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AN EXPLORATORY REVIEW OF TEMPERAMENT RESEARCH: TRENDS AND IMPLICATIONS FOR THEORY AND INTERVENTION IN THE FIELDS OF DEVELOPMENTAL PSYCHOLOGY AND EDUCATION.

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A RESEARCH REPORT SUBMITTED TO THE FACULTY OF EDUCATION, UNIVERSITY OF THE WITWATERSRAND, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF EDUCATION (EDUCATIONAL PSYCHOLOGY)

JOHANNESBURG, 2006

DECLARATION

I hereby declare that this research report is my own unaided work. It has been submitted for the degree Masters of Education (Educational Psychology) at the University of the Witwatersrand Johannesburg. It has not been submitted for any degree or examination at any other university.

_____

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ACKNOWLEDGEMENTS

I wish to express my sincere appreciation to:

My supervisor, Mrs. E. Harcombe, with whom it has been an honour and a privilege to work. Her investment of time, unstinting support, interest, knowledge and valuable guidance have been an inspiration.

My parents, for their interest, patience and belief in me. I would especially like to thank my father for persevering with me through the long nights as we tried to make sense of technological limitations. Without the support of my parents this would not have been possible.

My Sister, Liesel, who spent hours talking and discussing these studies with me so that I may make better sense of them. Her support has been phenomenal, her optimistic spirit an inspiration.

Shireen and Karen, walked this road with me, who through their own experience know the pain and ecstasy a task of this proportion brings… It has been a privilege to share this learning curve with them.

Finally I would like to thank all those who have born witness to this phase of my intellectual journey willingly. All the prayers, warm wishes, moments of escape, and support have not gone unnoticed. Thank you Charlene for lighting the candles, Joy for motivating me to finish, Justin for the laughs, Tayln for your interest and valued technical advice, and Greg for your patience and belief in me to go the distance…

ABSTRACT

Temperament research has grown exponentially over the past decades. Diverse though the body of temperament research may be, due to the interest of many fields of study in this construct, fairly considerable areas of consensus in the understanding of temperament as a psychological construct has been achieved over the years. In other words, there is general agreement in the field that the notion that temperament is biological and genetic and that temperament plays a role in developmental contexts.

A review of recent temperament research (from 1998 to 2005) was done for this study. An automated search of many databases was conducted, as well as a hand search of well-accredited journals, mostly from the disciplines of developmental psychology and education. Based on selected criteria, 102 studies were chosen for review.

The findings of this study, based on an analysis of the selected studies, follow. For example, it was found that the large majority of the studies selected were methodologically sound. It was also noted that the various themes elicited from the analysis tended to follow the trends temperament research was following before 1998, at the beginning of this review. Evidence was also found that suggested there was a shift from using psychomedical frameworks towards constructivist, ecosystemic frameworks for underpinning temperament research, which suggests that contemporary temperament research is more likely to be studied from a developmental stance than it was a few years ago. The findings from this analysis were applied to issues in temperament research and practice in the context of developmental psychology and education.

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CHAPTER 1: LITERATURE REVIEW

INTRODUCTION:

Research on temperament has not been restricted to the field of psychology. The body of research has grown exponentially as interest in the topic has prompted contributions from various fields (e.g. education, biochemistry, physiology, pediatrics, psychiatric nursing, sociology and psychology, especially developmental psychology). Some of the early research still forms the basis of much of the temperament research currently conducted (this is especially true of the biological mechanisms that have been shown to influence individual differences).

The current status of research in temperament, especially in the fields of developmental psychology and education, is the subject of this review. A historical perspective of temperament theory and research follows as an introduction to the review.

HISTORICAL PERSPECTIVES

The study of temperament as a psychological construct goes back to ancient Greco-Roman times (Sanson, Hemphill & Smart, 2004), when philosophers and physicians led the field in their speculations on the nature of temperament. Philosophy continued to form the basis of temperament conceptualizations until the end of the 19th century when academia incorporated the notion of empiricism to theorizing (Strelau, 1998). Heymans (1906a, 1906b, 1906c, 1907, 1908a, 1908b, 1909, 1912, 1918 in Strelau, 1998) is often credited as being the 'father' of experimental personality research as he undertook the first known systematic empirical study on temperament using an experimental, psychometric and biographical approach (Strelau, 1998).

Biological emphases

In the early 20th century, temperament theories became increasingly more empirical and physiological in nature. Pavlov (1927 in Hergenhahn, 1992), for example, deepened the emphasis on physiology in his efforts to promote psychology as a science. His carefully monitored, controlled and systematic laboratory studies on temperament were instrumental in demonstrating the role the central nervous system (CNS) played in temperament (Pavlov, 1927 in Hergenhahn, 1992; 1935 in

Strelau, 1998). While Pavlov's studies highlighted individual differences in CNS reactivity, Teplov and Nebylitsyn's work (1972 in Kohnstamm, Bates & Rothbart, 1989) demonstrated additional properties of the CNS such as sensory threshold, strength of inhibition, lability (Teplov, 1964 in Kohnstamm et al., 1989) and dynamism (the speed at which conditioned responses are formed). In addition, Krasnogorsky (1939, 1953 in Strelau, 1998), using Pavlov's work as a base, identified four nervous system types in his studies on the nervous system properties in children. Krasnogorsky differed from the Pavlovian tradition in suggesting that temperament changes may be due to environmental factors such as learning, nutrition, social events, education and various diseases. Some researchers moved away from the notion of CNS conditioning and concluded instead that temperament was inborn and stable (Ivanov-Smolensky, 1935, 1953 in Strelau, 1998; Nebylitsyn, 1972 in Kohnstamm et al., 1989; Teplov, 1964 in Kohnstamm et al., 1989).

The notion that temperament is biological and genetic has continued, over the years, to receive considerable research attention, and many theorists posit that there is sufficient evidence to confirm this notion (Allport, 1937 in Strelau, 1998; Diamond 1957 in Strelau, 1998; Thomas & Chess, 1977 in Strelau, 1998; Buss & Plomin, 1975,1984 in Strelau, 1998; Rusalov, 1985, 1989c in Strelau, 1998). For example, the specification of the anatomo-physiological mechanisms and other biochemical factors that underpin temperament, have received considerable research attention (Eysenck, 1970 in Strelau, 1998; Gray, 1982 in Strelau, 1998; Kagan, 1984 in Strelau, 1998; Zuckerman, 1979 in Strelau, 1998). Hormone research has also contributed to the body of knowledge in temperament. Frankenhaeuser (1986 in Kohnstamm et al., 1989) found that the two adrenal systems, namely the sympathetic-adrenomedullary and pituitary-adrenocortical could be linked to the temperament dimensions of effortful control and distress respectively. Frankenhaeuser and Johansson (1976 in Kohnstamm et al., 1989) also found links between temperament and cognitive performance when studying epinephrine levels.

While some theorists posited that temperament is mono-dimensional (Kagan, 1989; Zuckerman, 1979), other researchers theorized that it is multi-dimensional (Buss & Plomin, 1975; Rothbart & Derryberry, 1981; Strelau, 1998; Thomas & Chess, 1977 in Strelau, 1998), however, consensus has not yet been achieved.

In spite of a considerable body of research, regarding the heritability of temperament, many researchers consider that there is insufficient evidence to prove the genetic link (Holden, 1987 in Strelau, 1998; Loehlin & Nichols, 1976 in Strelau, 1998).

Another biological trend in temperament research was pursued by Kretschmer (1921 in Strelau, 1998), Sheldon and Stevens (1942 in Strelau, 1998) and Sheldon, Stevens & Tucker (1940, 1942 in Strelau, 1998) who developed a highly systematic framework positing that temperamental traits were linked (directly or indirectly) to body morphology or body types. This framework was immensely popular and generated considerable research. For example, Walker, (1962 in Khonstamm et al., 1989) and Hanely (1951 in Kohnstamm et al., 1989) linked somatotype to teachers' and peer ratings of behaviour patterns in young school children. Some studies have also linked delinquency to body types (Cortes & Gatti, 1972 in Khonstamm et al., 1989; Glueck & Glueck, 1950, 1956 in Khonstamm et al., 1989). In the 1980s body morphology research was also linked to the study of Type A behaviour and heart disease (Matthews, 1980, 1982 in Kohnstamm et al., 1989; Matthews & Avis, 1983 in Khonstamm et al., 1989; Steinberg, 1986 in Khonstamm et al., 1989; Whalen & Henker, 1986 in Khonstamm et al., 1989).

Temperament and psychological constructs

Temperament research has also explored links with certain psychological constructs. For example, temperament was linked to individual differences in emotion (Allport, 1937 in Strelau, 1998; Eysenck, 1970 in Strelau, 1998; Mehrabian, 1978 in Strelau, 1998; Goldsmith and Campos, 1982 in Strelau, 1998) and CNS temperament traits were linked to styles of behaviour (Thomas and Chess, 1977 in Strelau, 1998; McDevitt and Carey 1978, in Strelau, 1998; Strelau, 1983 in Strelau, 1989; Buss & Plomin, 1975; Rothbart & Derryberry, 1981; Rusalov, 1989a).

Moving from positivist to constructivist frameworks

Most of the research referred to above was based on a positivist, psycho-medical framework, that is, temperament was examined either as a genetic, biological construct or as a conditioned response. However, in the 1970s Thomas and Chess extended their studies to examining the interactions between the individual's temperament and his or her environmental niche (Thomas & Chess, 1977 in Rothbart 2004; Wachs & Kohnstamm, 2001). This change in direction echoed the

contemporary move from a modernist/positivist, philosophy to a more postmodern, constructivist philosophy (Appleton & King, 2002).

This meant that as researchers applied constructivist principles to the study of temperament, findings increasingly led to a growing consensus that temperament research regarding children and adolescents needed to be understood from a developmental perspective (Kohnstamm et al., 1989; Rothbart, 2004; Thomas, Chess & Birch, 1968; Wachs & Kohnstamm, 2001).

