in-service teachers, the relationship between types of experience and knowledge subscales of ADHD became more complex. As discussed above, direct experience teaching a child with ADHD was associated with enhanced perception of knowledge, but not objective knowledge. Thus, practical experience was not enough on its own to build a comprehensive knowledge of ADHD. In-service trainers need to provide comprehensive information about ADHD and assist teachers in processing mixed or controversial information. In-service teachers with greater teaching experience held more favourable attitudes than teachers with less teaching experience, and therefore could act as mentors for less experienced staff.

**Conclusion**

The pattern of our results showed that indirect experience and personal experience were key factors associated with pre-service teachers’ knowledge of ADHD. In contrast,
teaching experience and direct experience teaching children believed to have ADHD were key factors associated with in-service teachers’ knowledge of ADHD, along with more complex relationships between their personal experience, direct experience and indirect experience. Our findings supported the use of multi-dimensional models of attitude strength to identify teacher factors (such as knowledge and different types of experience) that potentially impact on outcomes for children expressing the characteristics of ADHD. The survey nature of the study added to what is known of the ecological validity to the attitude strength literature and also had applications for teacher training, both at pre-service and in-service levels. The study highlighted the importance of indirect experience, such as university course work, as a key source of information about ADHD for pre-service teachers who by definition must lack practical experience. Thus, pre-service coursework needs to provide comprehensive information about ADHD so that as new teachers enter the classroom they are prepared for the very high likelihood of teaching a child with ADHD. Specifically, pre-service teacher training needs to provide practicums in which student teachers can observe and teach children displaying characteristics of ADHD. Additionally, pre-service course work needs to provide four or more instances of exposure to information about ADHD, with an emphasis on increasing the frequency of exposure to information about causes and treatments. At the in-service level, our results suggested that teachers’ direct, indirect and personal experience combined to form their knowledge of ADHD. In-service teachers’ attitudes were linked with their teaching experience rather than specific types of experience related to ADHD, perhaps reflecting the broad nature of overall attitudes. In-service training programs need to provide comprehensive information about ADHD and to encourage teachers to discuss their knowledge of ADHD, so that controversies and ambivalence can be recognised and attitudes toward teaching children displaying behaviours characteristic of ADHD become more favourable.
Statement of Originality

We, the PhD candidate and the candidate’s Principal Supervisor, certify that the following text, figures and diagrams are the candidate’s original work.

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Name of Candidate: Donnah Lee Anderson

Name/title of Principal Supervisor: Dr Susan E. Watt

Candidate | 14th September 2012 | Date

Principal Supervisor | 19th September 2012 | Date
Statement of Authors’ Contribution

We, the PhD candidate and the candidate’s Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate’s contribution as indicated in the Statement of Originality.

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<tr>
<td>Sue Watt: Editorial and methodological advice</td>
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<td>Bill Noble: Editorial advice</td>
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Name of Candidate: Donnah Lee Anderson

Name/title of Principal Supervisor: Dr Susan E Watt

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19th September 2012  
Date
Chapter 4: A Multi-Dimensional Model of the Origins of Attitude Certainty: Teachers’ Attitudes Toward Attention-Deficit/Hyperactivity Disorder
Abstract

This research tested and extended a laboratory-derived model of the origins of attitude certainty using a real attitude object: Teaching children with attention-deficit/hyperactivity disorder (ADHD). In Study 1, an experiment manipulated the amount of information, thought, and consistency of information delivered to pre-service teachers \((n = 224)\) with no prior experience with ADHD. Structural equation modelling (SEM) of Study 1 did not support the original model, in which relationships between attitude certainty and objective knowledge, thought and consistency were mediated by perceived knowledge, thought, and ambivalence. Instead, objective amount of information, thought, and consistency interacted in their effect on attitude certainty. Study 2 \((n = 368)\) used a survey to test whether experiences with ADHD (personal, direct and indirect) among in-service and pre-service teachers were antecedents of attitude certainty, and to test perceived accessibility as a mediator. SEM supported both these hypotheses. Perceived accessibility and perceived knowledge mediated the relationship between attitude certainty and prior experiences with ADHD, and between attitude certainty and objective knowledge. Together, the results suggest that psychological processes underlying strong attitude certainty differ according to the familiarity and personal relevance of the attitude object, and the context and stage of attitude formation.

Key words: Attention Deficit Disorder with Hyperactivity, Teacher Attitudes, Attitude Formation, Attitude Measurement, Teacher Education
A Multi-Dimensional Model of the Origins of Attitude Certainty: Teachers’ Attitudes Toward Attention-Deficit/Hyperactivity Disorder

Scenario: A recently graduated teacher noticed that one of the children in his class was more active, more impulsive and unable to concentrate as well as the other children. The teacher suspected that the child may have attention-deficit/hyperactivity disorder. During a craft lesson the teacher observed that the 6 year old boy had taken off his socks, soaked them with water and was hitting the other children with the soggy weapons. The teacher immediately felt somewhat frustrated by the child’s behaviour. Yet upon reflection, balanced against this negativity was a strong sense of enthusiasm, based on a life-long desire to be a teacher and four years of pre-service teacher training. All things considered, the new teacher felt positive about facilitating the child’s learning and had a favourable attitude toward teaching this child.

Attitudes refer to our evaluation of something, such as how much we “like a person, favour a brand or support a policy” (Tormala & Rucker, 2007, p. 469). The degree to which the teacher in the above scenario’s favourable attitude will influence his thoughts, decisions and actions, how long this favourable attitude will last and how it withstands more of the child’s disruptive behaviours will depend on the strength of the attitude. Stronger attitudes have greater influence on thought processes and behaviours, they are more durable and are more resistant to opposing viewpoints, compared with weaker attitudes (Krosnick & Petty, 1995). A large and dynamic body of theoretically based research focuses on analysing the attributes of strong attitudes and how they are formed. The present research advances this literature by extending a recent model of attitude strength (Smith, Fabrigar, Macdougall, & Weisenthal, 2008) to attitudes toward teaching children who express behaviours associated with ADHD. ADHD was chosen as the topic of this research because in the process of forming their attitudes, teachers and trainee-teachers (that is, pre-service teachers) are exposed to large amounts of multi-faceted information from various sources. How such information shapes attitude strength is the topic of this research paper.
More than 20 dimensions of attitude strength have been proposed (e.g., Raden, 1985; Scott, 1968). The various dimensions have been shown to be distinct constructs rather than reflecting a single underlying construct, thus a multidimensional model of attitude strength has been supported (Visser, Bizer, & Krosnick, 2006). Examples of these dimensions include volume of knowledge about a topic (Wood, Rhodes, & Biek, 1995), how quickly an attitude can be accessed in memory (Fazio, 1995), and the ambivalence or structural consistency of the attitude (Thompson, Zanna, & Griffin, 1995). Structural consistency refers to the configuration of favourable and unfavourable valence of information about an attitude object (Chaiken, Pomerantz, & Giner-Sorolla, 1995). That is, information may be consistently favourable or unfavourable, or it may be inconsistent and have mixed valence. Other dimensions include how certain a person is about their attitude (Gross, Holtz, & Miller, 1995), whether they have direct, or first-hand, experience with the attitude object (Fazio & Zanna, 1978) and indirect experience, that is, experience gained through secondary sources, such as the media or training courses (Eagly & Chaiken, 1998). Cognitive elaboration, or the extent of thought about the merits and limitations of an attitude object, is a dimension of strength based on the extent of information processing (Petty, Haugtvedt, & Smith, 1995).

These dimensions of attitude strength may be measured with either operative or meta-attitudinal indices (Bassili, 1996). Operative indices measure attitude strength objectively, for example, counting the number of responses on a list of thoughts to measure cognitive elaboration, or using an empirically derived questionnaire to measure knowledge of a topic. Meta-attitudinal indices measure attitude strength from a subjective perspective, for example, using Likert-scales to measure perceived thought, perceived knowledge, or perceived ambivalence.

Research has focused on how attitudes form and become strong by identifying the antecedents of attitude strength and the psychological processes of forming strong attitudes. A
growing body of research has focused on identifying the origins of attitude certainty, which refers to the level of confidence a person subjectively attaches to their attitude (Gross et al., 1995). Attitude certainty is a meta-attitudinal dimension of strength, in that it is a secondary cognition (e.g., the teacher above may be very certain that he is favourable toward teaching children with behavioural issues) attached to an initial cognition (e.g., the teacher’s attitude is favourable; Petrocelli, Tormala, & Rucker, 2007). Attitudes that are held with strong certainty impact on behaviours more strongly than those with weak certainty (Bizer, Tormala, Rucker, & Petty, 2006; Fazio & Zanna, 1978), they are more durable (Bassili, 1996) and show greater resistance to persuasion (Tormala & Petty, 2002; Wu & Shaffer, 1987). Identifying the origins of attitude certainty will provide understanding of the processes involved in forming, maintaining and changing attitudes, as well as predicting and intervening in attitudes, choices and behaviours (Tormala, Clarkson, & Henderson, 2011).

A Model of the Origins of Attitude Certainty

Smith et al. (2008) tested a multi-dimensional model of the antecedents of attitude certainty that placed subjective attitude strength dimensions as mediators of the relationships between operative dimensions of attitude strength and attitude certainty. They hypothesised that subjective appraisals of attitude strength were more proximal sources of attitude certainty than operative dimensions. Smith et al. provided psychology students with information about three departments in a hypothetical general store, such as listing the strengths and limitations of a camera department, a sporting goods department, and a gardening supply department (e.g., the department sells a limited range of products). Using a 2 x 2 x 2 design, Smith et al. manipulated the amount of information (i.e., amount of actual knowledge; high vs. low), the amount of cognitive elaboration of the information (high vs. low) and the structural consistency of the information (consistent vs. inconsistent). Smith et al. then measured the concomitant subjective attitude strength dimensions of perceived knowledge, perceived
thought and perceived ambivalence. Results showed support for a causal model, whereby subjective dimensions of attitude strength acted as mediators of relations between objective dimensions and attitude certainty (see Figure 4.1).

As shown in Figure 4.1, which shows the significant results from Smith et al. (2008) only, four full-mediational effects were found: (a) perceived knowledge mediated the relationship between amount of knowledge and attitude certainty; (b) perceived knowledge mediated the relationship between cognitive elaboration and attitude certainty; (c) perceived ambivalence mediated the relationship between structural consistency and attitude certainty; and (d) perceived ambivalence mediated the relationship between amount of knowledge and attitude certainty. One partial mediation effect was also supported: Perceived thought mediated the relationship between cognitive elaboration and attitude certainty, however the direct relationship between elaboration and attitude certainty was also significant.

Smith et al.’s (2008) results aid understanding of the psychological processes underlying attitude certainty and suggest possible reasons why attitude certainty impacts on attitude strength. For example, they show that perceived knowledge is a more proximal source of attitude certainty than actual knowledge and suggest that people who are highly certain of their attitudes may be more likely to base their behaviours on their attitudes because their high degree of perceived knowledge about the issue enables them to see the relevance of their behaviour toward the attitude object (Smith et al., 2008).

**Ecological Validity of Laboratory Derived Models**

In their seminal guide to attitude theories, Eagly and Chaiken (1993) identified a lack of research on how attitudes form and become strong. They stated that this was in part due to the restrictions of laboratory experiments, in that “emotion-arousing, value-linked, behaviour-impelling attitudes” are difficult to create in a single laboratory session (Eagly & Chaiken, 1993, p. 681). In an analysis of 217 studies that reported both laboratory and field results from
Figure 4.1. Significant paths from Smith et al.’s (2008) mediational model of relationships between strength-related variables in the formation of attitude certainty. Numbers by path coefficients represent unstandardized regression coefficients.
82 meta-analyses (Mitchell, 2012), it was reported that laboratory and field effects in social psychology had the lowest correlation ($r = .53$) compared with other sub-fields in psychology (e.g. industrial organizational psychology, $r = .89$). Within social psychology, studies on social perception and cognition had the lowest correlation between laboratory and field results of $r = .53$. Moreover, the majority of laboratory results that changed signs from positive to negative or vice versa, were from social psychology (Mitchell, 2012). These findings reinforce Eagly and Chaiken’s call for more extensive use of field research to supplement laboratory studies, and they highlight that it is difficult to know how well the results of studies, such as those by Smith et al. (2008), will generalise beyond the laboratory.

Laboratory results may differ from those in natural settings in various ways. In laboratory settings relationships between people are temporary, impression management is less likely, and information is presented remotely via written documents, videos or audio files. In comparison, in natural settings relationships are enduring and information is shared via face-to-face dialogue (Eagly & Chaiken, 1993). Laboratory settings demand a constant, high level of attention to stimuli and participants are asked to decide quickly on their attitude toward novel stimuli (Eagly & Chaiken, 1993; Tormala et al., 2011). In natural settings, attention is more variable (Eagly & Chaiken, 1993), attitudes are formed over longer time periods toward familiar attitude objects, and attitudes may be expressed repeatedly prior to being measured (Tormala et al., 2011). Self-interest or personal significance (Eaton, Majka, & Visser, 2008; Holbrook, Berent, Krosnick, Visser, & Boninger, 2005) is also more likely in natural settings than in laboratory experiments, where hypothetical attitude objects, of which participants have no prior experience or future application, are used as stimuli. It is important to test Smith et al.’s (2008) model on attitudes pertaining to real life, which may have more complexity and personal relevance than an artificial scenario (Haslam & McGarty, 2004). While attitude strength researchers, including Smith et al., have focused on identifying the
antecedents of attitude certainty (e.g., Bizer et al., 2006; Haddock, Rothman, Reber, & Schwarz, 1999; Holland, Verplanken, & van Kippenberg, 2003; Tormala et al., 2011), almost 20 years after Eagly and Chaiken’s review, there remains a lack of research in applied settings outside the laboratory.

**Extensions to Smith et al.’s (2008) Model**

Holland, Verplanken and van Knippenberg (2003) showed that when attitudes were perceived as easily recalled and readily accessible, they led to stronger attitude certainty compared to when they were perceived as difficult to access. Smith et al. (2008) suggested perceived accessibility may mediate the elaboration-attitude certainty relationship, and the structural consistency-attitude certainty relationship. To date, no published studies have tested these hypotheses.

Attitude theories have long stated that attitudes are formed either through direct experience with an attitude object (e.g., teaching a child with ADHD), or through indirect experience from other people and institutions, such as news media and education systems (Eagly & Chaiken, 1998; Maio, Olson, Bernard, & Luke, 2003). Direct experience has been found to increase attitude certainty more than indirect experience (see Ajzen & Fishbein, 2000; Fazio & Zanna, 1981; Maio et al., 2003) and Smith et al. (2008) suggested direct experience be added to their model as an antecedent of attitude certainty. Both types of experience are thought to impact on attitude certainty by influencing volume of knowledge (Tormala & Rucker, 2007). The attitude strength literature also suggests that personal significance of an attitude gives rise to stronger attitude-behaviour relations, attitude persistence and stability over time (Thomsen, Borgida, & Lavine, 1995). With approximately one in 20 children diagnosed with ADHD (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007), it is likely that teachers would know someone close to them, such as a relative or friend, who has either been diagnosed with ADHD or who they believe exhibits the
characteristics of ADHD. Teachers themselves may have been diagnosed with ADHD or believe that they exhibit its characteristics. This personal experience would be likely to evoke personal significance and strengthen attitude certainty regarding attitudes toward teaching children with characteristics of ADHD. Anderson, Watt, Noble and Shanley (2012b) found that in-service teachers’ direct experience, and pre-service teachers’ indirect and personal experiences were positively associated with their perceived knowledge of ADHD. This suggests that perceived knowledge may mediate the relations between the experience variables and attitude certainty. Perceived accessibility may also mediate these relations. If personal, direct, and indirect experiences are found to be antecedents of attitude certainty, future laboratory studies would need to devise methods to accommodate these variables.

Barden and Petty (2008) noted that causal inferences based on Smith et al.’s (2008) findings are limited because the impact of the distraction task they used to manipulate elaboration was not checked with a measure of objective elaboration. This critique can be extended to the other manipulated variables, in that measures of objective knowledge and objective ambivalence as manipulation checks were not undertaken.

**Aim and Hypotheses**

The aim of the current research was to test and extend Smith et al.’s (2008) model of attitude certainty by applying it to attitudes toward teaching children who express characteristics of ADHD using an experimental (Study 1) and a survey (Study 2) design. Both studies tested the ecological validity of Smith et al.’s model using a real and complex attitude object. Study 1’s manipulations were checked using objective measures. Study 2 extended Smith et al.’s model by adding perceived accessibility as a potential mediator and by adding direct, indirect and personal experience with ADHD as potential antecedents of attitude certainty. It was predicted that the model would produce the same significant mediated relationships as Smith et al.’s model, as shown in Figure 4.1. In addition, for study 2,
perceived accessibility was predicted to mediate the elaboration-attitude certainty and structural consistency-attitude certainty relations. Direct, indirect and personal experience with ADHD were expected to act as antecedents of attitude certainty, with perceived knowledge and perceived accessibility mediating these relationships.

**Study 1: Experiment**

**Method**

**Participants**

Two hundred and twenty four education students (42 males and 182 females, 125 trainee primary teachers and 99 trainee secondary teachers) from two Australian universities were recruited during lectures for voluntary participation. Mean age was 20.36 years ($SD = 4.86$). Inclusion criteria were that participants were enrolled in the first semester of an education degree. Exclusion criteria were prior diagnosis of ADHD, knowing someone close who had a diagnosis of ADHD, prior experience working in a school (e.g., practice teaching or teacher’s aide), or participation in courses or self-studies that provided information about ADHD. These criteria were aimed at holding prior knowledge of ADHD constant.

**Design**

The experiment was a $2 \times 2 \times 2$ between groups factorial design: Amount of knowledge (low vs. high) x structural consistency (low vs. high) x degree of elaboration (low vs. high).

**Manipulation of Independent Variables.** Amount of knowledge was manipulated by providing participants with either six statements about ADHD (low amount of knowledge) or 18 statements (high amount of knowledge). Structural consistency was manipulated by presenting information about ADHD that had consistent valence (i.e., high structural consistency consisting of either all favourable or all unfavourable statements), or inconsistent valence (i.e., low structural consistency consisting of a mixture of half favourable and half
unfavourable statements). An example of an unfavourable statement was ‘Children who have ADHD tend to make careless errors’ (West et al., 2005). An example of a favourable statement was ‘Children who have ADHD are likeable children’ (NSW DET, 1993).

Appendix E shows the statements about ADHD and Appendix F shows pre-testing analyses of the valence of the statements. To control for the valance of information influencing attitude strength outcomes in the high structural consistency condition, half of the high-consistency groups received favourable information, while the other half received unfavourable information.

The elaboration of the information was manipulated via a distraction task that was created by the first author. Participants in the low elaboration condition engaged in the concurrent distraction task under time pressure. The distraction task consisted of a five minute audio recording of a spoken list of letters and numbers. The letters and numbers were spoken approximately one second apart with approximately a 3:1 letter to number ratio. Participants were asked to count the number of letters spoken while reading the information about ADHD before the audio recording ended (i.e., five minutes). Participants in the high elaboration condition read the passage with no distraction or time pressure.

The three manipulated variables were checked using measures of objective knowledge, thought and ambivalence (see below).

Materials

Information sets. Six sets of information about ADHD were created to manipulate the amount of knowledge (low vs. high), structural consistency (low vs. high) and to control for valence of information in the high structural consistency groups (favourable vs. unfavourable information). The six sets of information contained a total of 36 statements in relation to ADHD; 18 unfavourable statements and 18 favourable statements. All statements were adapted from literature on ADHD: West, Taylor, Houghton and Hudyma (2005), 28
statements; Kos, Richdale and Jackson (2004), four statements; Kos and Richdale (2004), one statement; and New South Wales Department of Education (1993), three statements.

**Measures.** After participating in the appropriate manipulation for their group, all participants completed a 59-item questionnaire (Appendix G), consisting of five sections: Demographics, global attitude, self-reported attitude strength, open-ended measures of elaboration and ambivalence and a direct measure of knowledge of ADHD.

**Demographic items.** Five demographic items asked about participants’ sex, age, whether they were training to be a primary or secondary school teacher, which university they attended and whether they had been exposed to information about ADHD in the past 12 months.

**Global attitude.** Participants rated their overall attitude towards teaching children who have ADHD on a scale from 0 (extremely unfavourable) to 100 (extremely favourable) (Esses & Maio, 2002; Haddock & Zanna, 1998). Thermometer scales correlate highly with multiple-item measures of attitudes, such as semantic differential scales (Haddock & Zanna, 1999; Stangor, Sullivan, & Ford, 1991).