This meant that researchers moved, with varying degrees, from unidimensional to multidimensional forms of research, especially in the context of child and youth development. An example of such studies includes Thomas and Chess's landmark research (Thomas, Chess & Birch, 1968) which contributed considerable insight into the role temperament plays in child development. The findings of this multidimensional, longitudinal study emphasized the notion that the environment and temperament are not independent entities, as not only do they interact, but they also have the potential to modify each other (Thomas, Chess & Birch, 1968). In other words, as individual characteristics, such as temperament, ability and motivation interacted with the environment, specific behaviour patterns were found to evolve during the course of development (Thomas, Chess & Birch, 1968, p182).

Thomas and Chess's pioneering work also led to the developmental notion of 'goodness of fit'. Goodness of fit refers to the congruency achieved between environmental demands and the individual's ability and characteristics, which may lead to positive or negative behavioural and / or developmental outcomes which can contribute to the development of risk or resilience traits in young people (Keogh, 2003). These findings are seen as having important implications for understanding and predicting how children differ and how these differences are continuously expressed as significant factors in psychological growth and reactions to environmental stressors (Thomas, Chess & Birch, 1968; Keogh 2003). Goodness of fit findings are also seen as having implications for various medical, psychological and educational interventions (Teglasi, 1998; Keogh 2003).

This shift from a positivist view to a constructivist view has led to a proliferation of research regarding the interactions between temperament and various biological, development, education, and psychology variables, which in turn has promoted a considerable growth in temperament knowledge, especially in the context of child and youth development. A brief summary of these findings follow in the next section.

Temperament/environment interaction

The interactions between the biological aspects of temperament and environmental influences became increasingly the focus of research (Teplov, 1964 in Kohnstamm et al., 1989; Rusalov, 1987 in Kohnstamm et al., 1989; Strelau, 1972 in Kohnstamm et al., 1989), which led researchers to suggest that neither genetics nor context could be the sole contributor in understanding temperament.

Neurophysiological research also highlighted similar interactional complexities such as Gray's neurophysiological model (1979,1982 in Kohnstamm et al., 1989; Amsel, 1986 in Kohnstamm et al., 1989) which examined the effects of the interaction between behavioural inhibition and behavioural activation on temperament. In addition, functional brain imaging and the mapping of the human genome has allowed for the examination of links between inherited structures, temperament and the effects of experience (Rothbart, 2004).

Aspects of social development have also been linked to the interactions between temperamental characteristics and various environmental influences. For example, some studies have linked social developmental outcomes to the influence of temperament on parenting styles (Ghazinour, Richter, Emami & Eisemann, 2003; Lytton, 1990 in Sanson, Hemphill & Smart, 2004; Nixon, 2001; Rubin and Stewart, 1996 in Sanson et al., 2004; Sanson & Rothbart, 1995 in Sanson et al., 2004; Scar, 1992 in Sanson et al., 2004; Spangler, 1990 in Sanson et al., 2004; Wachs, 1988 in Sanson et al., 2004), while other studies examined the link between temperament and peer relationships (Chen, Rubin and Li, 1995 in Sanson et al., 2004; Skarpness & Carson, 1986 in Sanson et al., 2004; Stocker & Dunn, 1990 in Sanson et al., 2004). Social competence and delinquency have also been linked to the interactions between temperament and environmental influences

(Eisenberg, Fabes, Bernzweig, Karbon, Poulon, & Hanish, 1993 in Sanson et al., 2004; Fabes et al., 1999; Windle, 1990).

Researchers have also demonstrated links between early childhood temperament, environmental variables and later adjustment problems in adolescence (Hagekull, 1994 in Sanson et al., 2004; Katainen, Räeikköenen & Keltikangas-Järvinen, 1999 in Sanson et al., 2004; Ledingham, 1991 in Sanson et al., 2004; Maziande et al., 1990; Tubmin & Windle, 1995; Wills, DuHawel & Vaccaro, 1995 in Sanson, 2004; Wills, Windle & Cleary, 1998 in Sanson et al., 2004).

Children's coping abilities, resilience and their response to stress have also been noted as being dependent on interactions between temperament and environmental influences (Carson & Bitner, 1994; Harcombe, 1993; Rubin, Coplan, Fox & Calkins, 1995 in Sanson et al., 2004;Smith & Prior, 1995 in Sanson et al., 2004; Werner & Smith, 1982 in Sanson et al., 2004).

Though emotional development in relation to temperament has not been researched as much as have other aspects of development, a few studies linked temperament interactions to the development of depression (Tubmin & Windle, 1995), and empathy (Bryant, 1987 in Sanson et al., 2004).

Some links have also been made between temperamental interactions and the development of cognition (Harcombe, 1993) and cognitive constructs such as conscience (Koschanska, DeVet, Goldman, Murray & Putnam, 1994 in Sanson et al., 2004)

Interactive temperament research in education has focused mainly on exploring temperament interactions with academic achievement (Burrows, Horton & Oakland, 1997; Guerin, Gottfried, Oliver & Thomas, 1994 in Sanson et al., 2004; Harcombe, 1993; Lerner, Lerner & Zabski, 1985 in Sanson et al., 2004; Martin, 1989 in Sanson et al., 2004; Paterson, & Sanson, (1999) in Sanson et al., 2004; Skuy, 1992 in Harcombe 1993). Using temperament styles as a basis for academic instructional approaches, some studies showed positive findings (Barklay, 1983 in Sanson et al., 2004; Keogh & Burnstein, 1988 in Sanson et al., 2004; Orth & Martin, 1994 in Sanson et al., 2004).

Studies have also attempted to research the role goodness of fit can play at school (Lerner, 1986 in Sanson et al., 2004; Talwar, Nitz & Lerner 1990 in Sanson et al., 2004).

Temperament and wider contextual interactions

Temperament research that incorporates the wider social context, cultural variables, social economic status, gender and other group differences into the studies is becoming more common. For example, de Vries's research (1984 in Strelau, 1998) on temperament and infant mortality rates during a famine among the Masai in East Africa is a well quoted example of how different temperament characteristics are valued in some contexts but not in others. Research linking positive adjustment, temperament and cultural values is also on the increase (Chen et al., 1995 in Sanson et al., 2004; Korn & Gannon, 1983 in Sanson et al., 2004).

CONCLUSION

So far this review of temperament research has covered approximately a hundred years. Towards the end of this time fairly considerable areas of consensus in the understanding of temperament as a psychological construct has been achieved. In other words, there is general agreement on what constitutes temperament, as evidenced by a roundtable discussion organized for developmental temperament researchers in 1987 where a definition of temperament was generally accepted (Strelau, 1998). This definition concluded that "temperament refers to behaviour characteristics in which individuals differ such as intensity, energy, strength, speed, tempo, fluctuation and mobility; it is relatively stable as compared with other phenomena and is also characterized by considerable cross-situational consistency; and it has a biological basis" (Strelau, 1998, *p 35*). Temperament researchers and theorists also agreed that temperament influences development.

However, after all these years of temperament research, and despite the agreed notion that temperament influences development, there is little research evidence to show that developmentalists, psychologists, and educationalists have been using temperament in training programmes and / or in their practice (Bates, 1984 in Sanson et al., 2004; Carey in Kohnstamm et al., 1989; Ford & Lerner, 1992; McClowry in Teglasi, 1998; Pawson & Tilley, 1997; Wachs & Kohnstamm, 2001).

CHAPTER 2: METHODOLOGY

RATIONALE

An exploratory review of current temperament research would be effective for researchers, theorists and practitioners for many reasons. Firstly, temperament research emanates from many fields and many perspectives. Examining temperament studies would illustrate the extent to which consensus is being achieved in relation to temperament, especially in the fields of developmental psychology and education. Such analysis would also enable a critique of research methodology to be conducted.

Secondly, a review study would provide an opportunity for examining the theories that underpin this research, thereby enabling a critical engagement with theoretical development in the field of temperament research in the context of human development and education. This engagement would provide a platform from which the efficacy of current research could be examined, both in terms of theory and practice. It could also provide researchers committed to temperament research with rationales for continuing with and/or refocusing future research.

And finally, a review of this nature could prove to be a valuable resource for making decisions on how to use temperament research in practice. For example, a critical analysis of these studies could help practitioners (such as teachers, parents and psychologists) to have easier access to these findings. In addition, it would enable practitioners and / or researchers to apply the findings to intervention design more confidently, as practitioners are often hesitant to implement programmes unless they are convinced of their viability and efficacy.

RESEARCH QUESTIONS

1. To what extent is the reviewed temperament research (during the period 1998 – 2005) methodologically sound?
2. What themes emerge from this body of research?
3. What theoretical frameworks emerge?
4. What implications for future research and theory can be drawn from the findings of this review?

DATA COLLECTION PLAN:

An exploratory review of the research was undertaken according to the following procedures:

Search procedures:

An automated search of the following databases was conducted to identify articles for possible inclusion in this study: Educational Resources Information Center (ERIC), ProQuest, Ebcohost and PsychINFO. Ancestry was used to locate additional studies cited in the reference lists of articles obtained through the database search and other comprehensive texts published on temperament. A hand search of selected journals was also carried out to ensure that a fair representation of published research on the topic had been identified. These journals included: *Child Development, Child Psychology and Psychiatry, The British Journal of Psychiatry, The American Journal of Psychology, The Journal of Personality Assessment, The International Journal of Psychology, The Journal of Abnormal Psychology, The British Journal of Developmental Psychology, The British Journal of Clinical Psychology, The South African Journal of Psychology, The South African Journal of Education, Adolescence, The British Journal of Educational Psychology and The American Academy of Child and Adolescent Psychiatry.* These particular journals were selected because they are frequently cited as sources of articles on temperament.

It is accepted that some temperament research may exist that although relevant to this review has not been included, as all journals from all the countries mentioned have not been reviewed. However, as stated above, journals included for the review were based on the criterion of being those most frequently used to publish temperament research. So while *all* relevant research has not been included in this corpus, is considered that the selection is a comprehensive indication of the trends in temperament research.