**Attitude strength.** Four attitude strength constructs were measured using multiple self-report items with 7-point Likert scales. The order of sets of items for each attitude strength dimension was varied, such that each attitude strength dimension appeared in different sequences and positions across orders.

**Perceived knowledge.** Perceived knowledge (PK) was assessed with four items which were re-phrased from Smith et al.’s (2008) study on a hypothetical store to suit attitudes toward ADHD: How much information do you feel you have about ADHD? (PK1); How well informed are you about ADHD? (PK2); How knowledgeable do you feel about ADHD? (PK3); and, If you had to write a list of everything you knew about ADHD, how long a list could you produce? (PK4). Responses ranged from 1 = Very little/Completely
uninformed/Not at all knowledgeable/Very short, to 7 = A great deal/Completely informed/Extremely knowledgeable/Very long, respectively. Cronbach’s alpha was .88. Inter-item correlations ranged from .58 to .71.

**Perceived amount of thought.** Perceived thought (PT) was assessed with three items which were re-phrased from Smith et al.’s (2008) study on a hypothetical store to suit attitudes toward ADHD: How much have you thought about ADHD? (PT1); How carefully have you thought about ADHD? (PT2); and, How much time have you spent thinking about ADHD? (PT3). Responses ranged from 1 = Never/Not at all carefully/Very little to 7 = Very often/Extremely carefully/A great deal, respectively. Cronbach’s alpha was .89, and inter-item correlations ranged from .66 to .75.

**Perceived ambivalence.** Perceived ambivalence (PAM) was measured with three items which were re-phrased from Smith et al.’s (2008) study on a hypothetical store to suit attitudes toward ADHD: When you think about ADHD to what extent are your reactions completely one-sided (i.e., positive or negative) versus mixed? (PAM1, 1 = Completely one-sided to 7 = Completely mixed); How much conflict do you experience when considering the good and bad aspects of ADHD? (PAM3, 1 = No conflict at all to 7 = Extreme conflict); and To what extent are your evaluations completely positive, mixed or completely negative? (PAM3, 1 = Completely negative to 7 = Completely positive, and a mid-point of 4 = Mixed). Consistent with Smith et al. (2008), PAM3 was recoded to range from 1-7, with higher scores representing increased ambivalence. Cronbach’s alpha was .67, and inter-item correlations ranged from .33 to .54.

**Attitude certainty.** Attitude certainty (C) was assessed with two items which were re-phrased from Smith et al.’s (2008) study on a hypothetical store to suit attitudes toward ADHD: How certain are you about your attitude toward teaching children with ADHD? (C1), and How confident do you feel that your attitude about teaching children with ADHD is
correct? (C2). Responses ranged from 1 = Not at all certain/Not at all confident to 7 = Completely certain/Very confident, respectively. Cronbach’s alpha was .85 and the two items correlated at .74.

Measures used for Manipulation checks: Objective measures of knowledge, elaboration and ambivalence. To measure objective knowledge of ADHD, West et al.’s (2005) 67-item Knowledge about Attention Deficit Disorder Questionnaire (KADD-Q) scale was shortened to 33 items (see Anderson, Watt, Noble, & Shanley, 2012a). Participants responded to each item by selecting either True, False or Don’t know. Total scores were formed by summing correct responses from 18 items that matched the information presented to participants in the experiment. Higher scores represented stronger knowledge of ADHD.

Objective measures of elaboration and the structural consistency of information were calculated from open-ended responses involving thought lists for beliefs about children with ADHD and self-rated valences (Haddock & Zanna, 1998). Participants listed up to 12 words or short phrases for stereotype beliefs and teaching beliefs. Stereotypic beliefs refer to beliefs about a group of peoples’ features, attributes and characteristics (Haddock & Zanna, 1999). For example, stereotypic beliefs about children with ADHD are that they are naughty and disruptive. Teaching beliefs refer to beliefs about how children with ADHD impact on the teaching process. A teacher may think that teaching children with ADHD is too time consuming or that teaching children with ADHD challenges them to create engaging lessons. Only the cognitive component of the attitude was measured to align with the manipulation of beliefs in Smith et al.’s (2008) study. Participants rated each word or phrase that they had written on a 5-point scale representing the valence of each listed belief. The scale ranged from very positive (++), positive (+), neutral (0), negative (-) to very negative (--).

To measure elaboration, which is the extent to which a person has thought about information relating to the attitude object (Wegener, Downing, Krosnick, & Petty, 1995), the
mean number of stereotypic beliefs and teaching beliefs was calculated from the open-ended responses. Ambivalence scores were calculated from the valence ratings using instructions from Esses and Maio (2002, pp. 86-87). A maximum score of 48 represented high ambivalence, while a minimum score of zero represented low ambivalence.

**Procedure**

The procedure was adapted from Smith et al. (2008). Education students were recruited during lectures and were told that the purpose of the study was to investigate how trainee teachers process information about children’s behaviours. Participants were randomly assigned to one of eight groups, with the four groups receiving high structural consistency of information further randomly allocated into sub-groups receiving either favourable or unfavourable information to control for valence effects.

Participants read one of the six sets of information about ADHD relevant to their experimental condition. After reading the information all participants completed the questionnaire. Participants were debriefed about the experimental design and given all 36 statements about ADHD (see Appendix E).

**Results and Discussion**

**Manipulation Checks Using Objective Measures**

**Objective knowledge of ADHD.** High vs. low amounts of information were contrasted at the high elaboration condition only. Results showed that low information produced significantly lower objective knowledge ($M = 10.14, SD = 2.50$) than high information ($M = 11.77, SD = 3.31$), $t(59.17) = -2.72, p = .009$, $\eta^2 = .11$.

**Objective elaboration.** ANOVA showed that the high elaboration condition ($M = 4.16, SD = 2.15$) produced a significantly greater number of thoughts based on the open-ended responses than the low elaboration condition ($M = 3.46, SD = 2.27$), $F(1, 222) = 5.71, p = .018$, Partial $\eta^2 = .03$. 


**Objective ambivalence.** ANOVA showed information with high structural consistency ($M = 20.40, SD = 4.44$) produced significantly lower ambivalence scores than structurally inconsistent information ($M = 22.92, SD = 3.29$), $F(1, 222) = 23.23, p < .001$, Partial $\eta^2 = .10$.

**The Effect of Amount of Information, Amount of Elaboration and Structural Consistency on Attitude Certainty**

To check that the manipulations impacted on mean attitude certainty scores, a 2 (amount of information: low vs. high) x 2 (elaboration; low vs. high) x 2 (structural consistency; low vs. high) between subjects analysis of variance (ANOVA) was conducted. There were no univariate outliers but mean attitude certainty was significantly positively skewed ($p < .001$). Square root transformation improved normality and the transformed version was used in the analyses. There were no significant differences between positive and negative valence of information, $t(221) = 0.35, p = .726, \eta^2 < .01$, or any sex effects, $F(1,222) = 0.10, p = .758, \eta^2 < .01$, on mean attitude certainty. No main effects or interaction effects were significant for order of presentation (all $p > .36$). Thus valence, order and sex effects were not included in the following analyses.

Factorial ANOVA results showed that all interaction effects and all main effects were significant at $p < .05$, except the main effect for structural consistency, $p = .477$. Follow-up simple effects analyses for the three-way interaction were conducted using MANOVA. When the amount of information was low, the interaction between elaboration and structural consistency was not significant, $F(1, 216) = 0.11, p = .73$. Simple main effects analysis showed that higher elaboration ($M = 1.67, SD = 0.25$) produced significantly greater mean attitude certainty than low levels of elaboration ($M = 1.32, SD = 0.21$), $F(1, 216) = 172.85, p < .001$. The simple main effect for structural consistency was not significant. These results
showed that elaboration impacted on mean attitude certainty even with low amounts of information.

When the amount of information was high, the elaboration x structural consistency interaction was significant, $F(1,216) = 15.07, p < .001$. Follow-up analyses revealed that at low levels of elaboration, structurally inconsistent information ($M = 1.50, SD = 0.22$) produced significantly higher mean attitude certainty than structurally consistent information ($M = 1.28, SD = 0.25$), $F(1, 216) = 11.77, p = .001$. Conversely, at high levels of elaboration, structurally inconsistent information ($M = 1.83, SD = 0.23$) produced significantly lower mean attitude certainty than structurally consistent information ($M = 1.97, SD = 0.23$), $F(1, 216) = 4.24, p = .041$.

**Structural Equation Models**

Two stage analyses of the structural equation models were conducted as recommended by Byrne (2001) and Kline (2005). Stage one involved testing the measurement model, that is, the loadings of the observed attitude strength items on the latent attitude strength variables. Stage two involved running the full structural equation model with the modified versions of the measurement model from stage one included. The model tested replicated the one tested by Smith et al. (2008). Assumptions are reported in Appendix H. Descriptive statistics and correlations among attitude strength variables are presented in Appendix I.

**Model 1.**

*Measurement model.* The measurement model tested how 12 attitude strength items loaded onto (a) perceived knowledge, (b) perceived thought, (c) perceived ambivalence, and (d) attitude certainty. As shown in Table 4.1, all fit indices showed reasonable (RMSEA) to good fit (CFI, Normed Chi Square, SRMR). The Chi Square value was significant, which indicated poor fit. Chi square is overly sensitive to sample size (Kline, 2005), thus the model was interpreted as fitting well. None of the modification indices were large (i.e., above 10)
and the model was not respecified. Table 4.2 shows the parameter estimates for the measurement model.

**Structural model and path analyses.** All fit indices, other than Chi Square, indicated good fit of the data to the model (see Table 4.1). The model (see Figure 4.2) explained 61.8% of the variance in attitude certainty. None of the indirect effects from amount of information ($p = .09$), elaboration ($p = .35$) or structural consistency ($p = .91$) to attitude certainty were significant. The direct path from amount of information to attitude certainty was significant ($\beta = 1.34$, $SE = .39$, $p = .003$), with higher amounts of information leading to greater attitude certainty. The direct effects from elaboration to attitude certainty ($p = .13$) and structural consistency to attitude certainty ($p = .18$) were not significant.

While model fit indices were reasonable, the path analyses did not support the predicted mediated relationships between the manipulated variables and attitude certainty based on Smith et al.’s (2008) results. The manipulation checks indicated that lack of support was not due to ineffective manipulations, however it should be noted that while the manipulation checks were all statistically significant, the effect size for objective elaboration was small-to-medium and the differences between means for objective knowledge were small, at only 1.63 facts between low and high knowledge conditions. The weak effect size may have impacted on the structural equation model result. For example, the small-to-medium effect size for objective elaboration may be responsible for weak statistical power and the lack of significant paths from this variable to the mediators and attitude certainty. The other effect sizes for manipulated knowledge and structural consistency were medium-to-large and thus the statistical power for these variables was good, as evidenced by the significant paths for these variables.
### Model Fit Indices for Study 1 and Study 2

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<th>χ²</th>
<th>df</th>
<th>χ²/df</th>
<th>CFI</th>
<th>SRMR</th>
<th>RMSEA</th>
<th>RMSEA 90%CI</th>
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<td>.963</td>
<td>.052</td>
<td>.070</td>
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</tbody>
</table>

*Note.* CFI, RMSEA and SRMR refer to Comparative Fit Index, Root Mean Square Error of Approximation, and the Squared Root Mean Residual respectively. These indices were selected following the recommendation of Kline (2005), and cover the main facets of fit associated with structural equation models. The CFI ranges from 0 to 1, with those above .95 suggesting good fit. For the RMSEA and SRMR a value of 0 represents perfect fit. RMSEA values below .05 indicate good fit, and values up to .10 indicate reasonable fit. SRMR values of .10 or lower are interpreted as favourable. χ²/df is the normed Chi Square and values less than 3.00 are considered reasonable. All parameters for the models were estimated using AMOS 20.00’s maximum likelihood algorithm with bootstrapped standard errors and bias corrected confidence intervals. *p<.05 **p< .01 ***p<.001
Table 4.2

*Measurement Models for the Experiment and Survey: Standardised Coefficients (β) and Unstandardised Coefficients (B), and Bootstrapped Standard Errors of B (SE)*

<table>
<thead>
<tr>
<th>Observed variable</th>
<th>Latent construct</th>
<th>Study 1: Experiment</th>
<th>Study 2: Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Model 1</td>
<td>Model 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>β</td>
<td>B</td>
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<tr>
<td>PK1</td>
<td>Perceived knowledge</td>
<td>0.88</td>
<td>1.51</td>
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<tr>
<td>PK2</td>
<td>Perceived knowledge</td>
<td>0.86</td>
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<tr>
<td>PK3</td>
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<td>PK2a</td>
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<td>PT1</td>
<td>Perceived thought</td>
<td>0.83</td>
<td>1.00</td>
</tr>
<tr>
<td>PT2</td>
<td>Perceived thought</td>
<td>0.88</td>
<td>1.04</td>
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<td>--</td>
</tr>
<tr>
<td>PT3</td>
<td>Perceived thought</td>
<td>0.84</td>
<td>0.92</td>
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<tr>
<td>PAM1</td>
<td>Perceived ambivalence</td>
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<td>--</td>
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<td>--</td>
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<td>C1</td>
<td>Attitude certainty</td>
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<td>1.00</td>
</tr>
<tr>
<td>C2</td>
<td>Attitude certainty</td>
<td>0.89</td>
<td>1.04</td>
</tr>
</tbody>
</table>

*Note.* All observed variables loaded significantly on their latent variables, *p* < .01. Abbreviations for the observed variables are shown in the Materials sections.
Model fit statistics:
\[ \chi^2(72, N = 224) = 160.55, p < .001 \]
CFI = .960, RMSEA = .074, SRMR = .0571
Note:*p < .05  **p < .01
Figure 4.2. Model 1: Structural equation model showing the mediating effects of three subjective attitude strength variables on the relationships between manipulated knowledge and attitude certainty, manipulated cognitive elaboration and attitude certainty, and manipulated ambivalence and attitude certainty. Values adjacent to single headed arrows represent unstandardized regression weights. Values in parentheses represent bootstrapped standard errors of B. Values adjacent to double headed arrows represent correlations. Dashed lines represent non-significant relationships. All significance tests based on 1000 bias corrected bootstrapped samples.
Unexpected findings from the ANOVA results conveyed an explanation of why the hypotheses were not supported. These results showed the three manipulated antecedents of attitude certainty had moderated relationships with attitude certainty, and all interaction effects were significant. In contrast, Smith et al. (2008) found only one significant interaction effect (thought x structural consistency). The simple effects results for the three-way interaction suggested that when the amount of information was high, structural consistency impacted on attitude certainty at both low and high levels of elaboration, but in opposite directions. When there were high amounts of inconsistent information and low elaboration, attitude certainty was stronger than when high amounts of information were structurally consistent.

Two previous studies on the antecedents of attitude certainty offer a potential explanation for our results. Rucker, Petty and Briñol (2008) reported that attitude certainty was stronger when participants were told that others had considered both positive and negative aspects of a message, compared to when they were presented as only having considered one side of the message. Rucker et al. suggested that two-sided messages may have been perceived as more accurate, or complete, than one-sided messages, and thus stronger attitude certainty was conferred upon them. Wan, Rucker, Tormala and Clarkson (2010) reported that consumers were more certain of their attitudes when they formed them during a task that was resource depleting than during a non-demanding task. The distraction task used in our experiment was cognitively demanding. Participants in the low elaboration condition may have superficially recognised the large amount of information and its two-sided message, but because they were unable to process the information deeply (Craik & Tulving, 1975), they used a cognitive short-cut, in which they framed the information as a lengthy two-sided message. Such framing may have led to an inference of validity and stronger attitude certainty for the two-sided message than the one sided message.
Alternatively, when participants were able to process the information in the high elaboration condition, they may have processed the ambivalence within the information more deeply and perceived themselves as less certain with structurally inconsistent information compared to consistent information.

Our results imply that when there are large amounts of information available, attitude certainty depends on both the degree of elaboration and the structural consistency of the information. When the amount of information was low, high elaboration alone produced stronger attitude certainty. Our results for high amounts of information provide an example of circumstances when structurally inconsistent information produces stronger attitude certainty than consistent information, perhaps due to distinct cognitive processes when elaboration is limited.

The significant interaction effects suggest that future research should explore more complex models, such as mediated moderation or moderated mediation effects. For example, mediated moderation (Hayes, 2009) would occur if the amount of information about ADHD (X) interacts with amount of elaboration about that information (W) and then affects attitude certainty (Y) through perceived knowledge (M). Alternatively, moderated mediation (Hayes, 2009) may occur if, for example, the effect of structural consistency of information (X) on attitude certainty (Y) is mediated by perceived ambivalence (M), but is only significant when elaboration is high (W_1), and not when elaboration is low (W_2). If such relations were found this would offer a potential explanation for the present non-significant mediation results.

In order to test moderated relationships or more complex models, very large samples would be required for reliable results (Kline, 2005). The present sample was too small to attempt these analyses. Future research could explore models where the products (i.e., interaction effects) of the three manipulated variables are additional antecedent variables that have indirect paths to attitude certainty through the subjective attitude strength mediators.
Such research would clarify understanding of how strong attitude certainty forms and would enhance prediction and intervention in regard to attitudes, choices and behaviours (Tormala et al., 2011).

**Study 2: Survey of Pre-service and In-service Teachers**

Study 2 first tested Smith et al.’s (2008) model using a survey to supplement the laboratory research (Model 1). It then extended Smith et al. by adding perceived accessibility as a mediator variable, and direct experience, indirect experience and personal experience, as antecedents of attitude certainty (Model 2).

**Method**

**Participants**

**In-service teachers.** One hundred and twenty seven teachers (35 males and 92 females; 64 primary teachers and 61 secondary teachers, 2 scores missing) employed in government schools in regional New South Wales (NSW), Australia, voluntarily completed an online survey. Of the teachers who entered the survey website, 78.3% completed it. Teachers’ mean age was 41.04 years ($SD = 10.65$) and the mean duration of teaching experience was 15.75 years ($SD = 10.78$).

**Pre-service teachers.** Three hundred and twenty seven education students (59 males; 268 females, 198 primary teachers; 128 secondary teachers) from two regional universities in NSW, Australia, voluntarily completed an online survey. Their mean age was 30.44 years ($SD = 10.43$). Of the pre-service teachers who entered the website for the survey, 73.7% completed it.

**Materials and Design**

To apply Smith et al.’s (2008) model to the survey design the antecedents of attitude certainty, that is, the amount of knowledge, elaboration and ambivalence, were measured instead of manipulated. In addition, experiences with ADHD (i.e., direct experience teaching
a child with ADHD, indirect experience via study or media exposure on ADHD, and personal experience with ADHD) were also measured. All participants completed an online survey consisting of an information page and seven sections presented in the following order.

**Demographic items.** Both pre-service and in-service versions of the questionnaire (Appendix B and C, respectively) asked about participants’ sex, age, participation in courses that covered information about ADHD, exposure to information about ADHD in the last 12 months, and primary/secondary education status. The pre-service questionnaire asked which university was attended and how many semesters of study were completed. The in-service questionnaire asked what school year/s was/were currently taught, whether employment was full-time, part-time or casual, previous experience teaching a special education class and completion of in-service training on ADHD. Two items asked whether participants had experience teaching a child they believed to have ADHD and how many children they had taught who they believed had ADHD. Total scores for indirect experience were formed by summing the responses measuring exposure to information about ADHD in the last 12 months and during university or in-service training (range 0 - 12 instances of exposure to information about ADHD). Direct experience was measured by the number of children taught who were believed to have ADHD.

**Attitude strength.** Measures of perceived knowledge, perceived elaboration, perceived ambivalence, attitude certainty, global attitude and objective measures of knowledge, elaboration and ambivalence were the same as Study 1. Perceived accessibility (PAC) was measured using two items adapted from Wegener, Downing, Krosnick and Petty (1995) to suit ADHD: How easily does your attitude about ADHD come to mind? (PAC1), and How quickly does your attitude about ADHD come to mind? (PAC2). Responses ranged from 1 = Extremely difficult/Extremely slowly, to 7 = Extremely easily/Extremely quickly, respectively. Table 4.3 shows the internal consistency of the subjective items.
Table 4.3

Reliability Statistics for Subjective Attitude Strength Variables for Surveys of Pre-Service and In-Service Teachers

<table>
<thead>
<tr>
<th>Attitude strength variable</th>
<th>Cronbach’s alpha</th>
<th>Inter-item correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-service</td>
<td>In-service</td>
</tr>
<tr>
<td>Perceived knowledge</td>
<td>.96</td>
<td>.95</td>
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<tr>
<td>Perceived thought</td>
<td>.94</td>
<td>.92</td>
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<tr>
<td>Perceived ambivalence</td>
<td>.63</td>
<td>.65</td>
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<tr>
<td>Attitude certainty</td>
<td>.84</td>
<td>.83</td>
</tr>
<tr>
<td>Perceived accessibility</td>
<td>.88</td>
<td>.89</td>
</tr>
</tbody>
</table>

**Personal experience.** Four items asked about personal experience with ADHD; ‘Do you believe that you have ADHD?’; ‘Have you been diagnosed with ADHD?’; ‘Do you believe that anyone close to you has ADHD (such as your own child, a sibling, partner, parent, friend or work colleague)?’, and ‘Has anyone close to you been diagnosed with ADHD?’. Possible responses were ‘Yes’, ‘No’ or ‘Unsure’. Total scores for personal experience summed the ‘Yes’ responses, with a range from four (high experience) to zero (no experience).

**Procedure**

Ethics approval was acquired from the university Human Research Ethics Committee (HREC) and the NSW State Education Research Approval Process (SERAP).

**In-service teachers.** Schools were selected to include a range of school sizes (one to over 100 teachers) and to include a range of coastal, inland, rural and urban schools. Ten secondary school principals and 20 primary school principals were contacted via both telephone and email in each of the North Coast and New England regions of NSW. Five secondary schools and 15 primary schools from the North Coast region, and five secondary
schools and eight primary schools from the New England region agreed to participate.

Principals sent an email that contained a hyperlink to the in-service version of the survey to all teachers at their schools. The total number of teachers at schools who were invited to participate was estimated to be 1228, thus the response rate for in-service teachers was 10.3%.

**Pre-service teachers.** Education heads of schools at the two universities were asked for permission to recruit education students via email. The email contained a hyperlink to the pre-service version of the online survey. Seventy four percent of pre-service teachers who entered the website for the survey completed it.

In in-service and pre-service surveys, participants opened the hyperlink and read two information pages. If they agreed to continue, participants completed the seven remaining sections of the questionnaire, which took approximately 45 minutes. Submission of responses was taken as consent. Participating school principals and individual pre-service teachers were offered a summary of key results.

**Results and Discussion**

Two structural equation models were tested on the survey data. Model 1 tested Smith et al.’s (2008) model on a pre-service teacher sample for comparison with Study 1. Model 2 extended Smith et al.’s model by adding perceived accessibility and three types of experience (direct, indirect and personal) as observed exogenous variables. Model 2 was tested using pre-service and in-service teachers’ data, as this model required participants with experience teaching children with characteristics of ADHD and there were insufficient numbers of in-service teachers to test them separately from the pre-service teachers. Assumption tests are reported in Appendix H. Descriptive statistics and correlations between all variables for Model 1 and Model 2 are displayed in Appendix J.

**Structural Equation Analyses**

**Model 1.**
**Measurement model.** Eleven attitude strength items loaded onto four latent attitude strength constructs; (a) perceived knowledge, (b) perceived thought, (c) perceived ambivalence, and (d) attitude certainty. The initial model fit was poor as indicated from all indices, except the CFI, which was above .95 (see Table 4.1). The largest modification index (MI = 18.39) indicated that the item PT2 cross-loaded positively onto attitude certainty as well as its intended latent construct of perceived thought. As it made sense that careful thought would be positively associated with attitude certainty, PT2 was freely estimated in the revised model. The revised model improved all fit indices ($\chi^2\Delta = 31.75$, $p < .001$), and all but the Chi Square value indicated a reasonable to good fit (see Table 4.1). Table 4.2 shows the parameter estimates for the measurement model.

**Structural model and path analyses.** All model fit indices, except the Chi Square value, indicated reasonable to good fit (see Table 4.1). None of the modification indices related to the structural model. The results for Model 1, which explained 52.30% of the variance in attitude certainty, are depicted in Figure 4.3.

The overall indirect path from objective knowledge through the subjective attitude strength variables to attitude certainty was significant ($\beta = .25$, $SE = .05$, $p = .003$), with participants who had stronger knowledge reporting stronger attitude certainty. Sobel tests were conducted on individual indirect paths with bootstrapped standard errors (Preacher & Hayes, 2004). The indirect path through perceived knowledge was significant ($z = 4.11$, $SE = .01$, $p < .001$), but indirect paths for perceived thought and perceived ambivalence were not significant, $p > .05$. As the direct path from objective knowledge to attitude certainty was not significant, perceived knowledge fully mediated the relationship between objective knowledge and attitude certainty.
Chapter 4

Objective elaboration

Objective knowledge

Perceived knowledge $R^2 = .27^{**}$

Perceived thought $R^2 = .14^{**}$

Perceived ambivalence $R^2 = .04^{**}$

Attitude certainty $R^2 = .52^{**}$

Model fit statistics:

$\chi^2 (58, N = 269) = 113.17, p < .001$

$CFI = .98, RMSEA = .06, SRMR = .05$

Note: *$p < .05$ **$p < .01$
Figure 4.3. Study 2: Structural equation model showing the mediating effects of three subjective attitude strength variables on the relationships between objective knowledge and attitude certainty, objective cognitive elaboration and attitude certainty, and objective ambivalence and attitude certainty. Values adjacent to single headed arrows represent unstandardized regression weights. Values in parentheses represent bootstrapped standard errors of B. Values adjacent to double headed arrows represent correlations and their bootstrapped standard errors. Dashed lines represent non-significant relationships. All significance tests based on 1000 bias corrected bootstrapped samples.
The overall indirect path from objective elaboration to attitude certainty was significant, ($\beta = .12$, $SE = .04$, $p = .002$). None of the individual indirect paths, or the direct path, from objective elaboration to attitude certainty were significant, $p > .05$. Thus, there are no direct or mediated relationships between elaboration and attitude certainty.

The overall indirect path from objective ambivalence to attitude certainty was not significant, ($\beta = .05$, $SE = .05$, $p = .394$). The only individual indirect path that was significant was from objective ambivalence through perceived knowledge to attitude certainty ($z = 2.45$, $SE < .01$, $p = .010$). The direct path from objective ambivalence to attitude certainty was significant ($\beta = .12$, $SE = .06$, $p = .02$), therefore perceived knowledge partially mediated the relationship between objective ambivalence and attitude certainty. The direct path from perceived ambivalence to attitude certainty was also significant, ($\beta = -.37$, $SE = .09$, $p = .002$).

**Model 2: Perceived accessibility and experience variables.**

**Measurement model.**

Thirteen attitude strength items loaded onto five latent attitude strength constructs; (a) perceived knowledge, (b) perceived thought, (c) perceived ambivalence, (d) attitude certainty, and (e) perceived accessibility. Most model fit indices indicated good (Normed Chi Square, CFI, SRMR) to reasonable (RMSEA) fit. Model parameters are shown in Table 4.2.

**Structural model and path analyses.** All fit indices other than Chi Square showed the data fitted the model well (see Table 4.1). None of the modification indices related to any structural components of the model and no changes were made. Model 2 is displayed as Table 4.4 to assist ease of reading as the large number of paths was cluttered in diagram format. The overall model explained 72.3% of the variance in attitude certainty.
Table 4.4

**Model 2 Survey Data: Maximum Likelihood Parameter Estimates for a Structural Equation Model Showing the Mediating Effects of Four Subjective Attitude Strength Variables on the Relationships Between Six Exogenous Variables and Attitude Certainty**

<table>
<thead>
<tr>
<th>Exogenous variables</th>
<th>Potential Mediating Variables</th>
<th>Endogenous Variable</th>
<th>Direct effects</th>
<th>B</th>
<th>β</th>
<th>SE</th>
<th>B</th>
</tr>
</thead>
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<td>Perceived knowledge</td>
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<td></td>
<td></td>
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<tr>
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<td>.04</td>
<td>.22**</td>
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<td>.27**</td>
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<td>.31</td>
<td>.19**</td>
<td>.07</td>
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<tr>
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<td>.10</td>
<td>.36**</td>
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<td>.01</td>
<td>.03</td>
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<tr>
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<td>.01</td>
<td>.07</td>
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<tr>
<td>Perceived thought</td>
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<td>-.02</td>
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Note. *$p < .05$, **$p < .01$. $SE$ $B$ are bootstrapped values.

The overall indirect paths from objective knowledge ($\beta = 0.25, SE = 0.04, p = .002$), objective elaboration ($\beta = 0.09, SE = 0.04, p = .016$), direct experience ($\beta = 0.18, SE = 0.04, p = .002$), indirect experience ($\beta = 0.12, SE = 0.04, p = .004$) and personal experience ($\beta = 0.10, SE = 0.04, p = .009$) through the four subjective attitude strength variables to attitude certainty were significant. Sobel’s tests (Preacher & Hayes, 2004) with bootstrapped standard errors showed the paths from objective knowledge ($z = 3.83, SE = 0.01, p < .001$), direct experience ($z = 3.32, SE < 0.01, p < .001$), indirect experience ($z = 3.33, SE = 0.01, p < .001$), and personal experience ($z = 3.09, SE = 0.03, p = .002$) through perceived knowledge to attitude certainty.
were significant. The direct path from direct experience to attitude certainty was significant ($\beta = 0.09, SE = .04, p = .007$). Thus, perceived knowledge fully mediated the objective knowledge-attitude certainty, indirect experience-attitude certainty and personal experience-attitude certainty relationships, but only partially mediated the direct experience-attitude certainty relationship.

The indirect paths from objective knowledge ($z = 4.08, SE = 0.01, p < .001$), objective elaboration ($z = 1.95, SE = 0.01, p = .050$), direct experience ($z = 2.80, SE = 0.01, p = .005$), and indirect experience ($z = 1.97, SE = 0.01, p = .049$) through perceived accessibility to attitude certainty were also significant. Perceived accessibility fully mediated the objective knowledge-attitude certainty, objective elaboration-attitude certainty, and indirect experience-attitude certainty relationships, but only partially mediated the relationship between direct experience and attitude certainty. All other individual indirect paths from exogenous variables to attitude certainty were not significant. The direct path between objective ambivalence and attitude certainty was significant ($\beta = 0.08, SE = .04, p = .028$).

**Moderated Multiple Regression**

Because the Study 1 results showed significant interaction effects between the exogenous variables on attitude certainty, a hierarchical multiple regression analysis was run to test for moderation effects in the survey data (pre-service teachers only). Main effects were entered at step 1 and they significantly predicted attitude certainty, $R = .36, R^2 = .13, F(3, 262) = 13.15, p < .001$. Addition of the two-way interactions at step 2, and the three-way interaction at step 3, did not significantly change $F$, ($p = .918$ and $p = .258$, respectively). None of the interaction effects were significant, thus no moderator effects were found.

The survey results partially support the predicted models of mediated relations between antecedents of attitude certainty through subjective attitude strength variables to attitude certainty. As predicted, and in support of Smith et al. (2008), perceived knowledge
fully mediated the relations between objective knowledge and attitude certainty in Models 1 and 2. Other predictions based on Smith et al.’s results were not supported. Unlike Study 1, no moderation effects were found.

In support of our hypothesis and Smith et al.’s (2008) conjecture, perceived accessibility fully mediated the objective elaboration-attitude certainty relationship. Stronger objective elaboration was associated with stronger perceived accessibility, which in turn was associated with stronger attitude certainty. Unlike Smith et al.’s results, perceived thought did not act as a mediator variable, suggesting that the process of forming strong attitude certainty is acquired through perceived accessibility rather than perceived thought. Our survey results extend ecological validity to Holland et al.’s (2003) laboratory results, which showed that when attitudes were perceived as readily accessible, they led to stronger attitude certainty. Our results also showed that perceived accessibility fully mediated the objective knowledge-attitude certainty relationship and the indirect experience-attitude certainty relationship, and partially mediated the direct experience-attitude certainty relationship. Having more training in ADHD, having taught more children believed to have ADHD, knowing more facts about ADHD and thinking more about that information, were all associated with stronger perceived accessibility, which was positively associated with attitude certainty.

One of the most important findings was that Model 2 supported the addition of experience variables as antecedents of attitude certainty. The increase in variance explained in attitude certainty between Models 1 and 2 was 20%, and all of the experience variables were significant antecedents of attitude certainty. The present results extend direct experience, indirect experience (Eagly & Chaiken, 1998; Maio et al., 2003), and personal involvement (Thomsen et al., 1995) to a new population and add to generalisation of these constructs. Previous authors suggested indirect and direct experience impact on attitude certainty via knowledge volume (Tormala & Rucker, 2007). Our results demonstrate that perceived
knowledge and perceived accessibility act as mediators between the experience variables and attitude certainty.

Unexpected results were that the direct path from objective ambivalence to attitude certainty was significant (Models 1 and 2) and that perceived knowledge partially mediated this relationship (Model 1). Those with stronger objective ambivalence also had stronger attitude certainty. This result was similar to the simple effects results in Study 1, whereby structural inconsistency led to stronger attitude certainty than consistent information when elaboration of large amounts of information was prevented. As suggested above in the discussion for Study 1, structural complexity may have been inferred as completeness or accuracy of information, which then conferred stronger attitude certainty (Rucker et al., 2008).

**General Discussion**

The present research adds to the literature on the antecedents of attitude certainty. Study 1’s results did not support the hypothesised model, which was based on Smith et al.’s (2008) findings. Instead of mediated relationships between antecedent variables and attitude certainty, our results from Study 1 found moderated relationships. In contrast, Study 2’s survey results found support for mediation effects and no evidence of moderation. These discrepant results echo Mitchell’s (2012) meta-analysis findings, which found that laboratory and field effects in social psychology had the lowest correlation when compared with other sub-fields in psychology.

**Study 1’s Experimental Results vs. Smith et al. (2008)**

Our results may differ from Smith et al. (2008) due to differences between hypothetical attitude objects and real-life attitude objects. Attitudes pertaining to real objects often have more complexity and personal relevance than an artificial scenario (Haslam & McGarty, 2004). Greater personal importance has been shown to promote attention,
elaboration and memory for relevant information in laboratory conditions (Eaton et al., 2008; Holbrook et al., 2005). During data collection for Study 1, pre-service teachers asked about strategies for teaching children with ADHD during their first practice teaching session in schools, a topic that has high personal significance for teachers. On the other hand, Smith et al.’s hypothetical department store would be unlikely to have consequences for participants’ lives outside of the laboratory. Thus, personal significance of the ADHD topic for pre-service teachers may have motivated attentional and elaborative differences in the present study compared with Smith et al.’s study, and may account for differences between the two sets of results.

ADHD is a topic with unresolved controversies, such as concern about over-use and abuse of medication, the side-effects of medication, individual differences in responses to treatment, and lack of firm conclusions about aetiology (Salmelainen, 2002; Wilens et al., 2008). It is unlikely that hypothetical attitude objects have such complexity and emotive aspects. Research has shown that people are not good at predicting emotions from hypothetical situations (Wilson & Gilbert, 2005), thus hypothetical scenarios may not be good substitutes for real-world attitude objects that have affective elements. Attitudes formed by psychology students in response to hypothetical attitude objects are more likely to emphasise cognitive processes (Sears, 1986), such as abstract thinking (Ledgerwood & Callahan, 2012) and complex inferential thinking, while responses for attitude objects of personal significance are likely to also draw on immediate emotional responses (Harmon-Jones, Peterson, & Harris, 2009).

The personal relevance and structural complexity of attitudes towards teaching children with characteristics of ADHD could lead to the complex interaction effects observed in the Study 1 results. With complex attitude objects of personal relevance, attitude certainty reported under controlled laboratory settings could depend on combinations of antecedent
variables working through moderated mediation or mediated moderation, as described above. With simpler hypothetical attitude objects that have little personal relevance or emotive content, the relationships could be mediated, as supported by Smith et al.’s (2008) results.

**Study 2’s Survey Results vs. Study 1’s Experimental Results**

The samples in our experiment and survey were sourced from teachers at different stages of their careers. The sample in the survey included pre-service teachers (Model 1) and in-service teachers (Model 2) with teaching experience as well as direct, personal and indirect experiences with ADHD, whereas the experiment sampled only first year education students who were screened for lack of such experiences. Results from Model 2 suggest that direct, indirect and personal experiences are antecedents of attitude certainty, and thus participants’ different levels of prior experience across studies may be a factor that accounts for the moderated vs. mediated findings of the two studies.

In Study 1, the topic was novel for this sample and participants were required to respond quickly based on the information provided. In contrast, survey participants were familiar with the topic, attitudes were formed over longer time periods in natural settings, and they would be likely to have been expressed repeatedly prior to being measured (Tormala et al., 2011). These differences in attentional and social processes, familiarity with the attitude object, and stage of formation vs. expression of attitudes could conceivably explain the different results between the two studies.

The discrepancies between the present findings and Smith et al.’s (2008) findings, coupled with the different results between Study 1 and Study 2, imply that different psychological processes may be relevant for each circumstance. Thus, models of attitude formation should differentiate between participants’ prior experiences and self-interest pertaining to the attitude object. In circumstances where there was low self-interest for a hypothetical attitude object (e.g., Smith et al., 2008), and circumstances where self-interest
was apparent but attitudes were constructed and expressed over time in natural settings (e.g., Study 2), mediated relationships were found. However, when self-interest was evident for unfamiliar, multi-faceted attitude objects, and where attitudes were formed on demand in laboratory conditions (e.g., Study 1), moderated relationships were found. Thus, whether the attitude object is hypothetical, novel but real, or familiar and real, plus the stage and conditions of attitude formation (i.e., elicited in the laboratory vs. formed over time in natural settings) are likely to impact differentially on the nature of the psychological processes underlying the formation of strong attitudes.

**Limitations and future research**

**Design limitations.** Study 1 was an experiment with a factorial design in which the three independent variables, amount of information, thought and structural consistency, were manipulated. A strength of this study was that these manipulations were checked using objective measures of knowledge, thought and ambivalence. While this design allowed for causal statements to be made about the direct relations between the manipulated variables and the outcome variables, which in this case were the mediator variables of perceived knowledge, perceived thought, and perceived ambivalence, as well as the endogenous variable, attitude certainty, the design does not manipulate the mediator variables themselves, and as such causal statements cannot be made about their relationships with attitude certainty. The relationships between the mediator variables and attitude certainty remain limited to discussion of an association rather than a causal relationship. It would be beneficial in future research to design such manipulations so that all of the paths in the model can demonstrate casual relations with attitude certainty.

Study 2 was a survey of pre-service and in-service teacher samples. Its main limitation was its cross-sectional, between groups design, which limits discussion of the development of attitudes as individual differences were not controlled. In future, longitudinal studies could
follow individual trainee teachers over time throughout their degree and into employment as an in-service teacher. A longitudinal design would allow greater understanding of how knowledge of ADHD and attitudes toward teaching children who demonstrate its characteristics unfold.

**Measurement of objective ambivalence.** In Study 2, the direct paths from objective ambivalence to attitude certainty and the direct path from perceived ambivalence to attitude certainty were significant, but the paths from objective ambivalence to perceived ambivalence were not significant. These results suggested perceived ambivalence and objective ambivalence were distinct antecedents of attitude certainty, however, methodological limitations offer an alternative explanation. The measure of perceived ambivalence may access broader aspects of ambivalence than its objective counterpart. The objective measure was based only on conflicted beliefs so that it aligned with manipulation of structural consistency of beliefs in Study 1 and Smith et al. (2008). That is, it measured the cognitive component of ambivalence. In comparison, the indicators of perceived ambivalence may evoke awareness of affective and behavioural conflict as well as cognition (see Esses & Maio, 2002). This limitation may also explain why our hypothesis that perceived accessibility would mediate the objective ambivalence-attitude certainty relationship was not supported. The cognitive focus of the objective ambivalence measure may not relate to perceived accessibility, because it may capture cognitive, affective and/or behavioural aspects of an attitude, such as perceiving that recall is difficult when the components of an attitude are in conflict. In future research, objective scores for ambivalence may be improved by including affective and behavioural components as well as cognition (see Esses & Maio, 2002).