Selection Criteria:

To be selected for the corpus, a study was required to meet several criteria:

a. For the purposes of this research it is accepted that temperament exists and therefore research that seeks to define or prove its existence was not included in this study.
b. The study had to be published in a refereed journal.
c. Only current research was reviewed, that is research that has been published in the last 7 years (1998 – 2005). As the search was quite extensive, the hand search covered only the last 5 years (2000-2005).
d. For the purposes of this study research that applied temperament to child/youth development, psychology and education was chosen.
e. To incorporate the wide variety of research that has been done on temperament it was decided to use all studies that defined the construct of temperament in line with the broad temperament definition as was negotiated at the roundtable discussion in 1987 by developmental researchers (in Strelau, 1998). That is:
    - Temperament refers to behaviour characteristics in which individuals differ.
    - Temperament refers mainly to formal characteristics of behaviour or reactions, such as intensity, energy, strength, speed, tempo, fluctuation and mobility
    - Temperament is relatively stable as compared with other psychological phenomena and is also characterized by considerable cross-situational consistency.
    - Temperament has a biological basis.

In applying these criteria, 102 articles were identified for inclusion in this study (these articles have been preceded by an asterisk * in the reference list).

Inter-rater Reliability

Twenty of the studies were randomly selected for evaluation by a second reader to establish coding reliability. An Honours student, who had taken courses in research methodology, independently scored the sub-sample of the corpus using the set of internal and external validity criteria. Coding discrepancies were resolved through discussion.

DATA ANALYSIS:

Data Analysis for Research Question 1

Data analysis has been specifically structured around the three research questions. Since the first research question requires an examination of the methodological rigor of the corpus, the studies were subjected to an evaluation of internal and external validity using a quantitative coding procedure. The set of criteria for evaluating these studies with respect to internal and external validity is presented below in ***Table 1.***

Table 1: Definitions and weightings for internal and external validity

Criterion	Definition	Weighting factor
Internal validity Criteria		
General Design characteristics		
Random assignment	Participants were randomly chosen.	0-1
Control group intervention	Participants in the control group received an alternate intervention to control for the Hawthorne effect. Studies that are not intervention-based will be evaluated for the controls that were put in place. A person-oriented approach where participants are clustered according to various attributes has been identified as a good method for identifying interaction effects (Sanson et al., 2004). If this was done to establish some form of control the study will receive a weighting of one.	0-1
Research Design	For research to be sensitive to the developmental context it should be at least longitudinal in design (Sanson et al., 2004). • One-time measurement studies will receive a weighting of 0 • Cross sectional designs will receive a weighting of 1 • Longitudinal designs a weighting of 2 • Longitudinal designs combined with cross-sectional designs will receive a weighting of 3.	0-3
Number of interacting variables studied.	Simple linear studies are not considered to be effective in accurately representing the complex systems in which temperament develops. Research which focuses on a number of variables and their dynamic interactions is considered to more accurately reflect the complexities of roles temperament can play in development (Sanson et. al., 2004). Accordingly: • Unilinear studies will receive a weighting of 1 • Bidirectional studies will receive a weighting of 2 • Studies considering interactional effects of more than 3 variables will receive a weighting of 3	0-3
Mortality rates of participants	The number of participants in each group at the conclusion of the study should be approximately the same as when the study commenced. Unequivalent mortality rates may be associated with negative treatment characteristics or significant differences between those participants who remain and those who withdraw. Analysis of mortality rates is important in temperament research to elucidate whether or not dropout rates are in any way linked to temperament. If analysis has	0-1

	not been undertaken and/or if mortality rates are very high then the study will receive a weighting score of zero. Low mortality rates and/or analysis thereof will receive a rating of one.	
Measurement		
Operationalised measures	Dependent measures were described in enough detail so that the underlying variables of interest were clearly evident.	0-1
Reliability of measures reported	• If reliability estimates were provided the study receives a weighting of one • If treatment conditions were described in adequate detail to permit replication attempts the study receives an additional weighting of one.	0-2
Statistical treatment		
Sufficiently large N	The number of participants in each condition is sufficient to control Type 2 error probability. That is power analyses were conducted to ensure the sample size was large enough.	0-1
Type 1 error controlled	Some procedure was used to control for Type 1 error probability when multiple statistical comparisons were made. Statistical evidence was used to show that the null hypothesis has not been rejected in error. For example conducting multivariate analysis followed by univariate tests, or using planned comparisons.	0-1
Statistical analysis	Acceptable statistical tests/conventions were followed given the purposes of the study and nature of the hypotheses being tested. For research in temperament to be contextual, effort would have to be made to study interaction effects (Sanson et al., 2004). Simple correlation studies are not able to adequately capture the complex interactions of multiple systems relevant in developmental research. Statistical analysis of the studies was weighted according to the level of interactions it intended to measure: • A weighting of 1 is given to studies that are purely unilinear i.e. only ANOVA's were used to studies the variables • Multiple hierarchical regression analysis is given a weighting of 2 • A weighting score of 3 is allocated if structural equation modeling, LISREL, or latent growth curve modeling or trajectory analysis has been used as these are the best methods for measuring interaction effects. (Sanson et. al, 2004)	0-3
Effect sizes reported	Effect sizes were reported	0-1
External validity criteria		
Research hypotheses		
Rationale for the study	A direct link between research questions and the study is clear	0-1
Participant selection and description		
Participant selection	Participant selection clearly described. Inclusionary and/or exclusionary criteria for study participation delineated	0-1
Age	Mean chronological age of participants provided	0-1
Gender	Number of male and female participants provided	0-1
Grade	Number of participants at each grade level for children/adolescents and educational	0-1

	level of caregivers (where appropriate) provided	
Ethnicity	Ethnicity composition sample described	0-1
SES	If the socioeconomic status of the sample is described, the study will receive a weighting of 1. SES is an important aspect of the systems interacting with other variables in the development of temperament. In including SES in the research as an interacting variable the study is taking the broader social context into consideration. This is constructivist, adding not only to the methodological rigor of the study, but allows the study to more accurately represent the complexity temperament development. These studies will receive a weighting of 2.	0-2
Political	In accordance with ecosystemic theory, politico-socio-economic variables have a significant impact on the development of individuals. If politico—socio-economic variables are referred to in the study it will receive a rating of 1. If political-socioeconomic variables are included in the study it will receive a rating of 2	0-2
Locale	Location of the study indicated	0-1
Temperament		
Inter-rater reliability	Temperament assessment was not based solely on one method of assessment Temperament assessment should include at least two of the following: laboratory, home and/or school observations, inventories filled out by an assessor and caregiver or teacher (Kagan, 1989). • One method of assessment will receive a weighting of zero • Two methods of assessment will receive a rating of 1 • Three methods of assessment (including at least one form of laboratory observation and one inventory) will receive a weighting of 2 • Temperament assessed through natural/laboratory observations in different situations and with inventories by an assessor, caregiver and teacher or peer will receive a weighting of 3	0-3
Assessment Tools	In order to check socio-cultural effects, it is important to choose and administer assessment tools in a manner that minimizes confounding. E.g. for self-report questionnaires participants should have an appropriate reading level, also content and format should be free of cultural or ethnic bias (Fullard, McDevitt & Carey 1984, in Kohnstamm et al., 1989). This would be relevant for cross-cultural research where questionnaires etc. have been translated for use on the specified population…	0-1

The criteria chosen have been adapted from a variety of sources: relevant internal and external validity measures have been taken from the work of Campbell and Stanley (1963), Cook and Campbell (1979), and Huck, Cornier, and Bounds (1974) as used by Troia (1999). Criteria specific to temperament research arose out of previous research and reviews on temperament emphasizing the importance of contextualizing temperament research (Sanson et al., 2004; Kagan, 2003; Rothbart, 2004; Wachs & Kohnstamm, 2001). Internal and external validity criteria have been adapted to fulfill these requirements.

Each criterion is accompanied by a brief definition and a weighting factor representing its significance to the interpretations and generalizability of the study. The criteria are weighted so that

the studies receiving the highest scores are considered to be methodologically sound according to the criteria used in ***Table 1*** (see pp 11-13).

Tables 2 and ***3*** (See Appendices 1 and 2) report the coding decisions of this study for internal and external validity respectively, for each study in the corpus. The coding decisions for these studies are compiled as frequency counts in these tables for purposes of comparison and clarity of results. These tables have been placed in the Appendix as the coding data for the 102 studies was considered too extensive to incorporate in the body of this paper.

The ratio and percentages of the studies that met each criterion are summarised at the ends of ***Tables 1 and 2.*** Graphical representations have also been included to help elucidate the methodological rigor of the studies (see Chapter 3 for ***Graphs 1 and 2***).

Data Analysis for Research Question 2

The second aim of this research is to identify emergent themes in current temperament research As well as the extent to which these themes built on previous findings. An analysis of temperament research prior to 1998 (see chapter 1) suggests there is a growing consensus amongst temperament researchers that the study of temperament is done most soundly within a developmental context (Sanson et al., 2004; Kagan, 2003, Rothbart, 2004, Wachs & Kohnstamm, 2001), which motivated that the themes identified in this study should be developmental in nature. In addition, it was taken into account that for the purpose of this study the constructivist (ecosystemic) model was accepted as the theoretical underpinning for developmental research. On the other hand, for purposes of comparison, studies that were based on a static, psychomedical model, were also included for analysis as long as these studies researched temperament from a developmental viewpoint.

Consequently themes relating to children and youth with a particular emphasis on the interactions between the various systems that affect child and youth development were culled from the examined body of research using thematic content analysis (Neuman,1997), as was done with the literature before 1997 (see Chapter 1). The combined outcome of the analyses resulted in the following themes which were then utilised as the units of analysis in this review. Using a

combination of textual and thematic content analysis, the studies were searched for the content of these themes. The results of the search were then compiled as frequency counts for the various themes which both facilitated the analysis of the themes and the tracking of the extent to which these themes built on previous findings.

The themes used for this review include the following:

- Temperament and biological-environmental interactions
- Temperament and stress, coping and resilience
- Temperament and cognitive development
- Temperament and social development
- Temperament and emotional development
- Temperament and behavioural development
- Temperament and adjustment
- Temperament and goodness of fit
- Temperament and academic performance
- Temperament and academic instruction
- Temperament and psychological instruction
- Temperament interventions

The data mapping of these themes can be found in ***Table 4*** (see Appendix 3).

These trends are also analysed in terms of numbers of studies for each theme, year of publication, country of origin and theoretical underpinnings, which are represented graphically in ***Graphs 3 - 7*** (see Chapter 3). Frequency counts were once again used to facilitate the graphical representation of these results.

Data Analysis for Research Question 3

The third research question required the analysis of the theoretical frameworks underpinning the studies reviewed. As mentioned previously, since there is a growing consensus amongst temperament researchers that the study of temperament is done most soundly in a developmental context (Sanson et al., 2004; Kagan, 2003; Rothbart, 2004; Wachs & Kohnstamm, 2001), it was considered essential that underpinning theory should be interrogated to elucidate leanings toward constructivism. Therefore, for the purpose of this study, the theoretical underpinning of each study was analysed and assigned to either a psycho-medical or a constructivist, ecosystemic category. This has been done using a combination of textual and thematic content analysis (Neuman, 1997), whereby the studies were scrutinized for textual and / or thematic evidence of either a psycho-medical or a constructivist, ecosystemic theoretical underpinning.

The following criteria were used as a basis for these decisions:

- Criterion 1: Studies were designated by the researchers as belonging to one or the other orientation
- Criterion 2: The research questions and design indicated the theoretical orientation
- Criterion 3: The findings indicated the theoretical orientation

The theoretical frameworks of each study are reflected in ***Table 4*** (see Appendix 3). The various countries that have participated in research in temperament have also been included to track world-wide trends in theoretical orientation. The data on these countries was compiled as frequency counts for later graphical representation for this purpose.

Data Analysis for Research Question 4

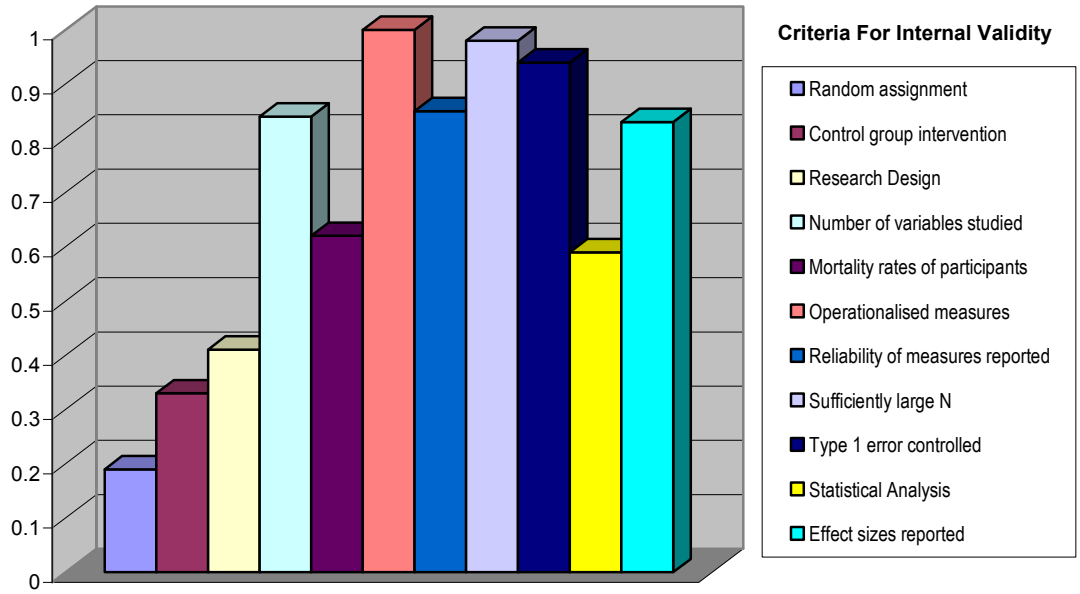
This question will be addressed in Chapter 4. The data used as a basis for this discussion will be drawn from the findings presented in the following chapter.

CHAPTER 3: RESULTS

The research questions are used as a structure for the presentation of the findings of this review.

RESEARCH QUESTION 1: TO WHAT EXTENT IS TEMPERAMENT RESEARCH (FOR THE PERIOD 1998-2005) METHODOLOGICALLY SOUND?

Table 2: Internal Validity and ***Table 3: External Validity*** (see Appendix 1 and 2) report the coding decisions for each study in the corpus. In addition, an overview of internal and external validity has been graphically represented below in ***Graph 1*** and ***Graph 2*** respectively. For clarity, the individual criteria have been graphically represented as differently coloured bars. The bars indicate the ratio of studies that fulfilled the specified criteria. For example, should a bar reach the number 1 on the scale it would indicate that all studies fulfilled that criterion. The results, in terms of each validity criterion, are then described verbally.



Graph 1: Internal validity results

INTERNATAL VALIDITY RESULTS

General design characteristics

- *Random assignment*: Participants were randomly chosen for 19 (19%) of these studies. This is a very low percentage, but this is not unusual, as random assignment in social research studies is particularly difficult to achieve.

- *Control groups*: Controls were used in 34 (33%) of the studies. Control groups were used for studying the efficacy of intervention programmes (for example, Nixon, 2001; Rapee, Kennedy, Ingram, Edwards & Sweeney, 2005; McClowry, Faan and Galehouse, 2002). Other studies analysed the differences between two clearly contrasting groups. Most often these studies compared 'pathologised' participants (for example, bipolar disorder, bulimia etc.) to 'normal' controls (for example, Kristensen & Torgersen, 2002; Wolke, Rizzo & Woods, 2002; Tripi, Palermo, Thomas, Goldfinger, & Florentino-Pineda, 2004; Al-Yagon, 2003; Dudley, Roy, Kelk & Bernard, 2001; Engström, Bransdström, Sigvardsson, Cloninger & Nylander, 2003; Giancola & Mezzich, 2003; Gomez & Baird, 2005; Ivarsson & Winge-Westholm, 2004). Researchers also compared specific temperament traits that are often associated with maladjusted individuals to those that were not maladjusted. For example, Jackson and Center (2002) compared individuals who where high in extraversion and neuroticism to individuals who are low in both traits. Most of the studies using controls chose to use a person-oriented approach where participants were clustered according to various attributes to facilitate the identification of interaction effects. For example, participants were clustered according to gender, age and most frequently, socio-economic context.

- *Research design*: For this criterion studies could receive a weighting score ranging from 0-3 depending on the type of research design. As argued in the methodology, studies using a combination of longitudinal and cross-sectional research design were considered methodologically sound and as such received higher scores. The average of these weighting scores yields a value of 41% indicating a rather low score of achievable ratings for the studies (see ***Graph 1***). However, using this score on its own is of little value as it is rather meaningless. A breakdown of the various weighting scores gives a better reflection of the

internal validity of these studies for this criterion. Of the 102 studies only 4 (4%) used a combination of longitudinal and cross-sectional design. 49 (48%) used a longitudinal research design, 6 (6%) used a cross-sectional design and 38 (37%) based their data on a one-time measurement of the participants. Though slightly more than half of the studies used a longitudinal research design or a combination of longitudinal and cross-sectional design, obviously slightly less than half of the studies did not, which is considered a serious methodological flaw, especially considering the perceived consensus that temperament should be studied in a development-sensitive manner.

- *Number of variables:* For this criterion studies could receive a weighting score ranging from 0-3 depending on the number of variables included for study. As argued in the methodology (see chapter 2), studies that included 3 or more variables for study were considered methodologically sound and as such received the higher weighting scores. The average of the weighting scores of this criterion indicate that 85% of achievable weightings were achieved (see ***Graph 1***). At the outset this score seems quite impressive, however due to the wide range of weighting scores; it is rather meaningless on its own. A closer consideration of the scores reveals that researchers are attempting more social constructivist (ecosystemic) temperament research as 65 (63%) of the studies included 3 or more variables for measurement. However, about half of these studies used simple, correlational statistical analyses, instead of, for example, the more complex regression analyses, which would have teased out the interaction effects of the variables more effectively. In addition, broader contextual variables (although mentioned as the external validity criteria indicate) were rarely used in statistical anaylses as only 15 (14 %) included the broader socio-economic context (SES) as a variable in the study, and 3 (3%) included the political context. 28 (27%) of these studies were bi-directional in nature, studying the impact of at least 2 variables on each other, however these variables were mostly intra-psychic in nature, which though systematic, is not contextual. Finally 9 (9%) of these studies were unilinear and correlational in nature.

- *Mortality rates*: Approximately two thirds of the studies mentioned mortality rates (62%). Of the 38 studies that did not report mortality rates 11 were longitudinal in design and one was longitudinal in combination with cross-sectional. This is considered a serious methodological

flaw for these studies, as data cannot be considered free of bias unless attrition effects etc. were tested for. The other 26 studies were one-time measurements.

Measurement

- *Operationalised measures*: All studies operationalised their measures and were clear in identifying dependent variables and describing other variables of interest in the research.

- *Reliability of measures reported*: As argued in the methodology (see chapter 2) studies that provided reliability estimates and described the study in enough detail for replication purposes were considered methodologically sound and received the higher weighting scores. ***Graph 1*** indicates that when averaging the weighting scores 85% of achievable ratings (0-2) were reached for this criterion. However this score gives little information on the true validity of these studies. A closer look at the scores reveals that 75 (73%) of the studies received a rating of 2, meaning that they provided reliability estimates for their results and described their research in enough detail so that the studies could be easily replicated. 24 (23%) did not report reliability estimates for their results but did however describe the study in enough detail for replication. One study (Rieser-Danner, 2003) supplied insufficient reliability data.

- *Type I and Type II error:* Type II error was controlled for in all but two of the studies. Type I error was controlled for in all but 6 (6%) of the studies usually by conducting multivariate analyses followed by univariate tests, or by using planned comparisons.

- *Sufficiently large sample size:* 95% of these studies used sufficiently large sample sizes.

- *Effect sizes:* Effect sizes were reported in 85 (83%) of the studies.