**Measurement of attitude certainty.** The present study measured attitude certainty using a single factor structure to enable replication of Smith et al.’s (2008) model. Petrocelli et al. (2007) found support for two factors of attitude certainty: Attitude clarity and attitude...
correctness. Attitude clarity refers to ‘the subjective sense that one knows what one’s attitude is’ (Petrocelli et al., 2007, p.31), and attitude correctness refers to ‘the subjective sense that one’s attitude is correct’ (Petrocelli et al., 2007, p.31). The antecedents of attitude certainty are likely to impact on clarity and correctness in distinct ways. For example, structural consistency is likely to impact on attitude clarity but not attitude correctness. In contrast, correctness could be impacted by other antecedents, such as social context. Visser and Mirabile (2004) suggested that social networks in which people’s attitudes were similar would be likely to produce strong attitude certainty, while networks in which attitudes were socially heterogeneous would be likely to produce weak attitude certainty. Attitude correctness is likely to be influenced by comparison to others’ attitudes, while attitude clarity is likely to depend on structural consistency. Petrocelli et al. provide suggestions for measuring clarity and correctness that future researchers may find useful.

Practical Implications

Study 1. The experiment results have implications for teacher trainers at pre-service level. The results show the amount of information provided about teaching children with ADHD, the extent of cognitive elaboration of that information, and its structural consistency, all interact and impact on attitude certainty. Considering the unresolved controversies in the literature surrounding ADHD (e.g., Salmelainen, 2002; Wilens et al., 2008) it is likely that pre-service teachers will be exposed to information that is structurally inconsistent. Teacher trainers need to ensure that education students have access to comprehensive, empirically sound information about ADHD. To achieve this, the amount of information needs to be substantial and learning experiences need to allow deep cognitive elaboration of the information. For example, discussion lessons, whereby different viewpoints can be raised and discussed at length, or written essays that involve development of an argument that debates
controversies in the literature, may be useful learning experiences that foster deep cognitive elaboration.

**Study 2.** The literature in education has found positive relationships between both direct experience (Kos et al., 2004; Sciutto, Terjesen, & Bender Frank, 2000) and indirect experience (Barbaresi & Olsen, 1998; Jerome, Gordon, & Hustler, 1994; Jones & Chronis-Tuscano, 2008; Kos et al., 2004; Vereb & DiPerna, 2004) with objective knowledge of ADHD and perceived knowledge of ADHD (Kos et al., 2004). Our results for Model 2 suggest one likely consequence of these relationships is stronger attitude certainty toward teaching children with characteristics of ADHD. Stronger attitude certainty is likely to lead to teachers’ behaviours that are consistent with their attitude (Bizer et al., 2006; Fazio & Zanna, 1978), attitudes that are not amenable to persuasion (Tormala & Petty, 2002; Wu & Shaffer, 1987) and are more durable over time (Bassili, 1996). Consistency in pedagogical practices and behavioural management strategies are likely outcomes of strong attitude certainty. The results of Model 2 imply that teacher trainers should provide favourable direct experiences, such as exposure to positive interactions with children diagnosed with ADHD during practicums, and favourable indirect experiences, such as provision of information about how to manage dysfunctional behaviours and facilitate learning for children diagnosed with ADHD. These experiences would foster strong and favourable attitudes and have beneficial consequences for children. Teacher trainers should acknowledge that education students and teachers who have personal experience with ADHD are likely to already perceive their knowledge about ADHD to be high and to already have formed strong attitudes. These teachers may be useful mentors for less experienced teachers.

**Conclusion**

The present research tested a laboratory model of the origins of attitude certainty (Smith et al., 2008) in an applied setting using both laboratory and field settings. It addressed
a gap in external validation of this model. Previous research which found attitude strength was influenced by social context (Festinger, 1954; Petrocelli et al., 2007; Visser & Mirabile, 2004), attentional processes (Tormala et al., 2011; Tormala & Rucker, 2007) and self-interest (Eaton et al., 2008; Holbrook et al., 2005) offered potential explanations for why our results differed across studies. The present results suggest that the psychological processes underlying strong attitudes differ according to familiarity with the attitude object, personal relevance of the attitude, and the context and stage of attitude formation. When there was low self-interest for a hypothetical attitude object (e.g., Smith et al., 2008), or when self-interest was apparent but attitudes were already established in natural settings (Study 2), then mediated relationships were found. However, when self-interest was evident for unfamiliar attitude objects and where attitudes were formed on demand in laboratory conditions (Study 1), moderated relationships were found. The present research adds to Mitchell’s (2012) findings on the ecological validity of psychological models across research paradigms and demonstrates the importance of testing attitude strength models on a variety of samples and populations using a range of research settings and attitude objects. The role of different types of experience as antecedents of attitude certainty, such as direct experience, indirect experience and personal experience, warrants further study. Similarly, perceived knowledge and perceived accessibility, appear to be mediators of objective attitude strength variables and attitude certainty. Their role in complex models that include moderated mediation or mediated moderation should be tested in future research that utilises large samples. Such research will develop models of attitude certainty that aid understanding of how attitudes are formed and become strong in laboratory and applied settings. Once these models are developed they will have practical application in settings such as schools. The child who was throwing the wet socks in the vignette at the beginning of this article was exhibiting the key characteristics of ADHD; hyperactivity, inattention and impulsivity. If researchers develop reliable and valid
models of how attitude certainty forms, then teacher trainers, school psychologists and others can assist teachers like the one in the vignette to develop favourable attitudes toward teaching children who express characteristics of ADHD that are durable, resistant to persuasion and that manifest as consistent behaviours towards the children in the classroom.
Statement of Originality

We, the PhD candidate and the candidate’s Principal Supervisor, certify that the following text, figures and diagrams are the candidate’s original work.

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Name of Candidate: Donnah Lee Anderson

Name/title of Principal Supervisor: Dr Susan E. Watt

Candidate

14th September 2012

Date

Principal Supervisor

19th September 2012

Date
**Statement of Authors’ Contribution**

We, the PhD candidate and the candidate’s Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate’s contribution as indicated in the *Statement of Originality*.

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Chapter 5: Summary and Conclusion
**Summary and Conclusion**

The research program reported in the previous chapters systematically investigated the formation of teachers’ knowledge of ADHD and attitudes towards teaching children with characteristics of this disorder. Children with characteristics of ADHD are challenging to teach because they cause disruption in the classroom, have problems interacting with their peers, and often have other problems such as learning disorders, anxiety, depression and other developmental disorders (Ohan, Visser, Strain, & Allen, 2011). Teacher training courses, the media, classroom experience, and personal experience with ADHD, provide teachers with numerous sources of anecdotal evidence and more formal information about the causes, treatments and characteristics of ADHD. This results in many inconsistencies in information and demonstrates the complexity of attitude formation. To address the issue of how these complex attitudes develop, the present research used models of attitude content, structure and strength to investigate the formation of teachers’ knowledge and attitudes regarding ADHD. It also applied a model of the formation of attitude certainty (Smith, Fabrigar, MacDougall & Wiesenthal, 2008) that was initially developed using hypothetical attitude objects, to a real and personally relevant attitude object, that is, attitudes toward teaching children who express the characteristics of ADHD.

The present research found that teachers’ knowledge and attitudes develop during pre-service training, and also continue to change with increased classroom experience. While knowledge of ADHD generally increased with teaching experience, in some instances more experience was associated with weaker knowledge and more ambivalent attitudes. For example, teachers with more experience teaching children who express characteristics of ADHD and more personal experience, had weaker knowledge of treatments for ADHD than teachers with less experience. Strong attitudes were shown to develop via combinations of direct, indirect and personal experiences with ADHD, as well as the amount and structural
consistency of information and amount of thought about ADHD. The overall findings highlight the need to investigate such complex attitudes in ecologically valid ways.

In this final chapter, the broad aims, specific research objectives and key findings are revisited. The implications of the present results for attitude models, future research in education, and practice within education settings are discussed. The chapter concludes with discussion of how the present results and models may be usefully applied to broader contemporary social issues and other complex, multifaceted attitude objects.

Aims

The first aim was to provide a theoretical basis for applied research in the area of attitudes toward teaching children who exhibit the characteristics of ADHD. This would enable description of the content, structure and strength of pre-service and in-service teachers’ knowledge of and attitudes to ADHD, and how these features change with increased teaching experience. The second aim was to test the ecological validity of a multi-dimensional model of how attitudes form and become strong and to extend the model’s scope. Specifically, Smith et al.’s (2008) model of the antecedents of attitude certainty was applied to laboratory and field studies of in-service and pre-service teachers’ attitudes to teaching children with characteristics of ADHD. Six research objectives stemmed from these broad aims and the results were reported in Chapters 2 to 4 in journal article format.

Research Objectives

Chapter 2. Chapter 2 reported survey results that tested differences in knowledge of ADHD and attitudes toward teaching children with characteristics of ADHD across three levels of teaching experience; (a) in-service teachers, (b) pre-service teachers who already had practical teaching experience, and (c) pre-service teachers without practical experience. Chapter 2 reported the findings for the following research objectives:
1. To identify and describe the content, structure, and strength of pre-service teachers’ and in-service teachers’ attitudes toward teaching children showing characteristics of ADHD.

2. To identify whether in-service teachers and pre-service teachers differed in their knowledge and attitudes toward ADHD, thereby identifying the period of teachers’ careers in which their knowledge and attitudes were formed.

**Summary of results.** Results from Chapter 2 showed that as teachers gained experience in the classroom, their knowledge of ADHD increased. Specifically, in-service teachers had significantly more total objective knowledge of ADHD, higher perceived knowledge, and more knowledge of characteristics and treatments of ADHD, than both groups of pre-service teachers.

Results from Chapter 2 showed that for all teacher groups, overall attitudes toward teaching children with characteristics of ADHD were slightly favourable and significantly different from the mid-point, while average stereotypic and teaching beliefs were moderately unfavourable and significantly different from the mid-point. These beliefs and attitudes did not change significantly with increased teaching experience. Pre-service teachers with classroom experience and in-service teachers both had significantly unfavourable affect and significantly favourable past behaviours. Pre-service teachers without classroom experience reported slightly favourable affect, but this was not significantly different from the scale mid-point. Teachers with in-service experience reported more favourable behaviours toward children with ADHD than pre-service teachers with experience, but less favourable emotions compared to pre-service teachers without experience. Inter-component ambivalence was observed, especially in the in-service teacher sample, whereby negative beliefs and emotions were accompanied by positive past behaviours towards children believed to have ADHD.
Chapter 3. In this chapter the construct of teachers’ prior experience was refined by drawing on the multidimensional model of attitude strength to identify three types of experience with ADHD. The three types were (a) direct experience teaching a child with ADHD; (b) indirect experience gained via pre-service university courses, in-service training or the media; and (c) personal experience with ADHD. These types of experience were conceptualised as dimensions of attitude strength. Chapter 3 reported results that addressed the following objective:

3. To identify how pre-service teachers’ and in-service teachers’ direct, indirect and personal experiences with ADHD were related to their knowledge of ADHD and their attitudes toward teaching children who exhibit characteristics of ADHD.

Summary of results. The results from Chapter 3 showed that pre-service teachers with personal experience had stronger perceived knowledge and knowledge of causes of ADHD than those without personal experience. Those with four or more instances of exposure to information via indirect experience had stronger objective knowledge (total and treatments) and stronger perceived knowledge than pre-service teachers with less indirect experience. In comparison, in-service teachers who had more direct experience perceived their knowledge as stronger than those with less direct experience. Indirect experience appears to compensate for in-service teachers’ lack of personal experience in regard to their knowledge of causes of ADHD. However, personal experience and strong direct experience were associated with weaker scores for knowledge of treatments than those of teachers with less experience. This counterintuitive relationship may have been due to greater awareness of individual differences in responsiveness to treatments, and/or awareness of controversies about treatments.

The results showed that overall attitudes were positively and significantly related to in-service teachers’ number of years of teaching experience after controlling for direct,
personal and indirect experiences. Pre-service teachers’ age was positively and significantly associated with their overall attitude: after controlling for direct, indirect and personal experience, this relationship was non-significant.

**Chapter 4.** Chapter 4 applied and extended Smith et al.’s (2008) model of the origins of attitude certainty using experimental (Study 1) and survey (Study 2) procedures. The following objectives were addressed:

4. To test the external validity of Smith et al.’s (2008) model of attitude certainty on a real and complex attitude object (i.e., attitudes toward teaching children who exhibit the behaviours associated with ADHD) using survey and experimental procedures.

5. To extend Smith et al.’s (2008) model by adding the perceived accessibility of an attitude as another mediator in the model.

6. To extend Smith et al.’s (2008) model by adding direct, indirect and personal experience with ADHD as potential antecedents of attitude certainty.

**Summary of results.** Structural equation models (SEM) showed that Study 1 did not support the mediated relationships reported by Smith et al. (2008). Instead, the manipulated variables had moderated relationships with attitude certainty. The simple effects results implied that when there was a large amount of information available, attitude certainty depended on both the degree of elaboration and the structural consistency of the information. When the amount of information was low, the interaction of elaboration and structural consistency was not significant, and simple main effects showed high elaboration alone produced stronger attitude certainty.

In contrast, SEM analysis on the results from Study 2 partially supported Smith et al.’s (2008) model, and found that perceived knowledge fully mediated the relations between objective knowledge and attitude certainty. Other predictions based on Smith et al.’s results
were not supported, and unlike Study 1, no moderation effects were found. However, as discussed in more detail below, the results of Study 2 supported perceived accessibility as a mediator variable and the experience variables as antecedents of attitude certainty.

**Contributions to Attitude Models and Attitude Measurement**

**Models of attitude content and structure.** The research reported in Chapters 2 and 3 addressed Kos, Richdale and Hay’s (2006) call for theoretically-driven research on teachers’ knowledge of and attitudes toward ADHD. As noted above, the present research drew on social psychological models of attitude content, structure and strength to guide measurement of teachers’ knowledge, attitudes and experiences in relation to ADHD. Thurstone (1928), one of the founders of attitude measurement, claimed that attitudes are too complex to measure using a single numerical index. Multiple methods of measuring attitudes were adopted in the present research. In Chapters 2 and 3, global, or overall attitude toward teaching children with ADHD, was rated on an attitude thermometer scale (Esses & Maio, 2002; Haddock & Zanna, 1998). Overall attitudes were based on a uni-dimensional model of attitude structure. In Chapter 2, the tripartite model of attitude content guided measurements of cognitive, affective and behavioural components of attitudes (Eagly & Chaiken, 1993; Zanna & Rempel, 1988). Stereotypic and symbolic beliefs (Haddock & Zanna, 1999), affect and behaviour were assessed using open-ended responses and self-reported valence ratings (Esses & Maio, 2002; Haddock & Zanna, 1998). The research reported in Chapter 2 extended the open-ended response method of measuring attitudes to a new population of interest, thus adding to generalisation of this method.

Use of the tripartite model of attitude content also allowed measurement of a bi-dimensional structure, whereby favourable and unfavourable evaluations can be held simultaneously (Eagly & Chaiken, 1993). This bi-dimensional structure allowed identification of ambivalence and its trajectory as teachers progress through their university studies and
teaching career. Pre-service teachers without classroom experience had negative beliefs and positive emotions. Both pre-service teachers with classroom experience and in-service teachers had negative beliefs and emotions, but positive past behaviours towards children they believed to have ADHD. Furthermore, ambivalence became stronger with increased classroom teaching experience. These results converge with those of Ohan, Cormier, Hepp, Visser and Strain (2008). While Ohan et al. did not conceptualise their findings within an attitude strength model, they found that teachers with higher knowledge of ADHD in comparison to those with lower knowledge, reported more helpful behaviours toward children with ADHD, believed these children would cause greater classroom disruption, and felt less confident in managing such children. Ohan et al. used different methods to measure beliefs, emotions and behaviours than the present research, thus their study adds convergent validity to the open-ended measures of attitude components. Future research on ambivalence in teachers’ attitudes toward ADHD could usefully look at why unfavourable affect and beliefs develop, when at the same time, positive behaviours are reported. It may also be useful to identify different types of inter-component and intra-component ambivalence in teachers’ attitudes so that strategies can be developed to assist them to cope in their roles with such children.

The results from Chapter 2 concerning attitudinal ambivalence suggest that single component models of attitudes are not able to detect the subtle aspects of attitudes towards multi-faceted issues such as ADHD. The lack of significant correlations of overall attitude with the attitude components and the total attitude component score suggest it is important to measure both overall attitude and attitude components, as they appear to be addressing separate constructs. Results from Chapter 3 showed that overall attitude was positively associated with the extent of teaching experience. This suggests that attitudes measured with broad scales, such as the thermometer scale, are associated with broad experiences, rather
than specific experiences, such as direct, indirect and personal experience. These results indicate the complexity of evaluation that is “summarised” by the concept of attitude and that casting a wide net by use of multiple measures is warranted.

**The multi-dimensional model of attitude strength.** The research reported in Chapters 2, 3 and 4 conceptualised teachers’ objective knowledge of ADHD, perceived knowledge, and experience with ADHD, as dimensions of attitude strength. The results reported in Chapters 3 and 4 were consistent with attitude strength literature that identifies direct experience, indirect experience (Eagly & Chaiken, 1998; Maio, Olson, Bernard, & Luke, 2003), and personal involvement (Eaton, Majka, & Visser, 2008; Holbrook, Berent, Krosnick, Visser, & Boninger, 2005; Thomsen, Borgida, & Lavine, 1995) as antecedents of strong attitudes. Results from Chapter 3 showed that in-service teachers’ direct experience, but not their indirect experience, was positively associated with perceived knowledge. This is consistent with literature that showed direct experience had more of an effect on other strength variables than indirect experience (Ajzen & Fishbein, 2000; Fazio & Zanna, 1981; Maio et al., 2003).

Applying the multi-dimensional model of attitude strength to the education literature is useful for understanding the relations between teachers’ experience, knowledge and other strength dimensions. This theoretical base also suggests the likely consequences of strong attitudes. For example, Krosnick and Petty (1995) found that strong knowledge was associated with stable attitudes that manifest in behaviours towards attitude objects. Thus, having strong knowledge of ADHD and perceiving oneself as having strong knowledge are likely to provide stable attitudes that manifest in behaviours and decisions toward children who display the characteristics of ADHD.

The results reported in Chapter 3 for pre-service and in-service teacher samples suggest that strong knowledge may form from different sources for populations with varying
degrees and types of experience. Strong knowledge appeared to develop via indirect experience when direct experience was not available, but as direct experience increased, strong knowledge depended on complex interactions among indirect, direct and personal experiences. Future research may benefit from developing models of strong knowledge in which populations with and without direct experience are catered for separately, or in which direct experience is a moderator variable.

**Modelling the origins of attitude certainty.** The results reported in Chapter 4 add to the literature on antecedents of attitude certainty and extend Smith et al.’s (2008) findings on this topic. The models tested in Chapter 4 identified subjective attitude strength variables as mediators of the relations between objective attitude strength variables and attitude certainty. As noted above, Study 1 did not support the predicted mediated relationships. Instead, the manipulated variables of amount of information and thought, and structural consistency interacted to impact on attitude certainty. These interactions were not included in the SEM analyses due to an inadequate sample size, so potential mediation effects may have been concealed.

In contrast, results from Study 2 supported mediated relationships but not moderated relationships, and found that direct, indirect and personal experiences with ADHD were additional antecedents of attitude certainty. It is notable that Study 2 showed that perceived accessibility mediated the relations between antecedents and attitude certainty. Having more training in ADHD, having taught more children believed to have ADHD, knowing more about ADHD, and thinking more about that information, were all associated with stronger perceived accessibility, which was positively associated with attitude certainty. Unlike Smith et al.’s (2008) results, perceived thought did not act as a mediator variable, suggesting that the psychological process of forming strong attitude certainty is acquired through perceived accessibility of the attitude, rather than perceived amount of thought.
Results from Study 2 also showed that perceived knowledge mediated the relations between attitude certainty and objective knowledge, and between attitude certainty and objective ambivalence. Stronger objective ambivalence was associated with stronger perceived knowledge, which was then associated with stronger attitude certainty. This counterintuitive result was similar to the simple effects results from Study 1, which found that when elaboration was prevented, high amounts of structurally inconsistent information led to stronger attitude certainty than consistent information. Together, Study 1 and Study 2 provide examples of high objective ambivalence being associated with stronger attitude certainty. In both instances, structural complexity may have been inferred as conveying accuracy of information, which then may have led to stronger attitude certainty (Rucker, Petty, & Briñol, 2008). The discrepant results between Study 1 (experiment) and Study 2 (survey) mirror Mitchell’s (2012) meta-analysis findings, which found that laboratory and field effects in social psychology had the lowest correlation compared with other sub-fields in psychology. The implications for theory and research, as well as potential reasons for the different results across studies, were elucidated in Chapter 4 and are revisited below.