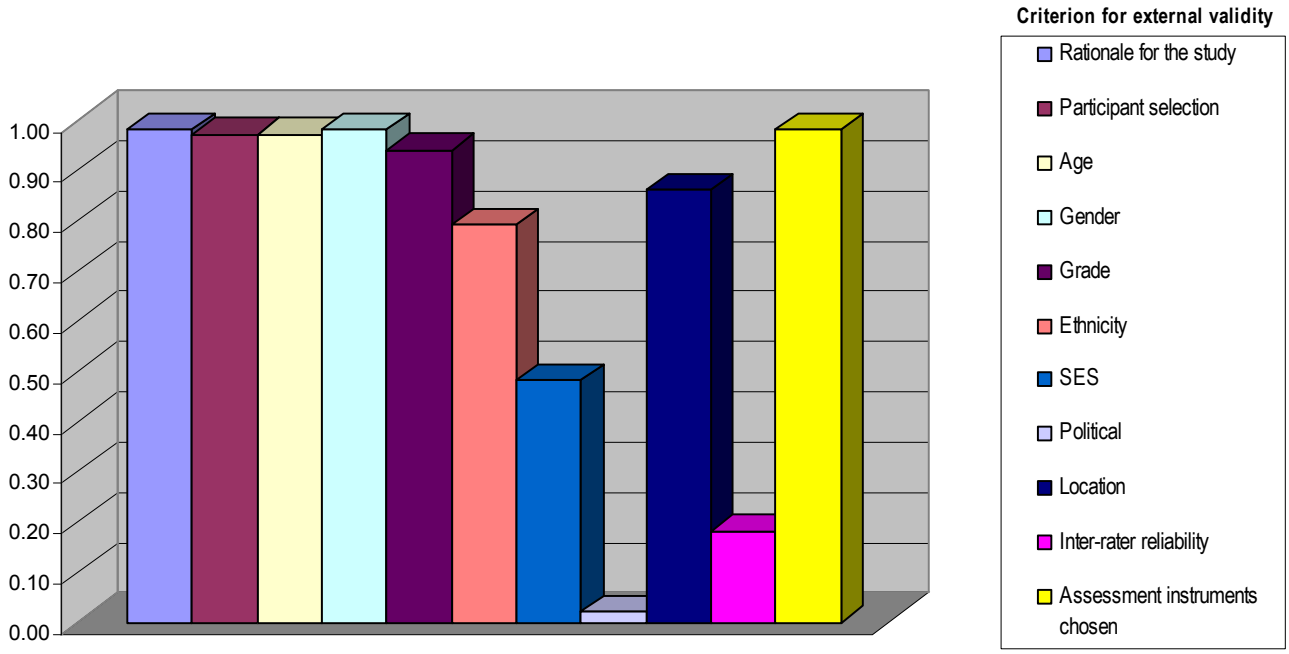
- *Statistical analysis*: Studies were weighted differently depending on the method of statistical analysis used (see the methodology chapter). Studies utilizing structural equation modeling, LISREL or latent growth curve modeling or trajectory analysis were considered methodologically sound for the purposes of studying temperament, and as such these studies were given the higher weighting scores. ***Graph 1*** indicates that when the weighting scores for

this criterion were averaged, 59% of the studies received achievable weightings. However, due to the wide range in weighting codes (0-3), this score does not give an accurate description of the internal validity of the statistical analysis. A closer look at the spread of scores according to the various weighting codes will give more clarity: 51 (50%) of the studies used multiple regression analysis while 15 (15%) used structural equation modeling, latent growth curve modeling or trajectory analysis (e.g. LISREL). This indicates that the majority of researchers in temperament are becoming more aware of matching statistical design to enhance developmental outcomes. However, as noted previously, not all these studies were contextual, but tended to examine the interaction of intra-psychic variables.

36 (35%) of the studies used simple correlation statistical methods to examine their data. Even though 14 (14%) of these studies had included 3 or more variables, simple statistical correlation methods were used instead of more sophisticated methods such as regression analyses. In the same vein, 15 studies measured bi-directional relationships by simple statistical correlation methods. This means that many of the studies reviewed could have used more appropriate statistical analyses and / or more developmentally sensitive research questions, which would have been more effective in revealing the complex interaction effects between person and context.

To summarise, when reviewing ***Graph 1***, it appears that the majority of the studies met most of the criteria for internal validity. The number of variables included for study, operationalisation of measures, reliability, sufficiently large sample sizes, effect sizes and controlling for Type I and Type II errors were particular strengths of these studies. However, it is also evident that many of these studies were not rigorous in their sampling methods, their usage of controls, the design of the research or their statistical methods. These methodological weaknesses have considerable impact on the internal validity of the studies, especially in the light of the consensus regarding the necessity of studying temperament in a development- sensitive manner.

EXTERNAL VALIDITY RESULTS



Graph 2: External validity coding

For clarity, the individual criteria have been graphically represented as differently coloured bars. The bars indicate the ratio of studies that fulfilled the specified criteria. For example, should a bar reach the number 1 on the scale it would indicate that all studies fulfilled that criterion.

- *Research hypothesis*: All studies provided a clear rationale for their research in explaining what they intended to measure. They also based research question(s) on previous studies or theory.

- *Participant selection and description*: All studies but one (Agnew, Brezina, Wright & Cullen, 2002) clearly described participant selection and delineated all inclusionary and exclusionary criteria. Only one study (Elliot & Thrash, 2002) did not provide the mean chronological age of the participants. Of the 17 studies that could have used grade level as a variable in their research only one study did not mention the grade level of the participants, giving a result of 94% studies fulfilling this criterion. 89 (87%) of the studies provided the location where the study took place. Ethnicity was mentioned in 84 (82%) of the studies. The graph indicates that

less than half of the studies fulfilled the criteria for SES. Although the value of SES is seemingly acknowledged in this body of research as 86 (84%) studies defined the SES of the participants, SES was not included in any of the studies as an statistical variable for analysis. 16 (16%) of the studies did not describe the SES of the participants. Only four (4%) of studies took political effects into consideration by mentioning or describing them. It is interesting to note that though many variables were mentioned in relation to participant selection and description, few of the studies measured the interaction effects of many of these variables. This has implications when considering the external validity of these studies from a social constructivist (ecosystemic) perspective.

- *Validated assessment tools*: All assessment instruments used in the studies had been previously tested for socio-cultural and other effects. In the two studies where translated questionnaires were used, these instruments were carefully checked for confounding and bias (Zhou, Eisenberg, Reiser & Wang, 2004; Lorensen, Wilson & White, 2004).

- *Inter-rater reliability*: 55 (54%) of these studies based their temperament findings on only one method of assessment (usually a questionnaire filled in by a caregiver of the participant), which means that inter-rater reliability was not considered in a little more than half of the studies. 34 (33%) of these studies used two methods of assessment. However, though three methods of assessment are considered desirable in temperament research for validity purposes (Kagan, 1989), only 11 (11%) of these studies fulfilled this criterion. This finding suggests that the majority of these studies have questionable results in terms of temperament analysis.

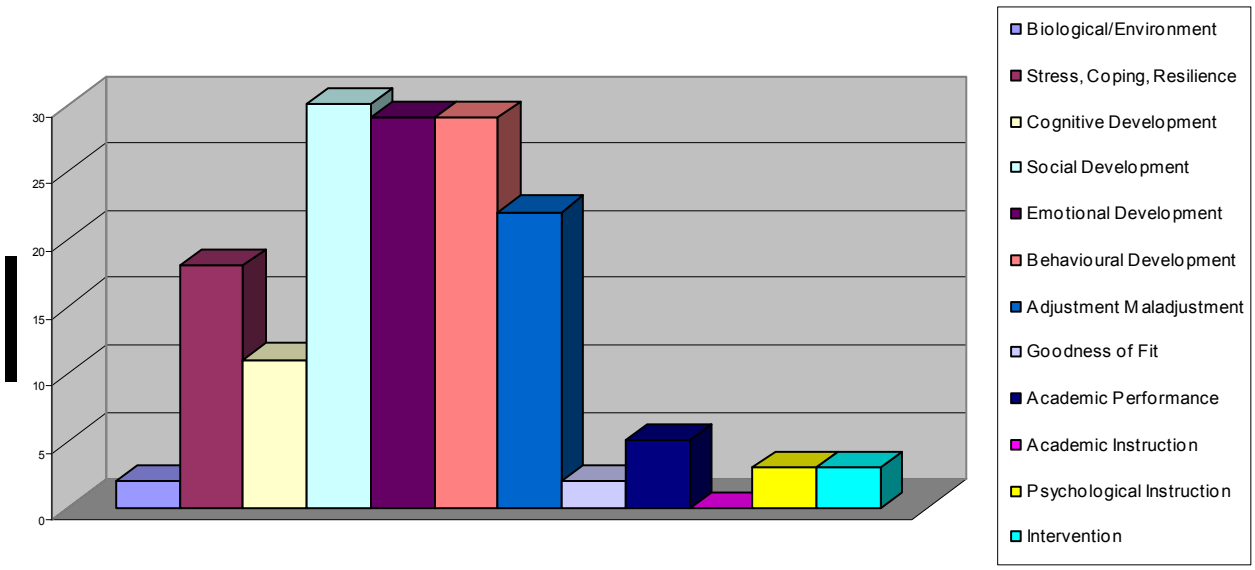
In summary, the majority of the criteria for external validity were also met (See ***Graph 2*** above**)**. However, although researchers are, to some extent, acknowledging the significance of historical, politico-socio-economic variables in many of these studies, these factors are infrequently included in statistical analyses, which casts doubt on the validity of many of the interaction effects findings. In addition, inter-rater reliability regarding the assessment of temperament is not provided for in the majority of the studies in this corpus, thereby compromising the external validity of more than 80% of these studies, which is considered a serious methodological flaw.

RESEARCH QUESTION 2: WHAT THEMES EMERGE IN THE BODY OF THIS RESEARCH?

Table 4: Emergent themes in temperament research for the period 1998 – 2005 (see Appendix 3) report the data mapping for each study in the corpus in terms of emergent themes, the number of studies comprising each theme, as well as the year of publication, country of origin and theoretical underpinnings of each study. These themes were chosen as a result of the content analysis mentioned in the methodology (see chapter 2). In addition, the findings have been presented graphically below in ***Graphs 3 – 7*** to facilitate discussion of the results.

EMERGENT THEMES RESULTS

The results obtained from the analysis of the corpus of research regarding the emergent themes are firstly graphically represented in ***Graph 3*** below and secondly, described in words. Thirdly, the results in terms of the themes in relation to year of publication (see ***Graph 4***) and countries of origin (see ***Graph 5***) are presented. Information for these graphs was taken from the thematic content analysis results tabulated in ***Table 4*** (See Appendix 3). The themes are presented graphically as frequency counts, i.e. the number of studies in which each theme emerged in the corpus. Each theme is presented as a differently coloured bar. The height of the bars indicates the number of studies in which the themes emerged. It will be noted that the value axis does not exceed the value of 30. The reason for this is that the results revealed that no theme was found to emerge in more than 30 of the studies.



Graph 3: Overview of emergent themes in temperament research for the period 1998 – 2005

Temperament and biological-environment interactions: Only two studies explored this theme. Two sub-themes emerged:

- Genetic factors were found to explain 77% of variance in temperament reactivity while environmental variables explained 23% (Bokhorst, Bakermans-Kranenburg, Fearon, van IJzendoorn, Fonagy & Schuengel, 2003).
- Another study found that the environment not temperament explained most of the variance in sibling and friendship relationships (Pike & Atzaba-Poria, 2003)

Temperament and coping: 17 studies explored this theme. Four sub-themes emerged:

- The interactions between parental perception of infant temperament and care-giving (St. Jonn-Seed & Weiss, 2002; Pearce & Ayers, 2005).
- The relations between coping and perceptions of temperament and parenting (Secco & Moffat, 2003; Hyde, Else-Quest, Goldsmith and Biesanz, 2004; Edelstein, Weede-Alexander, Shaver, Schaaf, Quas, Lovas & Goodman, 2004)
- The links between stress, temperament and post traumatic stress disorder (Ghazinour, Richter, Emami & Eisemann, 2002)
- The relationship between stress, temperament and delinquency (Agnew, Brezina, Wright, & Cullen, 2002)

Temperament and cognitive development: 11 studies explored this theme. Five sub-themes emerged:

- The relation between temperament and cognitive development (Chang & Burns, 2005; Rieser-Danner, 2003; Thorell, Bohlin & Rydell, 2004)
- Goodness of fit on a few levels predicts cognitive development (Churchill, 2003)
- The interaction between temperament, socialization and cognitive development (Coplan, Prakash, O'Neil, & Armer, 2004)
- The links between language development and temperament (Dixon & Hull Smith, 2000)
- The interaction between cognition and drug use is mediated by temperament (Giancola & Mezzich, 2003)

Temperament and social development: 30 studies explored this theme. Three sub-themes emerged:

- The interaction between temperament, attachment and socialization (Al-Yagon, 2003; Hagekull and Bohlin, 2003; Belsky, Friedman & Hsieh, 2001)
- The links between temperament and social development (in some cases mediated by parenting styles) (Belsky, Friedman & Hsieh, 2001; Eisenberg, Liew & Pidada, 2004; Eisenberg, Pidada & Liew, 2001; Fabes, Eisenberg, Jones, Smith, Guthrie, Poulin, Shepard & Friedman, 1999; Fabes, Leonard, Kupanoff & Martin, 2001; Laible, 2004; Rothbart, Ellis, Rueda & Posner, 2003; Stams, Juffer & van IJzendoorn, 2002; Vachha & Adams, 2005; Zhou, Eisenberg, Reiser & Wang, 2004)
- Interaction between goodness of fit and social development (Churchill, 2003)

Temperament and emotional development: 29 studies explored this theme. 4 sub-themes emerged:

- The interaction between attachment, temperament, the environment and emotional development (Bokhorst, Bakermans-Kranenburg, Fearon, van IJzendoorn, Fonagy & Schuengel, 2003; Laible, 2004; Seifer, LaGasse, Lester, Bauer, Shankaran, Bada, Wright, Smeriglio & Liu, 2004)

- The effects of temperament on the development of depression and anxiety (Bussing, Gary, Mason, Leon, Sinha & Garvan, 2003; Denham, Mason, Caverly, Schmidt, Hackney, Caswell, & DeMulder, 2001; Eisenberg, Pidada & Liew, 2001; Lonigan, Phillips & Hooe, 2003)
- The interaction between temperament and socio-emotional development (Chang & Burns, 2005; Coplan, Prakash, O'Neil, & Armer, 2004; Eisenberg, Zhou, Losoya, Fabes, Shepard, Murphy, Reiser, Guthrie & Cumberland, 2003, Fabes, Leonard, Kupanoff & Martin, 2001; Heinonen, Raikkonen, Keltikangas-Jarvinen, 2003; St. Jonn-Seed & Weiss, 2002; Kochanska, Coy, Tjebkes & Husarek, 1998; Manian, Strauman, & Denney, 1998)
- The link between temperament and the development of empathy (Van der Mark, IJzendoorn, Bakermans-Kranenburg, 2002)

Temperament and behavioural development: 29 studies explored this theme. 5 sub-themes emerged:

- The interaction between temperament and substance abuse/use (including smoking) (Babor, Webb, Burleson & Kaminer, 2004; Etter, Pelissolo, Pomerleau & De Saint-Hilaire, 2002; Giancola & Mezzich, 2003)
- The relation between temperament and behavioural problems (Boyce, Essex, Alkon, Smider, Pickrell & Kagan, 2002; Burgess, Marshall, Rubin & Fox, 2003; Eisenberg, Guthrie, Fabes, Shepard, Losoya, Murphy, Jones, Poulin & Reiser, 2000; Eisenberg, Pidada & Liew, 2001; Giancola, Mezzich & Tarter, 1998; Jackson & Center, 2002; St. Jonn-Seed & Weiss, 2002; McClowry, Faan & Galehouse, 2002; Murray & Kochanska, 2002; Putnam & Stifter, 2005; Schwebel & Plumert, 1999; Stams, Juffer & van IJzendoorn, 2002)
- The links between temperament and behavioural problems mediated by parenting styles (Rubin, Burgess & Hastings, 2003; Russel, Hart, Robinson, and Olsen, 2003; Soubhi, 2004)
- The relation between stress in pregnancy, temperament and behavioural problems (Hyde, Else-Quest, Goldsmith and Biesanz, 2004).
- The interaction between temperament and hyperactivity (Thorell, Gunilla, Bohlin & Rydell, 2004)

Temperament and adjustment: 23 studies explored this theme. Five sub-themes emerged:

- The links between temperament and psychopathology (Boyce, Essex, Alkon, Smider, Pickrell & Kagan, 2002; Kristensen & Torgersen, 2002; Lemery, Essex & Smider, 2002; Sherrad, Tonge, & Ozanne-Smith, 2004; Wills, Sandy, Yaeger, & Shinar, 2001; Windle & Mason, 2004; Wolke, Rizzo & Woods, 2002)
- The interaction between temperament, psychopathology and mediating factors (Bussing, Gary, Mason, Leon, Sinha & Garvan, 2003; Joyce, McKenzie, Luty, Mulder, Carter, Sullivan & Cloninger, 2003; Kim-Cohen, Moffitt, Caspi & Taylor, 2004)
- The role temperament plays in sexual offenses (Giotakos, Vaidakis, Markianos, Sandoni, Christodoulou, 2004)
- The interactions between autism, temperament and adjustment (Gomez & Baird, 2005)

Temperament and goodness of fit: 2 studies explored this theme. Two sub-themes emerged:

- Improving goodness of fit between teacher and child, parent and teacher links to social and cognitive development in children (Churchill, 2003).
- Improving goodness of fit between parents and child links to decreasing child pathology (Nixon, 2001)

Temperament and academic performance: 5 studies explored this theme. Two sub-themes emerged:

- A predictive link between temperament and school readiness (Belsky, Friedman & Hsieh, 2001; McBryde, Ziviani & Cuskelly, 2004)
- The interactions between temperament, emotion and school performance (Reed-Victor, 2003; Chang & Burns, 2005; Windle & Mason, 2004)

Temperament and academic instruction: No studies explored this theme.

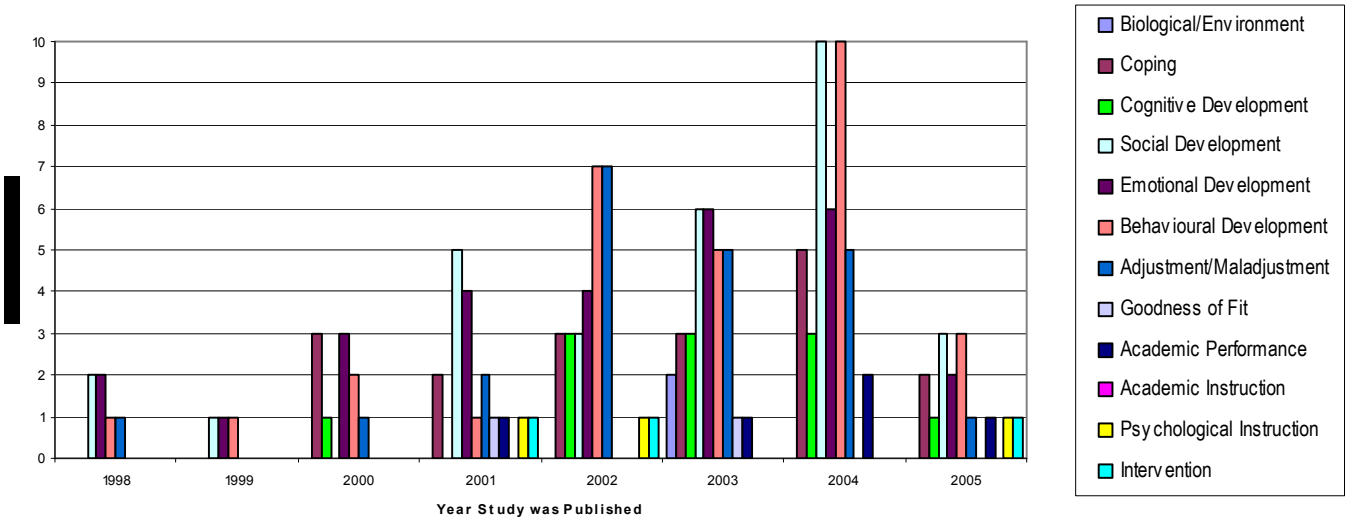
Temperament and psychological instruction: 3 studies explored this theme. One sub-theme emerged:

- Improving understanding of temperament linked to more competent parents and improved parent-child relationships (McClowry, Faans & Galehouse, 2002; Rapee, Kennedy, Ingram, Edwards & Sweeney, 2004)

Temperament interventions: 3 studies explored this theme. 3 well-evaluated intervention programmes that targeted improving parent-child relations in the context of temperament produced excellent outcomes (McClowry, Faans & Galehouse, 2002; Rapee, Kennedy, Ingram, Edwards & Sweeney, 2004).