**Implications for theory and research.** Differences between hypothetical attitude objects and real-life attitude objects may explain the differences between Smith et al.’s (2008) study and the results of Study 1. Attitudes pertaining to real life, such as in Study 1, are likely to have more complexity and personal relevance than those evoked in an artificial scenario (Haslam & McGarty, 2004), such as that used by Smith et al. The ambivalence identified in Chapter 2 indicated that ADHD was an attitude object with complex bi-dimensional structure and multi-component content. Greater personal importance has been shown to promote attention, elaboration and memory for relevant information in laboratory conditions (Eaton et al., 2008; Holbrook et al., 2005). It has also been shown that people are not good at predicting emotions from various hypothetical situations (Wilson & Gilbert, 2005), thus hypothetical
scenarios are not likely to be good substitutes for real attitude objects that have affective elements, such as teaching children with characteristics of ADHD. Furthermore, attitudes formed by psychology students in response to hypothetical attitude objects may emphasise cognitive processes (Sears, 1986), such as abstract thinking (Ledgerwood & Callahan, 2012) and complex inferential thinking (Harmon-Jones, Peterson, & Harris, 2009), while attitude objects of personal significance are also likely to evoke emotional responses (Harmon-Jones et al., 2009).

This personal relevance and complexity of ADHD attitudes may have led to the complex interactions observed in Study 1. With complex attitude objects of personal relevance, attitude certainty reported under controlled laboratory settings may depend on combinations of antecedent variables working through complex non-linear relationships, such as moderated mediation or mediated moderation. With simpler hypothetical attitude objects that have little personal relevance or affective content, the relationships may be linear, as found by Smith et al. (2008). Future research can usefully test models of attitude strength on other attitude objects, so that the conditions in which different types of relationships occur (e.g., mediated vs. moderated) are identified. Future research could explore models where the products (i.e., interaction effects) of the three manipulated variables are additional antecedent variables that have indirect paths to attitude certainty through the subjective attitude strength mediators. Such research would increase understanding of how strong attitude certainty forms under various circumstances. In order to test moderated relationships or more complex models using structural equation modelling, very large samples would be required for results to be reliable (Kline, 2005).

Differences between the results of the experiment and survey may be accounted for by participants’ differing degrees of prior experience, familiarity with teaching children with characteristics of ADHD, and the different stage and circumstances of attitude formation.
Tormala, Clarkson and Henderson (2011) found that the degree of familiarity with an attitude object and the stage and circumstances of attitude formation affected whether perceived speed of evaluation led to attitude certainty. Perception of slow evaluation promoted certainty with unfamiliar attitude objects, but perception of fast evaluation led to greater attitude certainty when objects were familiar (Tormala et al., 2011). The majority of participants in the present Study 2 had prior teaching experience as well as direct, personal and/or indirect experience with ADHD, whereas Study 1 sampled only education students who lacked any prior experience with ADHD. Study 1 participants formed their attitudes in the laboratory based on the information provided, while those in Study 2 formed their attitudes in natural settings over longer time periods. Laboratory settings demand a constant, high level of attention to stimuli, participants are often asked to decide quickly on their attitude toward novel stimuli (Eagly & Chaiken, 1993; Tormala et al., 2011; Tormala & Rucker, 2007) and do so in comparative social isolation (Eagly & Chaiken, 1993). In natural settings, attention is more variable than the laboratory (Eagly & Chaiken, 1993), attitudes are formed over longer time periods and they may be expressed repeatedly prior to being measured (Tormala et al., 2011). These differences in attentional and social processes, familiarity with the attitude object, and formation versus expression of attitudes may account for the different results of the laboratory and survey studies.

In summary, the discrepancies between the findings reported in Chapter 4 and those reported by Smith et al. (2008), coupled with the differences in results between Study 1 and Study 2, imply that different psychological processes may be relevant for each circumstance. Models of attitude formation should differentiate between participants’ prior experiences and self-interest pertaining to the attitude object. Mediated relationships were found in circumstances where there was little self-interest in relation to an attitude object (e.g., Smith et al., 2008) and where self-interest was apparent but attitudes had already been constructed.
over time and may have been readily accessed in memory (Study 2). When self-interest was
evident for unfamiliar attitude objects and where attitudes were formed on demand in
laboratory conditions (Study 1), moderated relationships were observed. Whether attitude
objects are hypothetical, novel-real, or familiar-real, and the stage and conditions of attitude
formation (i.e., elicited in the laboratory vs. formed over time in natural settings), may impact
differentially on the nature of the psychological processes underlying the formation of strong
attitudes. Future research should test these factors in laboratory and field settings by applying
multi-dimensional models of the origins of attitude certainty about both hypothetical and real
attitude objects. Research that develops models that have both internal and ecological validity
would increase understanding of how strong attitude certainty forms and is maintained, and
would enhance prediction and intervention in regard to attitudes, choices and behaviours
(Tormala et al., 2011).

Limitations

Design limitations. The survey of pre-service and in-service teacher samples that
informed Chapters 2, 3 and 4, was a cross-sectional design. Interpretations of results are thus
limited to between group differences because individual differences were not controlled.
Future researchers may consider longitudinal designs that repeatedly measure pre-service
teachers’ knowledge and attitudes from the beginning of their education studies through to
working in schools as a classroom teacher, so that the development of knowledge of ADHD
and attitudes toward teaching children who demonstrate its characteristic behaviours can be
more rigorously measured by controlling for individual differences.

The experiment that informed Chapter 4 allowed causal statements to be made about
the direct effect of the amount of information, amount of thought and structural consistency of
information on the endogenous variable, attitude certainty, and mediator variables. The
present study improved the design by using objective measures of knowledge, thought and
ambivalence as manipulation checks. However, a design limitation was that the mediator variables were not manipulated, and as such, causal statements could not be made about their relationships with attitude certainty. Future research could design such manipulations so that all of the paths in the model can demonstrate casual relations with attitude certainty.

**Measurement limitations.** Some limitations regarding measurement of objective knowledge of ADHD, objective ambivalence and attitude certainty were noted in previous chapters and are briefly revisited below.

Knowledge of ADHD. The questionnaire used to measure actual knowledge of ADHD in both the survey and experiment was a shorter version of West et al.’s, (2005) questionnaire. It was shortened to reduce repetitive content and to keep participation time practical. A potential limitation concerns the internal validity of the characteristics, causes and treatments subscales. While all three subscales had acceptable internal consistency (> .73) and validity of the characteristics subscale was supported by teachers with more experience scoring higher on this subscale than those with less experience, the mix of correct true-false answers across subscales was inconsistent. The treatment subscale had a mix of true and false correct answers. The majority of correct answers for the characteristics subscale were true, while for the causes subscale they were false. The different patterns of correct responses across subscales may confound results due to a response bias. Future research would benefit from developing subscales with a consistent number of true/false correct responses. Despite these methodological concerns, the use of subscales to measure knowledge of ADHD was supported and showed that subscales are useful to indicate strengths and gaps in knowledge.

Objective Ambivalence. Scores for objective ambivalence were calculated based on instructions from Esses and Maio (2002). In the survey for Chapter 4, results showed that objective ambivalence predicted attitude certainty, but unexpectedly, it did not predict perceived ambivalence. Concerns were raised in Chapter 4 about the construct validity of the
measure of objective ambivalence. It was based only on conflicted beliefs to align with Smith et al.’s (2008) and the present experiments’ manipulation of beliefs/cognition and not other components of attitudes, such as affect or behaviour. The measure of perceived ambivalence is likely to assess broader aspects of ambivalence than its objective counterpart, such as affective and behavioural conflict as well as cognition. In future research, objective scores for ambivalence may be improved by including affective and behavioural components as well as cognition (see Esses & Maio, 2002).

Attitude certainty. Chapter 4 measured attitude certainty using a single factor structure to enable replication of Smith et al.’s (2008) model. However, Petrocelli, Tormala and Rucker (2007) found support for two factors of attitude certainty: Attitude clarity, which is ‘the subjective sense that one knows what one’s attitude is’, and attitude correctness, which is ‘the subjective sense that one’s attitude is correct’ (p. 31). As explained in Chapter 4, the antecedents of attitude certainty are likely to impact on clarity and correctness in distinct ways. For example, structural consistency is likely to impact on attitude clarity, while correctness could be impacted by social context and perceiving that others to hold similar attitudes to one’s own (see Visser & Mirabile. 2004). Petrocelli et al. provide suggestions for measuring clarity and correctness that future researchers may find useful.

Implications for Practice

Chapter 2 showed that as teachers gained experience in the classroom, their knowledge of ADHD increased moderately and significantly. These results are similar to previous Australian studies on total objective knowledge (Bekle, 2004; Kos, Richdale, & Jackson, 2004) and perceived knowledge (Kos et al., 2004).

Gaps in knowledge. The results reported in Chapter 2 found that in-service teachers knew more about characteristics and treatments of ADHD than pre-service teachers. These results imply that pre-service training programs need to increase information provided about
characteristics and treatments of ADHD in university course work and to foster practical placements in schools that provide the opportunity to teach children who exhibit the characteristics of ADHD. Knowledge of treatments was the lowest scoring knowledge subscale for in-service and pre-service groups. Although knowledge of treatments was stronger in pre-service teachers with more indirect experience (Chapter 3), the results suggest that there is neglect of this aspect of information about ADHD in university courses and in-service training. Treatment information is most likely not taught to teachers because, technically, they do not treat ADHD. However, while school psychologists devise behavioural interventions for ADHD and medical practitioners prescribe medication, teachers are often responsible for implementing and evaluating interventions for ADHD in the classroom (Ohan et al., 2008; Vereb & DiPerna, 2004). Teachers are the main carers of children during the school day, and as the facilitators of children’s learning and development, teachers’ roles include supervising and administering individual treatment plans for children diagnosed with ADHD. It is important that educational institutions and in-service trainers increase coverage in their courses of information about treatments for ADHD so that teachers know more about the interventions that they administer. These results also carry implications for school psychologists, who may be a vital link between medical practitioners and teachers in their role in conveying information about medication to teachers, and in helping teachers implement and monitor the effects of behavioural and medical interventions. Given the high likelihood that new graduates will teach a child diagnosed with ADHD in their first class, pre-service training institutes should foster development of sound knowledge of all aspects of ADHD prior to entry into a teaching career.

**Pre-service teacher training.** The results reported in Chapter 3 found that pre-service teachers’ indirect experience, which included university courses on ADHD, was positively associated with knowledge of ADHD with moderate (objective knowledge) to large
(perceived knowledge) effect sizes. These results suggest that pre-service teacher training is an important source of information about ADHD. The experiment results reported in Chapter 4 showed that the amount of information provided to education students about teaching children with ADHD, the extent of elaboration of that information, and its structural consistency, all interacted to form attitude certainty. Stronger certainty is likely to lead to teachers’ behaviours that are consistent with their attitude (Bizer, Tormala, Rucker, & Petty, 2006; Fazio & Zanna, 1978), attitudes that are not amenable to persuasion (Tormala & Petty, 2002; Wu & Shaffer, 1987) and are more durable over time (Bassili, 1996). Consistency in pedagogical practices and behavioural management strategies are likely outcomes of strong attitude certainty. Considering the unresolved controversies in the literature surrounding ADHD (e.g., Salmelainen, 2002; Wilens et al., 2008), it is likely that pre-service teachers will be exposed to information that is structurally inconsistent. Teacher trainers should ensure that education students have access to comprehensive, empirically sound information about ADHD. To achieve this, the amount of information needs to be substantial. Chapter 3 results found that four or more instances of exposure to information about ADHD was required to impact on objective knowledge and perceived knowledge of ADHD. Additionally, based on the findings reported in Chapter 4, learning experiences need to allow deep cognitive elaboration of the information so that strong attitudes are formed. Discussion lessons, whereby different viewpoints and concerns can be raised and discussed at length, or written essays that involve development of an argument that debates controversies in the literature, may be useful learning experiences that foster deep cognitive elaboration. Results from the survey reported in Chapter 4 showed that direct, indirect and personal experience with ADHD were antecedents of attitude certainty. These results imply that teacher trainers should provide favourable direct experiences, such as exposure to positive interactions with children diagnosed with ADHD during school placements, and favourable indirect experiences, such
as provision of information about how to manage dysfunctional behaviours and facilitate learning for children diagnosed with ADHD, so that strong and favourable attitudes are formed and the subsequent consequences for children are beneficial.

**In-service teacher training.** The results from Chapter 3 showed that in-service teachers’ direct experience teaching a child with ADHD was associated with moderately and significantly higher perceived knowledge, but not objective knowledge. Thus, practical experience was not enough on its own to build comprehensive knowledge of ADHD. The moderate effect size and significant interaction showed that in-service teachers with personal experience and more direct experience scored lower on knowledge of treatments than less experienced teachers. This suggests that provision of comprehensive information about ADHD would assist teachers in processing mixed or controversial information.

As reported in Chapter 2, in-service teachers reported ambivalent attitudes towards teaching children with characteristics of ADHD. These teachers reported moderately unfavourable beliefs and affect, accompanied by moderately favourable behaviours. There is growing evidence that ambivalent attitudes are less stable over time, are less likely to guide information processing and behaviours, and are more pliable under persuasive communication than attitudes that are low in ambivalence (Armitage & Conner, 2000; Jonas, Broemer, & Diehl, 2000). Teachers who are ambivalent may therefore hold unstable attitudes and be inconsistent in their actions, decisions and evaluations in regard to children with characteristics of ADHD. Identification of ambivalence is important because such an attitude may have an unmeasured impact on academic and psychosocial outcomes for children with symptoms of the disorder and consequences for the teachers themselves. School psychologists could have a role in helping raise teachers’ awareness of ambivalence and identifying and implementing coping strategies. The results of Chapter 3 showed that in-service teachers who had greater teaching experience held more favourable attitudes than teachers with less
teaching experience. This suggests that these experienced teachers could be beneficial as mentors for less experienced staff.

**Broader Implications**

The approach of the present research may be extended to application outside the field of education and ADHD. The focus on complex, real-life attitudes and the formation of attitude strength may generalise to other multifaceted attitude objects that have personal and practical relevance. Development of reliable and valid models of how attitudes form and become strong would be useful for understanding other social issues in which people are required to process large amounts of structurally inconsistent information. Many of the most important concerns faced by individuals in contemporary societies are those that are controversial, perplexing, tend to polarise opinions and have serious and enduring consequences. Topics such as global warming and climate change, asylum seekers, genetic engineering, organ donation, legalisation of marijuana, euthanasia and assisted suicide, abortion and same sex marriage, all require people to process large amounts of structurally inconsistent, multifaceted information.

Consider for example, the global warming debate. A search on Google (12th July 2012) for ‘climate change’ produced over 770 million results, while ‘global warming’ produced 319 million results, demonstrating the very large amount of information available about this topic on the internet alone. Much of the information about climate change is presented in the media as structurally inconsistent. For example, a content analysis of prestigious newspapers in the United States found that press coverage contributed to divergent popular discourse by giving equal space to the anthropogenic and non-anthropogenic sides of the global warming debate (Boycoff & Boycoff, 2004). For a person to be certain of their attitude about disputed topics such as global warming, they are faced with evaluating a vast array of information for its relevance and accuracy, and carefully considering both sides of the
debate. Development of multi-dimensional models of attitude certainty, such as the model presented in Chapter 4 of this thesis, may assist understanding of how people come to be certain in their attitudes about complex issues such as global warming. Such models of strong attitudes would assist accurate prediction of related behaviours (e.g., recycling household waste, voting for a carbon tax, installing solar power, or using car pools and bicycles to commute to work) and could also be used to inform creation of effective interventions aimed at assisting people to make decisions (e.g., about environmental policy or law). A clear understanding of how attitudes form and become strong will aid those involved in forming, maintaining and changing attitudes, and will foster attitudes that are stable, enduring, and that manifest in decisive action.

Conclusion

The initial impetus for this research project was the observation that teachers are exposed to numerous sources of inconsistent information about ADHD during their training, in the classroom, and from the media. The present research formed links between the domains of education and social psychology to investigate the development of teachers’ knowledge of ADHD and their attitudes toward teaching children who exhibit the characteristics of the disorder. The content, structure and strength of these attitudes were modelled. The addition of a theoretical platform to the applied education literature offers systematic guidance to research on teachers’ knowledge and attitudes regarding ADHD. The laboratory-derived models of attitude content, structure and strength were tested on a real attitude object, thereby adding to what is known about their ecological validity.

The results showed gaps in teachers’ knowledge and increasing ambivalent attitudes as teachers gained classroom experience. Ambivalent attitudes were shown to accompany strong knowledge, and in some circumstances, strong attitude certainty. This suggests that when attitude objects have complex structure and multifaceted content, ambivalence may be an
indicator of attitude strength. The present results also supported direct, indirect and personal experiences as antecedents of knowledge and attitude certainty, and they showed perceived accessibility was a mediator of relations between these antecedent variables and attitude certainty. Mixed results from survey and experimental procedures, and in comparison to Smith et al.’s (2008) results, suggested that the process of attitude formation depends on: (a) the degree of prior experience with the attitude object, (b) whether the attitude object has personal and/or practical relevance, (c) the nature of the attitude object (i.e., hypothetical vs. novel-real vs. familiar-real), and (d) the stage and conditions of attitude formation (i.e., elicited in the laboratory vs. formed over time in natural settings). These results highlight the need to investigate such complex attitudes in ecologically valid ways. Research that establishes models that have both internal and ecological validity would increase understanding of how strong attitudes form and are maintained, and would enhance prediction and intervention in regard to attitudes, choices and behaviours. Such models have broad implications for attitudes toward complex and pressing social issues other than that of ADHD, such as global warming or genetic modification of crops.