Emergent themes and year of publication

In this section all the studies were analysed in terms of the number of studies in which each theme emerged in the year period indicated on the x-value axis of the graph below (see ***Graph 4***). The various themes are indicated by the differently coloured bars on the graph. The height of the bars indicates the number of studies in which these themes emerged. All information used for this graph is taken from the results of the content analysis represented in ***Table 4*** (see Appendix 3). The graph represents all studies included in this corpus. The maximum value of 10 on the y-value axis is taken directly from the results as none of the themes were found more in more than 10 studies over the year period indicated on the graph.



Graph 4: Emergent themes and year of publication

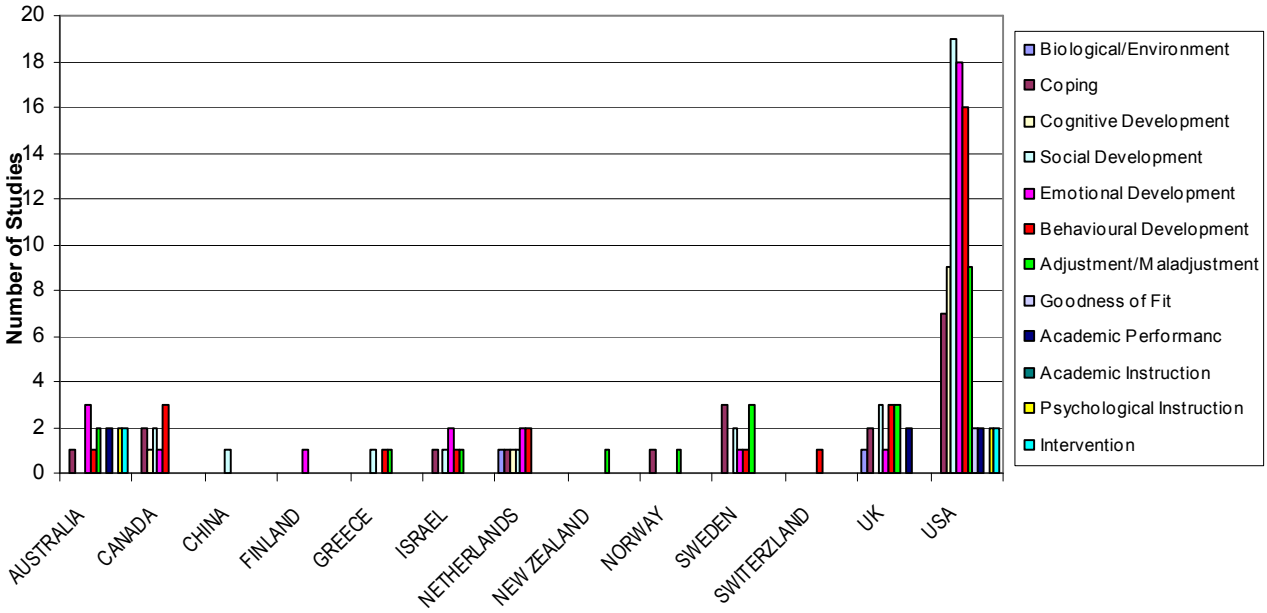
It is clear from ***Graph 4*** that the interest in studying temperament in the context of development increased exponentially from 1998 to 2004. The years 2002, 2003 and 2004, especially, evidenced the publication of a larger number of temperament and development articles published than before 2002. The dominant trends in researchers' interest or possibly in publishers' interest in certain themes, across these three years, show a steady and fairly strong interest in *coping, adjustment, cognitive, behavioural and emotional development.* However, sharp rises in numbers of publications regarding *social and emotional development,* suggest that these themes are more significant for contemporary researchers and their publishers.

Emergent themes and country of origin

Graph 5 shows an analysis of emergent themes as they were studied by various countries (see x-value axis) over the 1998-2005 period indicated by the corpus of this research. The information for this graph was taken from the results of the content analysis represented in ***Table 4*** (see Appendix 3). The coloured bars indicated the themes studied, whereas the height of the bar represents the number of studies in which this theme was found in the research done by the various countries.

In terms of country of origin, it is clear from ***Graph 5*** that the USA has a significant investment in research in temperament as 58 (57%) of the studies in the corpus originated from there. In

addition, it is interesting to note that the themes that engage US researchers the most, i.e. the themes that were studied far more than other themes were *coping, cognitive, social, emotional and behavioural development and adjustment.*



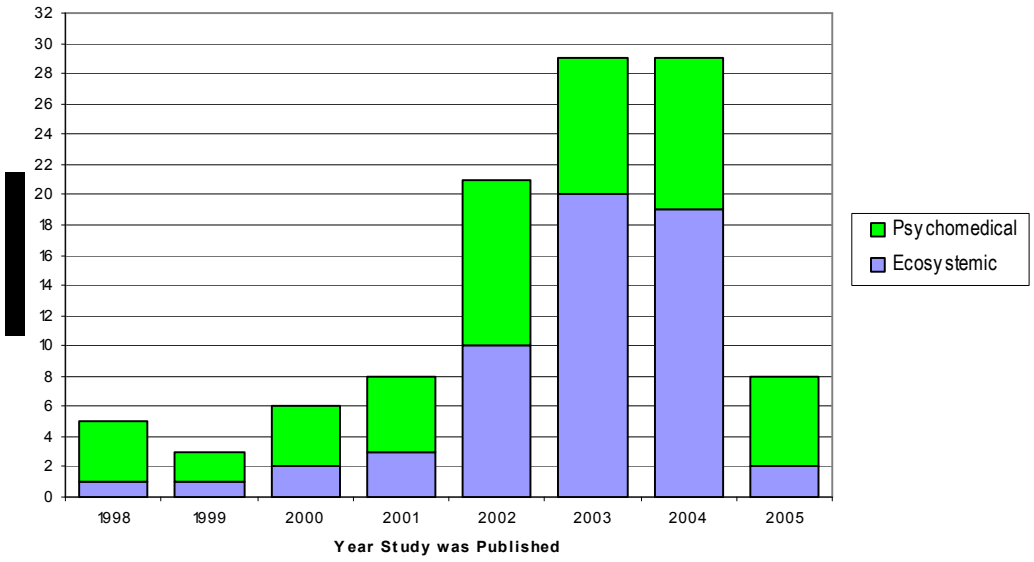
Graph 5: Emergent themes and country of origin

On the other hand it is interesting to note that other countries, such as Australia, Canada, Israel, Netherlands, Sweden and the UK also demonstrate a fair amount of interest in temperament research. The themes that seem to emerge most frequently in the research done by these countries include: *emotional development, coping, adjustment/maladjustment, social development* and *behavioural development.* The data also seems to indicate that the more practical themes such as *academic instruction*, *psychological instruction* and *intervention* are not popular areas of research for any of these countries during this period. This finding seems to echo a concern of practitioners who hesitate to incorporate temperament into their practice.

QUESTION 3: WHAT THEORETICAL FRAMEWORKS EMERGE?

THEORETICAL FRAMEWORK AND YEAR OF PUBLICATION RESULTS

The corpus was reviewed (see ***Table* 4,** Appendix 3) to explore the underpinning theories of each study. These results are presented graphically below in ***Graph 6.*** The graph indicates the trend of theory over the time frame of the studies. Each bar is divided into 2 colours to indicate the ratio of research over the year period (indicated on the x-value axis) that was either psychomedical or ecosystemic. The height of the bars on the y-value axis indicate the number of studies that were done for that year period.



Graph 6: Theoretical underpinnings and year of publication

A general overview of the theoretical underpinnings used in this corpus shows a fairly steady interest in using the psychomedical model. On the other hand, the years 1998-2001 indicated only a minimal interest in ecosystemic models. However, from 2002-2004 the usage of the ecosystemic framework increased considerably to the extent that the ecosystemic studies increased to double

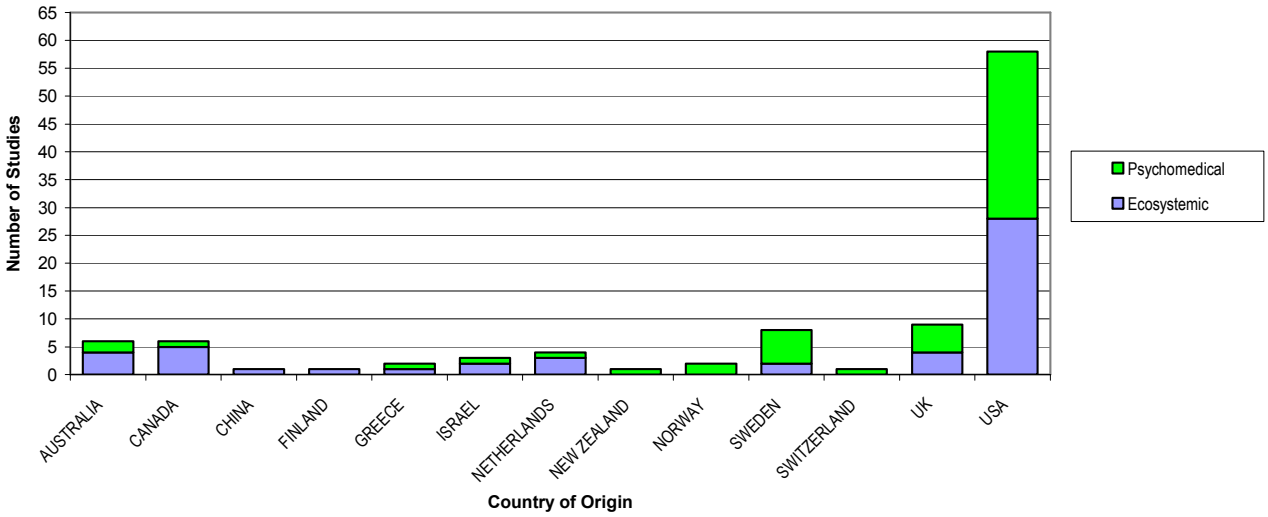
the number of psychomedical studies. 2005 reversed back to a similar ratio as the time period between 1998 and 2001.