In sum, the research reported in the previous chapters extends what is known about teachers’ knowledge and attitudes in regard to ADHD. The findings carry implications for attitude theories, attitude research and its broad application, and practice in teacher training and school settings. The prevalence and salience of ADHD in school settings, and teachers’ roles in facilitating children’s academic and social development, make future research that systematically develops an understanding of how teachers’ knowledge and attitudes forms and becomes strong as important. An understanding of these processes will cultivate teachers’ strong knowledge and strong positive attitudes that will promote positive academic and psychosocial outcomes for children with characteristics of ADHD.
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References


### Appendix A

**Adapted 33-item Knowledge of ADHD Questionnaire**

- The correct answers are indicated by an “X”
- There are 3 subscales.
  - Characteristics (CH) (11 items) (items 3, 7, 10, 15, 17, 19, 21, 25, 26, 30, 33)
  - Treatments (T) (11 items) (items 1, 2, 5, 8, 9, 16, 18, 20, 23, 27, 29)
  - Causes (C) (11 items) (items 4, 6, 11, 12, 13, 14, 22, 24, 28, 31, 32)

<table>
<thead>
<tr>
<th></th>
<th>TRUE</th>
<th>FALSE</th>
<th>DON’T KNOW</th>
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<tbody>
<tr>
<td>1. Following stimulant medication, children with ADHD may become highly anxious (e.g., crying or worrying excessively)</td>
<td>X (T)</td>
<td></td>
<td></td>
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<tr>
<td>2. Providing a child with a firm male role model is an effective treatment for ADHD</td>
<td></td>
<td>X (T)</td>
<td></td>
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<td>3. Children who have ADHD tend to talk excessively in class</td>
<td>X (CH)</td>
<td></td>
<td></td>
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<tr>
<td>4. ADHD is caused by ineffective discipline at home</td>
<td></td>
<td>X (C)</td>
<td></td>
</tr>
<tr>
<td>5. Stimulant medication increases a child’s ability to follow rules</td>
<td>X (T)</td>
<td></td>
<td></td>
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<tr>
<td>6. ADHD is caused by an allergic reaction</td>
<td></td>
<td>X (C)</td>
<td></td>
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<tr>
<td>7. Children who have ADHD tend not to finish their assignments</td>
<td>X (CH)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Special diets (e.g., reduced sugar, wheat free, milk free, additive free) are an effective treatment for ADHD</td>
<td></td>
<td>X (T)</td>
<td></td>
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</table>
| 9. Dietary supplements such as fish oils are an effective treatment for ADHD
  See below: current studies support use of fish oils as a treatment | X (T) |     |          |
<p>| 10. Children who have ADHD tend to blurt out answers in class | X (CH) |     |          |
| 11. ADHD is caused by family problems |     | X (C) |          |</p>
<table>
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<tbody>
<tr>
<td>12.</td>
<td>ADHD runs in families</td>
</tr>
<tr>
<td>13.</td>
<td>ADHD is caused by a diet high in junk food</td>
</tr>
<tr>
<td>14.</td>
<td>ADHD is caused by the inconsistent application of rules and consequences</td>
</tr>
<tr>
<td>15.</td>
<td>Children who have ADHD tend to have difficulties following rules</td>
</tr>
<tr>
<td>16.</td>
<td>Following stimulant medication children with ADHD may experience tics (motor movements and uncontrolled vocal sounds)</td>
</tr>
<tr>
<td>17.</td>
<td>Children who have ADHD tend to have poor handwriting</td>
</tr>
<tr>
<td>18.</td>
<td>Electroconvulsive therapy (ECT) is an effective treatment for ADHD</td>
</tr>
<tr>
<td>19.</td>
<td>Children who have ADHD tend to be disorganized</td>
</tr>
<tr>
<td>20.</td>
<td>Stimulant medication reduces or suppresses appetite</td>
</tr>
<tr>
<td>21.</td>
<td>Most children who have ADHD act impulsively (they do things without thinking)</td>
</tr>
<tr>
<td>22.</td>
<td>ADHD is caused by a child not trying hard enough to control his/her behaviour</td>
</tr>
<tr>
<td>23.</td>
<td>Stimulant medication is addictive</td>
</tr>
<tr>
<td>24.</td>
<td>ADHD is caused by excessive exposure to environmental substances such as lead</td>
</tr>
<tr>
<td>25.</td>
<td>All children who have ADHD appear to be constantly on the go</td>
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<tr>
<td>26.</td>
<td>Children who have ADHD tend to have poor concentration</td>
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<tr>
<td>27.</td>
<td>Stimulant medication works within five minutes of taking it</td>
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<tr>
<td>28. ADHD is caused by inoculations</td>
<td>X (C)</td>
</tr>
<tr>
<td>29. Homeopathic remedies are an effective treatment for ADHD</td>
<td>X (T)</td>
</tr>
<tr>
<td>30. Children who have ADHD tend to have poor body posture (e.g. they appear to slouch, slump in their chair, or sprawl across their desk)</td>
<td>X (CH)</td>
</tr>
<tr>
<td>31. ADHD is caused by food sensitivities</td>
<td>X (C)</td>
</tr>
<tr>
<td>32. ADHD is caused by inconsistent parenting</td>
<td>X (C)</td>
</tr>
<tr>
<td>33. Children who have ADHD tend to make careless errors</td>
<td>X (CH)</td>
</tr>
</tbody>
</table>
Appendix B

Pre-service Questionnaire for Online Survey

1. Are you: Male or Female?
2. What age did you turn last birthday? .................
3. Are you training to be a Primary or Secondary school teacher?
   Primary/Secondary
4. Which university do you attend? UNE/SCU
5. How many semesters of your education degree or diploma have you competed?
6. Have you completed any university units that covered information about ADHD? Yes/No
7. If ‘Yes’, how many units have you completed that covered information about ADHD? ______________________
8. In the last year have you read or viewed any of the following that contained information about ADHD? Yes/No
9. In the last year have you read or viewed any of the following that contained information about ADHD? (please tick the responses that apply to you)
   Book
   Journal article
   Website
   Newspaper article
   Magazine article
   Television program
   Radio program
   Movie
   Other?
   Please specify…………………………………………………………………
10. Have you ever worked as a teacher’s aide or in a similar role in a school? Yes/No
11. Have you completed any practice teaching units? Yes/No
    (If participants responded ‘No’ to question 10 and 11 the program automatically skipped to question 14; If participants answered ‘Yes’ to question 10 or 11 the program continued to question 12)
12. In your experience in schools did you teach any children who you believed had ADHD? Yes/No
(If participants answered ‘No’ to question 12 the program automatically skipped to question 14. If participants responded ‘Yes’ to question 12 the program continued to question 13):

13. Please estimate how many children you have taught who you believed to have ADHD

14. Below you will see something that looks like a thermometer. We would like you to use this thermometer to write a number between 0 and 100 in the box at the bottom of the page that shows your attitude toward teaching children who have ADHD.

If you have a favourable attitude you would provide a score somewhere between 50° and 100°. On the other hand, if you have an unfavourable attitude you would give a score somewhere between 0° and 50°. You are not restricted to the numbers written on the thermometer – feel free to write any number between 0 and 100 in the box at the bottom of the page.

<table>
<thead>
<tr>
<th>FAVOURABLE</th>
<th>100°</th>
<th>Extremely favourable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
<td>Very favourable</td>
</tr>
<tr>
<td></td>
<td>80°</td>
<td>Quite favourable</td>
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<tr>
<td></td>
<td>70°</td>
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<td></td>
<td>60°</td>
<td>Slightly favourable</td>
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<tr>
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<td>50°</td>
<td>Neither favourable nor unfavourable</td>
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<td>20°</td>
<td>Quite unfavourable</td>
</tr>
<tr>
<td></td>
<td>10°</td>
<td>Very unfavourable</td>
</tr>
</tbody>
</table>

| UNFAVOURABLE    |   0°    | Extremely unfavourable |

Please write a number between 0 and 100 to indicate your attitude toward teaching children who have ADHD:
The next set of questions asks you about your knowledge and attitudes towards ADHD. You need to circle a number on a scale that reflects the most accurate response for you. There are no right or wrong answers.

15. How much information do you feel you have about ADHD?
   1  2  3  4  5  6  7
   Very little                           A great deal

16. How knowledgeable do you feel about ADHD?
   1  2  3  4  5  6  7
   Not at all                           Extremely knowledgeable
   knowledgeable

17. How well informed are you about ADHD?
   1  2  3  4  5  6  7
   Completely uninformed                Completely informed

18. If you had to write a list of everything you knew about ADHD, how long a list could you produce?
   1  2  3  4  5  6  7
   Very short                           Very long

19. How much have you thought about teaching children with ADHD?
   1  2  3  4  5  6  7
   Never                                Very often

20. How carefully have you thought about teaching children with ADHD?
   1  2  3  4  5  6  7
   Not at all                           Extremely carefully
   all carefully

21. How much time have you spent thinking about teaching children with ADHD?
   1  2  3  4  5  6  7
   Very little                           A great deal
22. When you think about teaching children who have ADHD to what extent are your reactions completely one-sided (i.e., positive or negative) versus mixed?

Completely one-sided 1 2 3 4 5 6 7
Completely mixed

23. How much conflict do you experience when considering the good and bad aspects of teaching children who have ADHD?

No conflict at all 1 2 3 4 5 6 7
Extreme conflict

24. To what extent are your evaluations about teaching children who have ADHD completely positive, mixed or completely negative?

Completely positive 1 2 3 4 5 6 7
Mixed
Completely negative

25. How certain do you feel about your attitude toward teaching children who have ADHD?

Not at all certain 1 2 3 4 5 6 7
Completely certain

26. How confident do you feel that your attitude toward teaching children who have ADHD is correct?

Not at all confident 1 2 3 4 5 6 7
Very confident

27. How easily does your attitude about teaching children who have ADHD come to mind?

Extremely difficult 1 2 3 4 5 6 7
Extremely easily
28. How quickly does your attitude about teaching children who have ADHD come to mind?

1  2  3  4  5  6  7
Extremely slowly
Extremely quickly

29. How often do you talk about teaching children with ADHD?

1  2  3  4  5  6  7
Never
Daily/All the time.

Please turn the page
Following are a set of statements regarding ADHD. Some of these statements are true and some are false. We are interested in which statements you believe are true or false. For each statement in this section please select either TRUE, FALSE or DON’T KNOW to indicate your response.

**It is important to select a response to every statement.**

<table>
<thead>
<tr>
<th>Statement</th>
<th>TRUE</th>
<th>FALSE</th>
<th>DON’T KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>30. Following stimulant medication, children with ADHD may become highly anxious (e.g., crying or worrying excessively)</td>
<td></td>
<td></td>
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<tr>
<td>31. Providing a child with a firm male role model is an effective treatment for ADHD</td>
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<td>32. Children who have ADHD tend to talk excessively in class</td>
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<tr>
<td>33. ADHD is caused by ineffective discipline at home</td>
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<tr>
<td>34. Stimulant medication increases a child’s ability to follow rules</td>
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<td></td>
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<tr>
<td>35. ADHD is caused by an allergic reaction</td>
<td></td>
<td></td>
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<tr>
<td>36. Children who have ADHD tend not to finish their assignments</td>
<td></td>
<td></td>
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<tr>
<td>37. Special diets (e.g., reduced sugar, wheat free, milk free, additive free) are an effective treatment for ADHD</td>
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<tr>
<td>38. Dietary supplements such as fish oils are an effective treatment for ADHD</td>
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<tr>
<td>39. Children who have ADHD tend to blurt out answers in class</td>
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</tr>
<tr>
<td>40. ADHD is caused by family problems</td>
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<tr>
<td>41. ADHD runs in families</td>
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<td></td>
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<tr>
<td>42. ADHD is caused by the inconsistent application of rules and consequences</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>43. Children who have ADHD tend to have difficulties following rules</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44. Children who have ADHD tend to have poor handwriting</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>TRUE</td>
<td>FALSE</td>
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<tr>
<td>45.</td>
<td>Children who have ADHD tend to be disorganized</td>
<td></td>
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<tr>
<td>46.</td>
<td>Stimulant medication reduces or suppresses appetite</td>
<td></td>
<td></td>
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<tr>
<td>47.</td>
<td>Most children who have ADHD act impulsively (they do things without thinking)</td>
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<tr>
<td>48.</td>
<td>Stimulant medication is addictive</td>
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<tr>
<td>49.</td>
<td>ADHD is caused by excessive exposure to environmental substances such as lead</td>
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<td>50.</td>
<td>All children who have ADHD appear to be constantly on the go</td>
<td></td>
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</tr>
<tr>
<td>51.</td>
<td>Children who have ADHD tend to have poor concentration</td>
<td></td>
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</tr>
<tr>
<td>52.</td>
<td>Stimulant medication works within five minutes of taking it</td>
<td></td>
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</tr>
<tr>
<td>53.</td>
<td>ADHD is caused by inoculations</td>
<td></td>
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<tr>
<td>54.</td>
<td>Homeopathic remedies are an effective treatment for ADHD</td>
<td></td>
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<tr>
<td>55.</td>
<td>Children who have ADHD tend to have poor body posture (e.g. they appear to slouch, slump in their chair, or sprawl across their desk)</td>
<td></td>
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</tr>
<tr>
<td>56.</td>
<td>ADHD is caused by food sensitivities</td>
<td></td>
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<tr>
<td>57.</td>
<td>ADHD is caused by inconsistent parenting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>58.</td>
<td>Children who have ADHD tend to make careless errors</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please turn the page
In this section of the questionnaire we want you to list your thoughts, feelings and actions toward teaching children who have ADHD. In this section of the survey there are 4 parts:

1. CHARACTERISTICS of typical children with ADHD
2. Your THOUGHTS about teaching children with ADHD
3. Your FEELINGS about teaching children with ADHD
4. Your ACTIONS in regards to teaching children who have ADHD.

Please note there are no right or wrong answers for this section of the questionnaire.
59. CHARACTERISTICS of typical children with ADHD

We are interested in the characteristics that education students use to describe children with ADHD. Your task is to provide a description of typical children with ADHD. You may use single words or short phrases. Please provide a list of up to 12 words or short phrases as you need to accurately convey your impressions of a typical child who has ADHD. Please be honest. Your responses will be kept strictly confidential.

Children with ADHD are:
1………………………………………………………..
2………………………………………………………..
3………………………………………………………..
4………………………………………………………..
5………………………………………………………..
6………………………………………………………..
7………………………………………………………..
8………………………………………………………..
9………………………………………………………..
10………………………………………………………
11………………………………………………………
12………………………………………………………

60. Please read back through the list you wrote for the previous question. Decide for each characteristic whether it is positive, negative or neutral as you have used it to describe typical children who have ADHD. Give your immediate first impression. Don’t spend too much time on any one characteristic. Write a rating beside each word or phrase in the list above of how negative or positive each characteristic is using the following scale:

1. If the characteristic is positive, write a (+) beside it. If it is very positive write two pluses (++) beside it.
2. If the characteristic is neutral write a (0) beside it.
3. If the characteristic is negative, write a minus (-) beside it. If it is very negative, write two minuses (--) beside it.
61. Your THOUGHTS about teaching children with ADHD

We are also interested in education students’ impressions of how teaching children who have ADHD impacts on the teaching process. Your task is to provide a list of up to 12 ways that you think children with ADHD impact on the teaching process. Please be honest. Your responses will be kept strictly confidential.

Children who have ADHD effect or may affect the teaching process in the following ways:

1. ..................................................................................................................
2. ..................................................................................................................
3. ..................................................................................................................
4. ..................................................................................................................
5. ..................................................................................................................
6. ..................................................................................................................
7. ..................................................................................................................
8. ..................................................................................................................
9. ..................................................................................................................
10. ..............................................................................................................
11. ..............................................................................................................
12. ..............................................................................................................

62. Please read back through the responses you wrote for the previous question. Decide for each response whether it is positive, negative or neutral as you have used it to convey your impression of the effect that children with ADHD have on the teaching process. Give your immediate first impression. Don’t spend too much time on any one response. Write a rating beside each response of how negative or positive each effect is using the following scale:

1. If the characteristic is positive, write a (+) beside it. If it is very positive write two pluses (++) beside it.
2. If the characteristic is neutral write a (0) beside it.
3. If the characteristic is negative, write a minus (-) beside it. If it is very negative, write two minuses (--) beside it.

Please turn the page
63. Your FEELINGS about teaching children with ADHD

We are interested in the feelings or emotions that you experience when you see, meet or think about teaching children who have ADHD. Your task is to provide a list of up to 12 feelings that you experience. Please be honest. Your responses will be kept strictly confidential.

When I think about teaching children who have ADHD, I feel:

1. ..............................................................
2. ..............................................................
3. ..............................................................
4. ..............................................................
5. ..............................................................
6. ..............................................................
7. ..............................................................
8. ..............................................................
9. ..............................................................
10. .............................................................
11. .............................................................
12. .............................................................

64. Please read back through the responses you wrote for the previous question. Decide for each feeling whether it is positive, negative or neutral as you have used it to convey your emotions about teaching children with ADHD. Give your immediate first impression. Don’t spend too much time on any one characteristic. Write a rating beside each response of how negative or positive each feeling is using the following scale:

1. If the characteristic is positive, write a (+) beside it. If it is very positive write two pluses (++) beside it.
2. If the characteristic is neutral write a (0) beside it.
3. If the characteristic is negative, write a minus (-) beside it. If it is very negative, write two minuses (--) beside it.
65. Your ACTIONS in regards to teaching children who have ADHD

We are interested in your actions or behaviours in regards to teaching children with ADHD. If you do not have any experience teaching children who have ADHD then please go to the next page.

Your task is to list up to 12 of your actions or behaviours in regards to teaching children with ADHD. Please be honest. Your responses will be kept strictly confidential.

In the past I have acted in the following ways when teaching a child with ADHD:
1……………………………………………………….
2……………………………………………………….
3……………………………………………………….
4……………………………………………………….
5……………………………………………………….
6……………………………………………………….
7……………………………………………………….
8……………………………………………………….
9……………………………………………………….
10……………………………………………………….
11……………………………………………………….
12……………………………………………………….

66. Please read back through the responses you wrote for the previous question. Decide for each action you listed whether it is a positive, negative or neutral action in regards to teaching children with ADHD. Give your immediate first impression. Don’t spend too much time on any one characteristic. Write a rating beside each response of how negative or positive each characteristic is using the following scale:

1. If the characteristic is positive, write a (+) beside it. If it is very positive write two pluses (++) beside it.
2. If the characteristic is neutral write a (0) beside it.
3. If the characteristic is negative, write a minus (-) beside it. If it is very negative, write two minuses (--) beside it.

Please turn the page
67. Do you believe that you have ADHD?
   
   Yes/ No/ Unsure

68. Have you been diagnosed with ADHD?
   
   Yes/ No /Unsure

69. Do you believe that anyone close to you has ADHD? (such as your own child, a sibling, partner, parent, friend or work colleague)
   
   Yes/ No/ Unsure

70. Has anyone close to you been diagnosed with ADHD?
   
   Yes/ No/ Unsure

71. If you would like to add any other comments about ADHD or share your thoughts, feelings or experiences regarding ADHD, please do so here:

Thank you for sharing your thoughts and experiences with us.
Appendix C

In-service Questionnaire for Online Survey

1. Are you: Male or Female?
2. What age did you turn last birthday? .................
3. Are you a Primary or Secondary school teacher? Primary/Secondary
4. What years do you currently teach?
   Kindergarten 1 2 3 4 5 6 7 8 9 10 11 12
5. Are you employed on a Full-time/ Part time/ or Casual basis?
6. For how many years have you been a teacher? ...............  
7. Have you ever taught a Special Education class? Yes/ No
   If you answered ‘Yes’ for Question 7, for how many years have you taught a
   Special Education class? .................  
8. Have you completed any university units that covered information about ADHD? Yes/ No
   If ‘Yes’, how many units have you completed that covered information about ADHD? ____________________________
9. Have you ever completed in-service training on ADHD? Yes/ No
   If ‘Yes’, how many training courses have you completed? ________________________
10. In the last year have you read or viewed any of the following that contained
    information about ADHD? (please tick the responses that apply to you)
    Book
    Journal article
    Website
    Newspaper article
    Magazine article
    Television program
    Radio program
    Movie
    Other? Please specify.................................................................
11. Have you taught a child who you believed had ADHD? Yes/ No
    If you answered ‘Yes’ to Question 11 please estimate how many children you have taught who you believed had ADHD: ____________________
Appendix C

12. Below you will see something that looks like a thermometer. We would like you to use this thermometer to write a number between 0 and 100 in the box at the bottom of the page that shows your attitude toward teaching children who have ADHD.

If you have a favourable attitude you would provide a score somewhere between 50° and 100°. On the other hand, if you have an unfavourable attitude you would give a score somewhere between 0° and 50°.

You are not restricted to the numbers written on the thermometer – feel free to write any number between 0 and 100 in the box at the bottom of the page.

<table>
<thead>
<tr>
<th>FAVOURABLE</th>
<th>100°</th>
<th>Extremely favourable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90°</td>
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</tr>
<tr>
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<td>50°</td>
<td>Neither favourable nor unfavourable</td>
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<td>Quite unfavourable</td>
</tr>
<tr>
<td></td>
<td>10°</td>
<td>Very unfavourable</td>
</tr>
</tbody>
</table>

| UNFAVOURABLE | 0° | Extremely unfavourable |

Please write a number between 0 and 100 to indicate your attitude toward teaching children who have ADHD:
The next set of questions asks you about your knowledge and attitudes towards ADHD. You need to circle a number on a scale that reflects the most accurate response for you. **There are no right or wrong answers.**

13. How much information do you feel you have about ADHD?

1 2 3 4 5 6 7

Very little A great deal

14. How knowledgeable do you feel about ADHD?

1 2 3 4 5 6 7

Not at all Extremely knowledgeable
knowledgeable knowledgeable

15. How well informed are you about ADHD?

1 2 3 4 5 6 7

Completely informed Completely uninformed

16. If you had to write a list of everything you knew about ADHD, how long a list could you produce?

1 2 3 4 5 6 7

Very short Very long

17. How much have you thought about teaching children with ADHD?

1 2 3 4 5 6 7

Never Very often

18. How carefully have you thought about teaching children with ADHD?

1 2 3 4 5 6 7

Not at all carefully Extremely carefully

19. How much time have you spent thinking about teaching children with ADHD?

1 2 3 4 5 6 7

Very little A great deal
20. When you think about teaching children who have ADHD to what extent are your reactions completely one-sided (i.e., positive or negative) versus mixed?

<table>
<thead>
<tr>
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<th>1</th>
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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Completely one-sided</td>
<td>Completely mixed</td>
<td></td>
<td></td>
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</table>

21. How much conflict do you experience when considering the good and bad aspects of teaching children who have ADHD?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>No conflict at all</td>
<td>Extreme conflict</td>
<td></td>
<td></td>
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</tbody>
</table>

22. To what extent are your evaluations about teaching children who have ADHD completely positive, mixed or completely negative?

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<th></th>
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<th>2</th>
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<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Completely positive</td>
<td>Mixed</td>
<td>Completely negative</td>
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</table>

23. How certain do you feel about your attitude toward teaching children who have ADHD?

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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tbody>
<tr>
<td></td>
<td>Not at all certain</td>
<td>Completely certain</td>
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</tbody>
</table>

24. How confident do you feel that your attitude toward teaching children who have ADHD is correct?

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<th></th>
<th>1</th>
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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tbody>
<tr>
<td></td>
<td>Not at all confident</td>
<td>Very confident</td>
<td></td>
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</tbody>
</table>

25. How easily does your attitude about teaching children who have ADHD come to mind?

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<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Extremely difficult</td>
<td>Extremely easily</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
26. How quickly does your attitude about teaching children who have ADHD come to mind?

1 2 3 4 5 6 7

Extremely slowly

Extremely quickly

27. How often do you talk about teaching children with ADHD?

1 2 3 4 5 6 7

Never Daily/All the time.

Please turn the page
Following are a set of statements regarding ADHD. Some of these statements are true and some are false. We are interested in which statements you believe are true or false. For each statement in this section please select either TRUE, FALSE or DON’T KNOW to indicate your response.

**It is important to select a response to every statement.**

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<th>FALSE</th>
<th>DON’T KNOW</th>
</tr>
</thead>
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<td>33. ADHD is caused by an allergic reaction</td>
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<td></td>
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<tr>
<td>34. Children who have ADHD tend not to finish their assignments</td>
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<tr>
<td>35. Special diets (e.g., reduced sugar, wheat free, milk free, additive free) are an effective treatment for ADHD</td>
<td></td>
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<tr>
<td>36. Dietary supplements such as fish oils are an effective treatment for ADHD</td>
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<tr>
<td>37. Children who have ADHD tend to blurt out answers in class</td>
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<tr>
<td>38. ADHD is caused by family problems</td>
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<tr>
<td>39. ADHD runs in families</td>
<td></td>
<td></td>
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<tr>
<td>40. ADHD is caused by the inconsistent application of rules and consequences</td>
<td></td>
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<tr>
<td>41. Children who have ADHD tend to have difficulties following rules</td>
<td></td>
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<tr>
<td></td>
<td>TRUE</td>
<td>FALSE</td>
<td>DON’T KNOW</td>
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</tr>
<tr>
<td>42.</td>
<td>Children who have ADHD tend to have poor handwriting</td>
<td></td>
<td></td>
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<tr>
<td>43.</td>
<td>Children who have ADHD tend to be disorganized</td>
<td></td>
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<tr>
<td>44.</td>
<td>Stimulant medication reduces or suppresses appetite</td>
<td></td>
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<tr>
<td>45.</td>
<td>Most children who have ADHD act impulsively (they do things without thinking)</td>
<td></td>
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<tr>
<td>46.</td>
<td>Stimulant medication is addictive</td>
<td></td>
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<tr>
<td>47.</td>
<td>ADHD is caused by excessive exposure to environmental substances such as lead</td>
<td></td>
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<tr>
<td>48.</td>
<td>All children who have ADHD appear to be constantly on the go</td>
<td></td>
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<tr>
<td>49.</td>
<td>Children who have ADHD tend to have poor concentration</td>
<td></td>
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<tr>
<td>50.</td>
<td>Stimulant medication works within five minutes of taking it</td>
<td></td>
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<tr>
<td>51.</td>
<td>ADHD is caused by inoculations</td>
<td></td>
<td></td>
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<tr>
<td>52.</td>
<td>Homeopathic remedies are an effective treatment for ADHD</td>
<td></td>
<td></td>
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<tr>
<td>53.</td>
<td>Children who have ADHD tend to have poor body posture (e.g. they appear to slouch, slump in their chair, or sprawl across their desk)</td>
<td></td>
<td></td>
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<tr>
<td>54.</td>
<td>ADHD is caused by food sensitivities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>55.</td>
<td>ADHD is caused by inconsistent parenting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>56.</td>
<td>Children who have ADHD tend to make careless errors</td>
<td></td>
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</tr>
</tbody>
</table>
In this section of the questionnaire we want you to list your thoughts, feelings and actions toward teaching children who have ADHD. In this section of the survey there are 4 parts:

1. CHARACTERISTICS of typical children with ADHD
2. Your THOUGHTS about teaching children with ADHD
3. Your FEELINGS about teaching children with ADHD
4. Your ACTIONS in regards to teaching children who have ADHD.

Please note there are no right or wrong answers for this section of the questionnaire.
57. CHARACTERISTICS of typical children with ADHD

We are interested in the characteristics that teachers use to describe children with ADHD. Your task is to provide a description of typical children with ADHD. You may use single words or short phrases. Please provide a list of up to 12 words or short phrases as you need to accurately convey your impressions of a typical child who has ADHD. Please be honest. Your responses will be kept strictly confidential.

Children with ADHD are:
1. ..............................................................
2. ..............................................................
3. ..............................................................
4. ..............................................................
5. ..............................................................
6. ..............................................................
7. ..............................................................
8. ..............................................................
9. ..............................................................
10. .........................................................
11. .........................................................
12. ..............................................................

58. Please read back through the list you wrote for the previous question. Decide for each characteristic whether it is positive, negative or neutral as you have used it to describe typical children who have ADHD. Give your immediate first impression. Don’t spend too much time on any one characteristic. Write a rating beside each word or phrase in the list above of how negative or positive each characteristic is using the following scale:

1. If the characteristic is positive, write a (+) beside it. If it is very positive write two pluses (++) beside it.
2. If the characteristic is neutral write a (0) beside it.
3. If the characteristic is negative, write a minus (-) beside it. If it is very negative, write two minuses (--) beside it.
59. Your THOUGHTS about teaching children with ADHD

We are also interested in teachers’ impressions of how teaching children who have ADHD impacts on the teaching process. Your task is to provide a list of up to 12 ways that you think children with ADHD impact on the teaching process. Please be honest. Your responses will be kept strictly confidential.

Children who have ADHD effect or may affect the teaching process in the following ways:

1…………………………………………………………………. 
2…………………………………………………………………. 
3…………………………………………………………………. 
4…………………………………………………………………. 
5…………………………………………………………………. 
6…………………………………………………………………. 
7…………………………………………………………………. 
8…………………………………………………………………. 
9…………………………………………………………………. 
10…………………………………………………………………. 
11…………………………………………………………………. 
12…………………………………………………………………. 

60. Please read back through the responses you wrote for the previous question. Decide for each response whether it is positive, negative or neutral as you have used it to convey your impression of the effect that children with ADHD have on the teaching process. Give your immediate first impression. Don’t spend too much time on any one response. Write a rating beside each response of how negative or positive each effect is using the following scale:

1. If the characteristic is positive, write a (+) beside it. If it is very positive write two pluses (++) beside it.
2. If the characteristic is neutral write a (0) beside it.
3. If the characteristic is negative, write a minus (-) beside it. If it is very negative, write two minuses (--) beside it.

Please turn the page
61. Your FEELINGS about teaching children with ADHD

We are interested in the feelings or emotions that you experience when you see, meet or even think about teaching children who have ADHD. Your task is to provide a list of up to 12 feelings that you experience. Please be honest. Your responses will be kept strictly confidential.

When I think about teaching children who have ADHD, I feel:

1. .................................................................
2. .................................................................
3. .................................................................
4. .................................................................
5. .................................................................
6. .................................................................
7. .................................................................
8. .................................................................
9. .................................................................
10. ....................................................................
11. ....................................................................
12. ....................................................................

62. Please read back through the responses you wrote for the previous question. Decide for each feeling whether it is positive, negative or neutral as you have used it to convey your emotions about teaching children with ADHD. Give your immediate first impression. Don’t spend too much time on any one characteristic. Write a rating beside each response of how negative or positive each feeling is using the following scale:

1. If the characteristic is positive, write a (+) beside it. If it is very positive write two pluses (++) beside it.
2. If the characteristic is neutral write a (0) beside it.
3. If the characteristic is negative, write a minus (-) beside it. If it is very negative, write two minuses (--) beside it.

Please turn the page
63. Your ACTIONS in regards to teaching children who have ADHD

We are interested in your actions or behaviours in regards to teaching children with ADHD. If you do not have any experience teaching children who have ADHD then please go to the next page.

Your task is to list up to 12 of your actions or behaviours in regards to teaching children with ADHD. Please be honest. Your responses will be kept strictly confidential.

In the past I have acted in the following ways when teaching a child with ADHD:
1…………………………………………………………
2…………………………………………………………
3…………………………………………………………
4…………………………………………………………
5…………………………………………………………
6…………………………………………………………
7…………………………………………………………
8…………………………………………………………
9…………………………………………………………
10………………………………………………………
11………………………………………………………
12………………………………………………………

64. Please read back through the responses you wrote for the previous question. Decide for each action you listed whether it is a positive, negative or neutral action in regards to teaching children with ADHD. Give your immediate first impression. Don’t spend too much time on any one characteristic. Write a rating beside each response of how negative or positive each characteristic is using the following scale:

1. If the characteristic is positive, write a (+) beside it. If it is very positive write two pluses (++) beside it.
2. If the characteristic is neutral write a (0) beside it.
3. If the characteristic is negative, write a minus (-) beside it. If it is very negative, write two minuses (--) beside it.

Please turn the page
65. Do you believe that you have ADHD?
   Yes/ No/ Unsure

66. Have you been diagnosed with ADHD?
   Yes/ No /Unsure

67. Do you believe that anyone close to you has ADHD? (such as your own child, a sibling, partner, parent, friend or work colleague)
   Yes/ No/ Unsure

68. Has anyone close to you been diagnosed with ADHD?
   Yes/ No/ Unsure

69. If you would like to add any other comments about ADHD or share your thoughts, feelings or experiences regarding ADHD, please do so here:

Thank you for sharing your thoughts and experiences with us. Your valuable time and thoughtful responses are very much appreciated.
Appendix D

Summary of Key Results Provided to Survey Participants and School Principals

Teachers’ and education students’ attitudes to teaching children with attention-deficit/hyperactivity disorder (ADHD).

Researcher: Donnah Anderson, PhD candidate, University of New England.

The sample:

In total 454 people completed the survey (94 males and 360 females). 328 education students and 126 public school teachers took part. Education students were from University of New England (N = 174) and Southern Cross University (N = 175), and practicing teachers were from public schools in the North Coast and New England regions of NSW. The sample of education students consisted of 111 students who had no experience working in schools, while 217 students had either practice teaching experience or other experience, such as working as a teacher’s aide. The average age of students was 30.48 years (SD = 0.58 years) and the average age of teachers was 40.99 years (SD = 0.95 years).

Findings:

Attitudes toward teaching children who have ADHD:

On average both teachers and education students rated their attitude toward teaching children with ADHD as favourable. On a 0-100 scale, where zero represented an extremely unfavourable attitude and 100 represented an extremely favourable attitude, participants’ attitude scores ranged from zero to 100. Experienced teachers rated their attitude as slightly favourable (M = 61.98, SD = 22.12) and although the mean for education students was slightly higher (M = 65.49, SD = 21.44), the difference in attitude between teachers and education students was not statistically significant.

Knowledge about ADHD:

Participants completed a 33-item knowledge questionnaire about ADHD. Eleven items measured knowledge about characteristics of typical children with ADHD, another 11 items measured knowledge about treatments for ADHD and the remaining 11 items measured knowledge about causes of ADHD. Participants answered either True, False or Don’t know for all 33 items. Participants scored one point for each item that they answered correctly, so the lowest possible score was zero and the highest was 33.00. Results showed that participants’ total knowledge scores ranged from 1.00 to 31.00.

In general, experienced teachers’ knowledge of ADHD (M = 19.98, SD = 4.48) was significantly higher than that of education students with no experience in schools (M = 17.34, SD = 5.57) and education students with some experience in schools (M = 17.35, SD = 5.29). Teachers’ knowledge was higher than education students’ knowledge as regards characteristics of ADHD and treatments for ADHD, but not as regards knowledge of what causes ADHD. That is, teachers and education students did not differ in their knowledge of what is known to cause ADHD, but they did differ in their knowledge about typical characteristics of a child with ADHD and what treatments are effective for ADHD. These differences suggest that as teacher’s gain experience they also improve their knowledge of ADHD, especially as regards characteristics of typical children with ADHD and treatments for ADHD.

In general, participants knew most about causes of ADHD (M = 7.31, SD = 2.78), followed by knowledge about characteristics of children with ADHD (M = 6.99, SD = 2.43) and they knew least about treatments for ADHD (M = 3.79, SD = 2.19).
Practicing teachers’ positive strategies for teaching students with ADHD

Below is a summary of strategies listed by experienced teachers of children they believed to have ADHD. The strategies are arranged in five categories, (1) Communication, (2) Research and knowledge, (3) Classroom and behavioural management, (4) Pedagogy, and (5) Strategies to help manage your own responses and emotions. These strategies were all rated positively by the teachers who used them.

**Communication strategies**

- maintain open communication with parents, the child and learning support team
- look at the child directly when speaking to them
- spend one-on-one time with student with ADHD
- refer the child and parents to the school counsellor
- be very direct and clear with instructions
- write down the instructions in steps for the child
- model behaviours and approaches for support staff
- spend time with the child outside the classroom if possible (e.g. lunch time)
- listen to the child
- try to connect with the child and develop rapport
- ask the child to repeat what they hear you say
- repeat instructions in various modes (verbal, write on board etc)
- sit with child and speak quietly
- advise the Principal if a student is not receiving medication appropriately
- speak clearly and slowly
- talk to the child about their life and interests
- make sure the child knows you like them but that you did not like their behaviour;
- give written reminder notes to the child
- write positive comments on reports
- explain ADHD to the rest of the class
- teach empathy and tolerance of diversity to the whole class

**Research/knowledge strategies**

- observe the child
- discuss strategies with health professionals and talk to the doctor on the phone
- consult with special education teachers, school counsellors and welfare teachers
- ask for advice from other teachers
- read student files
- read books and websites on ADHD
- read about classroom management for children with ADHD
- spend time thinking about the child, ADHD and what to do
- involve the student and parent in planning
- talk to the child’s previous teacher to find out what worked
- attend workshops on ADHD and behaviour problems
- talk to parents and siblings in order to get an insight into the personality of the
student

Classroom & behavioural management strategies

- set simple and clear rules and instructions
- move the child to the front of the room
- seat the child with pupils who are focussed and will not distract him/her
- explain the rules carefully
- use the school disciplinary system
- follow school rules
- use consistent consequences and have a consistent approach to class discipline
- model behaviours and approaches for students
- use active play to help them use up their energy!
- talk to the child after the lesson about their behaviour and the teacher’s expectations
- give rewards for good behaviour, such as praise
- have a seating plan
- avoid escalating conflict by defusing the situation
- inappropriate behaviours can quickly escalate if not carefully handled
- negotiate behaviours and consequences
- allow time out
- joke around with them
- ignore minor negative behaviour
- be better organised
- have a box in the classroom and all students place their books in this box at the end of the lesson
- sit near the child
- play games to get the class settled (e.g., Simon says)
- remind the child what they should be doing
- hold a class discussion about expected behaviours
- remove the child from the room when they are disruptive and defiant
- move around the classroom to keep an eye on the class
- remove privileges for off-task behaviour
- modify approaches in mid-stream to effect changes in behaviour
- take the class outside to expend extra energy
- move the child to a position where they can be reached quickly
- have an area of the room for quiet play and time out
- explain the consequences of misbehaviour
- have additional tasks ready for when they finish
- allow students to do things out of seats
- give them jobs to do to give them brief out-of-seat time
- allow partial attendance
- have a desk that is close to where the lesson is conducted - if a student is having trouble, have them sit there
- limit potential distractions for the child
- involve them in the lesson (ask them questions, give them jobs)
allow them special privileges, like writing responses on the board
• give children and parents strategies for being more organised
• involve the child in the design of the day’s plan
• develop visual rules
• plan time-out activities
• have a letter that is pasted in the front of their books which simply lists the requirements of the classroom
• give more structure to lessons (and less room for misbehaviour)
• use calming music during lessons to maintain a calm mood in the room
• used well-behaved children as examples of appropriate behaviour and praise them
• write on the board a list of things that should be done in the class and at the end of the lesson go through the list to make sure everyone has completed it
• use a whistle as a signal to stop, look at the teacher, and listen, instead of yelling
• "time-out" options - used as calming time
• create lots of checklists
• monitor the child's progress at short intervals
• devise strategies that could be used at home and at school
• leave them alone when they need it
• try to give as much one-on-one time while the task is being set up
• use visual timetables and visuals for rules
• don’t make 'minor' infractions into major discipline issues
• learn what the child likes and responds to

Pedagogical strategies

• keep lessons short
• try to be specific and clear
• break the lesson into smaller steps
• plan lessons to engage the particular child
• set a clear structure
• write instructions down
• make lessons more physically active
• give individual support as needed during lessons
• repeat instructions as needed
• provide lots of variety in lessons to keep them occupied and interested
• use cues (visual and verbal) to get the student back on track
• set short-term goals
• ensure they have the right material
• find opportunities for kids to bring in their topics/ideas of interest
• re-write units to accommodate the child’s needs
• repeat instructions in various modes (verbal, pictorial, write on board etc)
• give more time for assessment tasks
• restructure tasks they are struggling with
• at the end of each teaching cycle check their books and put rewards inside for
those who have completed all the work
• be available to help the child when tasks are multi-staged
• give hands-on practical tasks whenever possible
• give the student individualised work to do that they will enjoy
• use scaffolds to assist them in the completion of their work
• give easy tasks to build confidence and self esteem
• use Information and Computer Technologies (ICT) and media to attempt to engage them
• find things for them to do with their hands
• prepare work so student can achieve, particularly in practical areas
• for younger children, use toys to engage them in lessons
• for older children, have the student teach the class about something they are interested in
• teach social skills (e.g. turn-taking, listening, saying thank you/please)

Strategies for managing your own responses and emotions

• try to be calm
• take a sympathetic attitude
• be compassionate
• be positive and low key
• model behaviours and approaches for students
• be flexible
• try to ignore minor misbehaviours
• be kind and patient
• joking around helps keep the intensity down
• be understanding of where they are coming from
• try to treat the child fairly
• follow welfare & behaviour policy
• deal with difficult issues only when you are feeling calmer
• make an effort to seek the child out and get to know them
• enlist support of teacher’s aides
• try to be more imaginative when planning lessons
• be very structured and well planned
• use a team approach to teaching
• drop expectations of how much could be done in a lesson
• try to build up the child’s self-esteem
• focus on the positives and the child’s strengths
• leave the room for a few minutes to regain one’s cool
• give the child space
• more structure in teaching style
• get advice and debrief with the school counsellor
• debrief with staff and students
• set firm boundaries on some issues and pick battles on others
• ask the teacher’s aide to give the child attention
• always remain calm and in control because children feel secure in a calm
environment
- encourage the child to do their best
- keep a sense of humour!
- practice selective deafness!
Appendix E

Statements about ADHD used in the Experiment

**Set 1: Low amount of information provided (6 statements), high structural consistency, negative valence**

- Doctors and scientists still do not know what causes ADHD
- Children who have ADHD tend to talk excessively in class
- Children who have ADHD tend to have difficulties following rules
- Following stimulant medication children who have ADHD may experience tics (uncontrolled motor movements and vocal sounds)
- Children who have ADHD tend to be quarrelsome
- Children who have ADHD tend to have poor concentration

**Set 2: Low amount of information provided (6 statements), high structural consistency, positive valence**

- Children from any walk of life can have ADHD
- Stimulant medication increases a child’s ability to follow rules
- ADHD is caused by neurological impairments and it is not the child’s fault
- Stimulant medication increases concentration
- Children who have ADHD are likeable children
- Teachers’ use of behavioural management techniques with children who have ADHD, such as rewarding a child for good behaviour, is a powerful strategy to help meet a child’s learning needs

**Set 3: High amount of information provided (18 statements), high structural consistency, negative valence**

- Doctors and scientists still do not know what causes ADHD
- Following stimulant medication, children who have ADHD may become highly anxious (e.g., crying or worrying excessively)
- Children who have ADHD tend to talk excessively in class
- Children who have ADHD tend to be accident prone
- Children who have ADHD tend not to finish their assignments
- Children who have ADHD tend to blurt out answers in class
• Children who have ADHD tend to have difficulties following rules
• Following stimulant medication children who have ADHD may experience tics (motor movements and uncontrolled vocal sounds)
• Children who have ADHD tend to engage in dangerous activities
• Children who have ADHD tend to have poor hand writing
• Children who have ADHD tend to be disorganised
• Most children who have ADHD act impulsively (they do things without thinking)
• Children who have ADHD tend to be quarrelsome
• Children who have ADHD tend to be inattentive
• Children who have ADHD tend to have poor concentration
• Adolescents who have ADHD are more likely than adolescents who do not have ADHD to receive a driving conviction
• Children who have ADHD tend to be verbally aggressive
• Children who have ADHD tend to make careless errors

Set 4: High amount of information provided (18 statements), high structural consistency, positive valence

• Children from any walk of life can have ADHD
• Children who have ADHD and take stimulant medication are less likely to become addicted to other drugs
• Stimulant medication increases a child’s ability to follow rules
• Following stimulant medication, children who have ADHD are more able to pay attention
• Currently, a combination of medication and behaviour management are used to successfully manage ADHD
• Children who have ADHD are able to establish normal family bonds
• Following stimulant medication, children who have ADHD tend to experience improvements in their relationships with peers, parents and teachers
• ADHD is caused by neurological impairments and it is not the child’s fault
• Children who have ADHD have potential just like any other child
• Parenting practices are not responsible for causing ADHD
• Stimulant medication is not addictive
• Slow-release stimulant medication needs to be taken only once during the school day
• Stimulant medication increases concentration
• Stimulant medication is the single most effective treatment of ADHD
• Behaviours associated with ADHD have been recognised by the medical profession for over one hundred years
• Children who have ADHD are likeable children
• Teachers’ use of behavioural management techniques with children who have ADHD, such as rewarding a child for good behaviour, is a powerful strategy to help meet a child’s learning needs
• Teachers can provide valuable information to parents and medical practitioners regarding the effects of medication on children and adolescents who have ADHD

**Set 5: Low amount of information provided (6 statements), low structural consistency (i.e., mixed valence)**

- Stimulant medication increases concentration
- Following stimulant medication children who have ADHD may experience tics (motor movements and uncontrolled vocal sounds)
- Children who have ADHD tend to be quarrelsome
- Children who have ADHD are likeable children
- Children who have ADHD tend to have difficulties following rules
- Teachers’ use of behavioural management techniques with children who have ADHD, such as rewarding a child for good behaviour, is a powerful strategy to help meet a child’s learning needs

**Set 6: High amount of information provided (18 statements), low structural consistency (i.e., mixed valence)**

- Children who have ADHD tend to talk excessively in class
- Children who have ADHD are able to establish normal family bonds
- Slow-release stimulant medication needs to be taken only once during the school day
- Following stimulant medication, children who have ADHD may become highly anxious (e.g., crying or worrying excessively)
- Doctors and scientists still do not know what causes ADHD
- ADHD is caused by neurological impairments and it is not the child’s fault
- Children who have ADHD tend to blurt out answers in class
- Stimulant medication increases concentration
- Children from any walk of life can have ADHD
- Stimulant medication increases a child’s ability to follow rules
- Following stimulant medication children who have ADHD may experience tics (uncontrolled motor movements and vocal sounds)
- Children who have ADHD tend to have poor concentration
- Children who have ADHD tend to make careless errors
- Children who have ADHD are likeable children
- Children who have ADHD tend to be quarrelsome
- Teachers’ use of behavioural management techniques with children who have ADHD, such as rewarding a child for good behaviour, is a powerful strategy to help meet a child’s learning needs
- Following stimulant medication, children who have ADHD tend to experience improvements in their relationships with peers, parents and teachers
- Children who have ADHD tend to have difficulties following rules
Appendix F

Pre-Testing of Statements about ADHD

Eleven third year psychology students pre-tested the valence and extremity of information sets by rating each of the 36 statements as either conveying a negative, positive or neutral tone in regard to children with ADHD. For 18 of the statements all of the participants provided the same judgement of valence. For the other 18 statements, the majority of dissenters rated the statement as neutral. The tendency for a few participants to rate some statements as neutral supported the goal to create mildly valenced information. None of the statements were deleted or altered.

To ensure that valence of information was comparable across high and low knowledge conditions participants rated the valence of each of the six sets of information on a 7-point Likert scale, where 1 represented ‘extremely negative’ and 7 represented ‘extremely positive’. Mean valence scores were calculated for the three low and three high sets of information. Sets with low amounts of information ($M = 3.88, SD = .71$) and sets with high amounts of information ($M = 3.88, SD = .69$) did not differ significantly in their valence, $t (10) = 0.00, p = 1.00$.

For the high structural consistency condition, tests were run to check that the extremity conveyed by the negatively valenced and positively valenced sets of information was equivalent. The absolute distance from each score to the midpoint of the 7-point Likert scale was calculated for the two negatively valenced sets (sets 1 and 3) and the two positively valenced sets (sets 2 and 4). Four dependent measures t-tests using a Bonferroni adjusted alpha of .0125 showed that the negative and positive sets of information did not differ significantly in their extremity. Set 1 ($M = 1.73, SD = .47$) did not differ significantly in extremity from set 2 ($M = 1.72, SD = 1.37$), $t (10) = .41, p = .69$, or from set 4 ($M = 1.81, SD$...
= 1.40), \( t (10) = -0.20, \ p = .846 \). Similarly, set 3 \( (M = 2.18, \ SD = .98) \) did not differ significantly from set 2, \( t (10) = 1.88, \ p = .089 \), or from set 4, \( t (10) = 1.08, \ p = .307 \).
Appendix G

Questionnaire used in the Experiment

1. Are you: Male or Female? (please circle the correct response)
2. What age did you turn last birthday?..........................................................
3. Are you training to be a Primary or Secondary school teacher? Primary/Secondary
   (please circle the correct response)
4. Which university do you attend?  UNE/SCU (please circle the correct response)
5. In the last year have you read or viewed any of the following that contained
   information about ADHD? (Please circle all relevant responses and write how many
   items you have read or viewed in the space provided)
   Book          How many?.................
   Journal article How many?.................
   Website        How many?.................
   Newspaper article How many?.............
   Magazine article How many?.............
   Television program How many?............
   Radio program How many?.............
   Movie          How many?.................
   Other? Please specify..............................................

Please turn the page and complete the next question
6. Below you will see something that looks like a thermometer. We would like you to use this thermometer to indicate your attitude toward teaching children who have ADHD based on the information you have just been provided with at the start of the study. Here’s how it works: If you have a favourable attitude toward teaching children with ADHD, you would provide a score somewhere between 50° and 100°, depending on how favourable you are toward teaching children who have ADHD. On the other hand, if you have an unfavourable attitude toward teaching children who have ADHD, you would give them a score somewhere between 0° and 50°, depending on how unfavourable you are. The degree labels will help you to locate your attitude on the thermometer. However, you are not restricted to the numbers indicated – feel free to use any number between 0° and 100°. Please be honest. Your responses will be kept strictly confidential.

<table>
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<th>100°</th>
<th>Extremely favourable</th>
</tr>
</thead>
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</tr>
<tr>
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</tr>
<tr>
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<td>70°</td>
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<tr>
<td></td>
<td>60°</td>
<td>Slightly favourable</td>
</tr>
<tr>
<td></td>
<td>50°</td>
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</tr>
<tr>
<td></td>
<td>40°</td>
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</tr>
<tr>
<td></td>
<td>30°</td>
<td>Fairly unfavourable</td>
</tr>
<tr>
<td></td>
<td>20°</td>
<td>Quite unfavourable</td>
</tr>
<tr>
<td></td>
<td>10°</td>
<td>Very unfavourable</td>
</tr>
</tbody>
</table>

| UNFAVOURABLE | 0° | Extremely unfavourable |

Please provide a number between 0° and 100° to indicate your attitude toward teaching children who have ADHD: __________
The next set of questions asks you about your knowledge and attitudes in regards to ADHD. You need to select a number on a scale that reflects the most accurate response for you. There are no right or wrong answers.

7. How much information do you feel you have about ADHD?

1  2  3  4  5  6  7

Very little  A great deal

8. How knowledgeable do you feel about ADHD?

1  2  3  4  5  6  7

Not at all  Extremely knowledgeable
knowledgeable

9. How well informed are you about ADHD?

1  2  3  4  5  6  7

Completely informed

Completely uninformed

10. If you had to write a list of everything you knew about ADHD, how long a list could you produce?

1  2  3  4  5  6  7

Very short  Very long

11. How much have you thought about teaching children with ADHD?

1  2  3  4  5  6  7

Never  Very often
12. How carefully have you thought about teaching children with ADHD?  
   1  2  3  4  5  6  7  
   Not at all carefully  
   Extremely carefully  

13. How much time have you spent thinking about teaching children with ADHD?  
   1  2  3  4  5  6  7  
   Very little  
   A great deal  

14. When you think about teaching children who have ADHD to what extent are your reactions completely one-sided (i.e., positive or negative) versus mixed?  
   1  2  3  4  5  6  7  
   Completely one-sided  
   Completely mixed  

15. How much conflict do you experience when considering the good and bad aspects of teaching children who have ADHD?  
   1  2  3  4  5  6  7  
   No conflict at all  
   Extreme conflict  

16. To what extent are your evaluations about teaching children who have ADHD completely positive, mixed or completely negative?  
   1  2  3  4  5  6  7  
   Completely Positive  
   Mixed  
   Completely Negative
17. How certain do you feel about your attitude toward teaching children who have ADHD?

1 2 3 4 5 6 7
Not at all Completely
Certain certain

18. How confident do you feel that your attitude toward teaching children who have ADHD is correct?

1 2 3 4 5 6 7
Not at all Very
Confident confident

19. How easily does your attitude about teaching children who have ADHD come to mind?

1 2 3 4 5 6 7
Extremely Easily
difficult easily

20. How quickly does your attitude about teaching children who have ADHD come to mind?

1 2 3 4 5 6 7
Extremely Quickly
slowly quickly

21. How often do you talk about teaching children with ADHD?

1 2 3 4 5 6 7
Never Daily/All the time.

Please turn the page
22. We are interested in the characteristics that education students use to describe children with ADHD. Your next task is to provide a description of typical children with ADHD. You may want to use single words or short phrases. Please write a list of as many words or short phrases as you need to accurately convey your impressions of a typical child who has ADHD. If you need to write a longer list than the spaces provided please continue your list below the lines or at the side of the page. Please be honest. There are no right or wrong answers. Your responses will be kept strictly confidential.

Children with ADHD are:

_____________________________________________________

_____________________________________________________

_____________________________________________________

_____________________________________________________

_____________________________________________________

_____________________________________________________

_____________________________________________________

_____________________________________________________

_____________________________________________________

_____________________________________________________


23. Please read back through the list you wrote for Question 22 (the previous question). Decide for each characteristic listed whether it is positive, negative or neutral as you have used it to describe typical children who have ADHD. Give your immediate first impression. Don’t spend too much time on any one characteristic. Write a rating of how negative or positive each characteristic is using the following scale:

1. If the characteristic is positive, write a (+) beside it. If it is very positive write two pluses (++) beside it.
2. If the characteristic is neutral write a (0) beside it.
3. If the characteristic is negative, write a minus (-) beside it. If it is very negative, write two minuses (--) beside it.
24. We are also interested in education students’ thoughts about how teaching children who have ADHD may impact on the teaching process. Your task is to provide a list of ways that you think children with ADHD may impact on your teaching process. Provide as many words or short phrases as you need to accurately convey your thoughts. If you need to write a longer list than the spaces provided please continue your list below the lines or at the side of the page. Please be honest. There are no right or wrong answers. Your responses will be kept strictly confidential.

Children who have ADHD may impact on my teaching process in the following ways:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

25. Please read back through the list you wrote for Question 24 (the previous question). Decide for each response whether it is positive, negative or neutral as you have used it to convey your impression of the effect that children with ADHD may have on your teaching process. Give your immediate first impression. Don’t spend too much time on any one characteristic. Write a rating of how negative or positive each characteristic is using the following scale:

1. If the characteristic is positive, write a (+) beside it. If it is very positive write two pluses (++) beside it.

2. If the characteristic is neutral write a (0) beside it.

3. If the characteristic is negative, write a minus (-) beside it. If it is very negative, write two minuses (--) beside it.
This is the final section of the questionnaire. Following are a set of statements regarding ADHD. Some of these statements are true and some are false. We are interested in which statements you believe are true or false. For each statement in this section please select either TRUE, FALSE or DON’T KNOW to indicate your response.

It is important to select a response to every statement.

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<thead>
<tr>
<th>Statement</th>
<th>TRUE</th>
<th>FALSE</th>
<th>DON’T KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>26. Following stimulant medication, children with ADHD may become highly anxious (e.g., crying or worrying excessively)</td>
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<tr>
<td>27. Providing a child with a firm male role model is an effective treatment for ADHD</td>
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<tr>
<td>28. Children who have ADHD tend to talk excessively in class</td>
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<tr>
<td>29. Children diagnosed with ADHD tend to be accident prone</td>
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<tr>
<td>30. Stimulant medication increases a child’s ability to follow rules</td>
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<tr>
<td>31. ADHD is caused by an allergic reaction</td>
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<tr>
<td>32. Children diagnosed with ADHD tend not to finish their assignments</td>
<td></td>
<td></td>
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<tr>
<td>33. Special diets (e.g., reduced sugar, wheat free, milk free, additive free) are an effective treatment for ADHD</td>
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<tr>
<td>34. Dietary supplements such as fish oils are an effective treatment for ADHD</td>
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<tr>
<td>35. Children diagnosed with ADHD tend to blurt out answers in class</td>
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<tr>
<td>36. ADHD is caused by family problems</td>
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<tr>
<td>37. ADHD runs in families</td>
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<td>38. Children with ADHD experience difficulties in establishing strong family bonds</td>
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<td>TRUE</td>
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</tr>
<tr>
<td>39. ADHD is caused by the inconsistent application of rules and consequences</td>
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</tr>
<tr>
<td>40. Children diagnosed with ADHD tend to have difficulties following rules</td>
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<tr>
<td>41. Following stimulant medication children with ADHD may experience tics (motor movements and uncontrolled vocal sounds)</td>
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<tr>
<td>42. Children diagnosed with an Attention Deficit Disorder tend to engage in dangerous activities</td>
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<tr>
<td>43. Children diagnosed with ADHD tend to have poor handwriting</td>
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<tr>
<td>44. Electroconvulsive therapy (ECT) is an effective treatment for ADHD</td>
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<tr>
<td>45. Children diagnosed with ADHD tend to be disorganized</td>
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<tr>
<td>46. Stimulant medication reduces or suppresses appetite</td>
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<tr>
<td>47. Most children diagnosed with ADHD act impulsively (they do things without thinking)</td>
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<tr>
<td>48. ADHD is caused by a child not trying hard enough to control his/her behaviour</td>
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<tr>
<td>49. Stimulant medication is addictive</td>
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<tr>
<td>50. ADHD is caused by excessive exposure to environmental substances such as lead</td>
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<td>51. All children diagnosed with ADHD appear to be constantly on the go</td>
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<tr>
<td>52. Children diagnosed with ADHD tend to have poor concentration</td>
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<tr>
<td>53. Stimulant medication works within five minutes of taking it</td>
<td></td>
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<tr>
<td>54. ADHD is caused by inoculations</td>
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<tr>
<td>55. Homeopathic remedies are an effective treatment for ADHD</td>
<td></td>
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</tbody>
</table>
56. Children diagnosed with ADHD tend to have poor body posture (e.g. they appear to slouch, slump in their chair, or sprawl across their desk)

57. ADHD is caused by food sensitivities

58. ADHD is caused by inconsistent parenting

59. Children diagnosed with ADHD tend to make careless errors

If you would like to add any other comments about ADHD or comment on your experience participating in this research project, please do so here:

Thank you for completing this questionnaire. Your responses are very valued.
Appendix H

Assumption Tests for Chapter 4

Study 1: Following MacCallum, Browne and Sugawara’s (1996) power tables for 72 degrees of freedom, \( N = 168 \) was needed for power of .80 and a close fit. Close fit refers to testing the null hypothesis that the model fits the population at \( p < .05 \) (MacCallum et al., 1996). The achieved sample size of 224 pre-service teachers was satisfactory. Multivariate normality, multicollinearity, linearity, homoscedasticity and multivariate outlier assumptions were met. Due to concerns about significant positive skewness at \( p < .001 \) for five variables, PK2 (\( z_{skew} = 3.65 \)), C1 (\( z_{skew} = 3.44 \)), C2 (\( z_{skew} = 3.42 \)), PT1 (\( z_{skew} = 3.78 \)), and PT3 (\( z_{skew} = 4.06 \)), bias-corrected bootstrapped standard errors were used in the structural equation analyses (Byrne, 2001). The bootstrapped procedure is free of assumptions of normality and provides more accurate estimates of parameter values than parametric methods when there are non-normal variables (Byrne, 2001). All variables were left untransformed to maintain interpretability and to allow comparison to Smith et al.’s (2008) results.

Study 2:

Missing data: Combined sample. Data were collected from 327 pre-service teachers and 127 in-service teachers. Contrasts of missing cases (five cases on total knowledge, 63 cases on objective elaboration and objective ambivalence) versus complete cases on all the perceived attitude strength variables and total knowledge were non-significant (\( p > .001 \)). Thus, data was Missing Completely at Random (MCAR) (Byrne, 2001; Kline, 2005). Considering the large sample size and MCAR evidence, the 63 cases with missing data, which included 5 cases with missing scores on total knowledge, were excluded from the analysis, leaving complete cases for 111 in-service teachers and 280 pre-service teachers.

Model 1 assumptions. Assumptions for univariate outliers, homoscedasticity and linearity were met. Exclusion of 11 multivariate outliers using Mahalanobis distances for 15
Appendix H

predictors, \( p < .001 \) (Tabachnick & Fidell, 2007), left a sample of 269 pre-service teachers, which had good statistical power (MacCallum et al., 1996). Due to concerns about normality (Mardia criterion for multivariate kurtosis, \( z = 5.98 \), PAM3, \( z_{\text{skew}} = -8.61 \)) bias corrected bootstrapped standard errors were used in the analyses (Byrne, 2001). The variables were left untransformed to aid interpretability. A multicollinearity issue was detected. The items PK2 and PK3 were strongly correlated, \( r (267) = .94, p < .001 \), and loaded onto the smallest eigenvalue at .73 and .76, respectively. This was resolved by using the average of the two variables (abbreviated PK2a, see Table 2) in the SEM analyses (Tabachnick & Fidell, 2007). The final Durbin-Watson statistic was 2.06, which supported independence of errors among the endogenous variables.

**Model 2 assumptions.** Exclusion of 14 multivariate outliers detected using Mahalanobis distances for 19 predictors at \( p < .001 \), left a sample size of 366 (267 education students and 99 in-service teachers). Linearity assumptions were met, however heteroscedasticity was detected. Due to concerns about normality (direct experience, \( z_{\text{skew}} = 17.92 \), \( z_{\text{kurtosis}} = 23.19 \); personal experience, \( z_{\text{skew}} = 6.98 \); indirect experience, \( z_{\text{skew}} = 5.10 \); Mardia criterion for multivariate kurtosis, \( z = 8.82 \)), bootstrapped bias corrected standard errors were used (Byrne, 2001). The variables were left untransformed to aid interpretability. The items PK2 and PK3 were strongly correlated, \( r (364) = .93, p < .001 \), and loaded onto the smallest eigenvalue at .77 and .75, respectively. The average of these two variables was used in the SEM (PK2a).
**Appendix I**

Chapter 4, Study 1 (Experiment): Zero-order Correlations Between Predictor Variables, Potential Mediating Variables and Attitude Certainty with Descriptive Statistics

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*Note.* Abbreviations for the variables are shown in the materials section of Chapter 4.
Appendix J

Chapter 4, Study 2 Survey: Zero-order Correlations Between Predictor Variables, Potential Mediating Variables and Attitude Certainty for Pre-service Teachers (above the diagonal) and Combined In-service and Pre-service Sample (below the diagonal) with Descriptive Statistics

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Knowledge

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Elaboration

17. Observed .07  .12* .05  .05  .02  .07  .01  .00  .00 -.08 .06 .02 .03 .03 -.03 .01 1.00 .13* .00 .15*

Ambivalence

249
### Appendix J continued.

|     | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 18. Direct Experience | .32** | .26** | .32** | .35** | .30** | .28** | .37** | .29** | .11* | -.05 | -.15** | .25** | .23** | .22** | .12* | -.09 | 1.00 | .16* | .16**|
| 19. Indirect Experience | .28** | .23** | .43** | .36** | .39** | .43** | .36** | .38** | .10  | .07  | -.02  | .22** | .20** | .26** | .18** | -.04 | .16** | 1.00 | .08 |
| 20. Personal Experience | .16** | .21** | .24** | .25** | .27** | .32** | .19** | .20** | .21** | .04  | .04  | -.04  | .15** | .14** | .13*  | .06  | .11*  | .06  | .10  | 1.00 |

### Pre-service teachers:

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*Note.* Abbreviations for the variables are shown in the materials section of Chapter 4.