It could be hypothesized that the ratio in 2005 could be due to the fact that all journal articles from 2005 may be too recent to be easily accessible on the databases or in the university libraries. This being said, it should also be noted that journal articles for 2005 were available for 7 of the 12 journals hand-searched for this review (*Child Development, Child Psychology and Psychiatry, British Journal of Psychiatry, The Journal of Personality Assessment, The British Journal of Clinical Psychology, The South African Journal of Psychology* and *Adolescence*).

A detailed description of these results follow:
Five studies were reviewed for 1998. Of these studies 1 (25%) had ecosystemic theory underpinning the research while 4 (75%) were psychomedical in nature. Three studies were reviewed in 1999 of which 1 (33.3%) was ecosystemic and 2 (66.6%) were psycho-medical. Similarly in 2000 six studies on temperament were reviewed. Of these 2 (33.3%) were ecosystemic while 4 (66.6%) were psychomedical. Of the eight studies reviewed in 2001, 3 (34%) were ecosystemic. Research in temperament increased significantly in 2002. Of the 21 studies reviewed, 10 (48%) were ecosystemic and 11 (52%) were psychomedical. In 2003, 20 (69%) of the 29 studies reviewed were ecosystemic. In 2004 nineteen (66%) of the 29 studies reviewed were ecosystemic. Of the 8 studies reviewed for 2005, two (25%) were ecosystemic. These findings suggest that there is an increasing trend in temperament research towards using ecosystemic frameworks to underpin studies.

Theoretical frameworks and country of origin results

The corpus was reviewed (see ***Table*** 4, Appendix 3) to explore the underlying theories used in all the studies in this corpus in relation to the countries of research origin, which is depicted in ***Graph 7: Theoretical underpinnings and country of origin*** (see below). The two colours on the bars indicate the ratio of the studies that are either psychomedical or ecosystemic. The height of the bars indicates the number of studies done by the various countries represented on the x-value axis of this graph.



Graph 7: Theoretical underpinnings and country of origin

Before examining these results it is pertinent to note that trends in theoretical orientation cannot be inferred from these results as a non-significant number of studies were done in most countries. However inferences can be drawn from the high number of temperament studies done in the USA, namely that there is still a dedicated core of scientists who use a psychomedical model (52% of their studies were psychomedical). At the same time there are a similar number of studies that are underpinned by ecosystemic frameworks, which suggests a complete dichotomy in this area in the USA.

When considering the results for the USA in ***Table 4*** (see Appendix 3), it is interesting to note that the psychomedical model formed the theoretical basis for more than half of the research done from the period 1998-2003, except in 2002 where out of the 4 studies done in the USA, half of them were ecosystemic. In 2004, this theoretical trend changes completely as 12 (80% of the 15 studies) were underpinned by ecosystemic frameworks. This coincidently is also the year that temperament research reached its peak in the USA. In addition, it is surprising to note that the research included in this corpus for the USA in 2005 was all underpinned by psychomedical theory, which further emphasizes the dichotomy that seems to exist in the area of temperament research.

CHAPTER 4: DISCUSSION

The research questions are used in this chapter to structure the discussion of the findings of this exploratory review.

METHODOLOGICAL SOUNDNESS OF THE STUDIES SURVEYED

The methodological strengths of the studies included in the corpus were a) The number of variables included for study, b) reliability measures, c) controls for Type I and Type II errors, d) rationale for the study, e) participant selection, f) descriptions of age, gender, location and ethnicity, g) validated assessment tools, h) sample size and i) effect sizes. However, it was also evident that these studies were not rigorous in their sampling methods, controls, and research design. In addition, inter-rater reliability of the assessment of temperament in 80% of these studies was not considered valid. The survey also showed that although many researchers acknowledged the importance of politico-socio-economic factors in their research, these variables were infrequently included in the studies for their interaction effects.

The methodological flaws evident in this corpus are especially significant when considering validity from an ecosystemic, constructivist perspective. Unilinear methods employed in research regardless of the number of variables studied, act to reduce the dynamic interactions to mere static data. In addition, research designs that are not at least longitudinal in design indicate that a significant portion of research in temperament (48%) is not taking developmental factors into consideration. Simpler research designs also significantly limit the number of broader interaction effects that can be measured. In addition, although most of the studies reviewed included thorough descriptions of the participants, these descriptors were rarely measured in the studies for their interaction effects. This was particularly true for the broader socio-political context, suggesting that the majority of research reviewed had a limited focus on the micro context of the participants.

55% of these studies based their study of temperament on only one method of assessment. In a previous review of temperament research, Bates (1989, in Kohnstamm et al., 1989), found that 90% of reviewed studies prior to 1989 only used one questionnaire, i.e. only one method of

assessment to measure temperament. This means that some researchers have improved in temperament research conceptualization from 1989 to 2005 in that 45% of recent research used more than one form of temperament assessment (an improvement of 35% since 1989). However, for 55% of the corpus studies it seems logical to assume that many of the findings are not valid in terms of describing temperament, since one method of assessment does not acknowledge the complexity of temperament nor acknowledge rater subjectivity. This methodological flaw along with the reticence to use more dynamic forms of statisitical analysis seem to be the main factors that need addressing in future temperament research.

IDENTIFIED THEMES IN THE REVIEWED STUDIES

The findings of this review have indicated that current research in temperament has largely built on the themes identified in the previous body of research, which is encouraging, as the body of knowledge regarding temperament has increased fairly considerably over the past seven years, though not quite as much as would have been expected after the promise of earlier years. One theme that was particularly well researched was social development. Studies linking temperament to emotional development also increased quite dramatically when compared to previous research. However, it is to be noted that not all themes have been built on, which is especially true of studies that have researched the interactions between temperament and cognition, and between temperament and academic instruction. This dearth of studies regarding the links between temperament and cognition and academic instruction is of particular concern as educational settings are significant contexts of childhood. Goodness of fit in schools has also received little research attention over the past seven years.

In addition, of the 102 studies reviewed in this paper, only 3 were intervention-based (McClowry, Faans & Galehouse, 2002; Nixon, 2001; Rapee, Kennedy, Ingram, Edwards & Sweeney, 2005). These studies varied in the statistical analysis of intervention effects with Nixon (2001) using simple correlational analyses right through to Rapee et al. (2005) who employed structural equation modeling to measure interaction effects in their study. However, of the three studies, Nixon (2001) was the only one who worked with both parents/caregivers and children, while Rapee et al. (2005) and McClowry et al. (2002) targeted only one system for intervention. The paucity of studies in this

area is also cause for concern as there is a fair amount of evidence that shows that temperament affects development, cognition, socio-emotional development and scholastic development, and should parents and caregivers, teachers, psychologists and so forth as well as the learners themselves not learn how to accommodate temperament better in order to benefit childhood development?

In addition, the paucity of intervention studies in this corpus of research adds evidence to the findings of some critical reviews of previous temperament research that have consistently emphasized that research in temperament is not producing relevant 'tools' for practice (Carey 1989, in Kohnstamm et al., 1989; Kagan, 2003; McClowry in Teglasi, 1998; Sanson et al., 2004). It appears that often there is a discrepancy between what researchers study and what practitioners and educators want to know (Zimiles, 2000). In addition, since it is generally accepted that temperament is developmental, for research to be truly meaningful and constructivist in nature, it is of particular import to study 'temperament-in-practice.' This points to the value of not only increasing the number of intervention-based studies in temperament but also to note how such studies could contribute significantly towards collaboration with practitioners and educators in planning, doing and evaluating these studies.

McKim (2005) argues that the reason for the lack of intervention studies in developmental research indicates there is a struggle at some level to convert knowledge into coherent, effective and replicable intervention programmes. Teglasi (1998) adds to this by suggesting that some factors contributing to this struggle include the huge expense of long-term, multi-leveled and multidisciplinary interventions, the failure of researchers to take into account the characteristics and cultural expectations of the systems under study, short-term evaluations which fail to capture the long-term effects of interventions and the focus of programmes which aim to change or 'fix' participants rather than accommodate/support them ecosystemically.

THEORETICAL UNDERPINNINGS OF THE RESEARCH SURVEYED

From the results it is clear that research in temperament has increased over the time period of this review (1998-2004). There is rising consensus that sufficient evidence exists regarding the significance and biological reality of temperament (Strelau, 1998). In addition, research and consensus appears to support the notion that temperament can only be meaningfully studied within a developmental context (Kagan, 1989; Kohnstamm et al., 1989; Rothbart, 2004, Wachs & Kohnstamm, 2001). This supposition is, admittedly, rooted in a social constructivist (ecosystemic) framework, which emphasizes the principle that development is based on the dynamic interplay between the biological environment of the body and the politico-socio-cultural world in which the individual finds him/herself (Mazotti, 1999). From this viewpoint, only research that is constructivist is deemed valid when exploring the complex interactions of systems impacting on development and the role temperament plays in this process (Combrinck-Graham, 1987; Janoski & Swartz, 1985; Donald & Lerner, 1992; Pawson and Tilley, 1997).

One of the major aims of this review was to uncover the trends evident in the underlying theories used in the reviewed studies. In fact, a general overview of the theoretical underpinnings used in this corpus shows a fairly steady interest in using the psychomedical model. On the other hand, the years 1998-2001 indicated only a minimal interest in ecosystemic models. However, from 2002-2004 the usage of the ecosystemic framework increased considerably to the extent that the ecosystemic studies increased to double the number of psychomedical studies. These trends are encouraging, as they seem to indicate that many researchers in temperament are acknowledging that the construct needs studying from a developmental, i.e. social constructivist viewpoint.

However, a more indepth analysis of these studies reveal a more complex, less positive scenario. For example, a limited number of studies do indeed appear to have been conducted on constructivist, ecosystemic lines. One of these studies is the Heinonen, Raikkonen, and Keltikangas-Jarvinen study (2003), which linked temperament to self-esteem, by examining the interactions of multiple relationships (mother-father, mother-child, mother-colleague). The mother-child relationship was not measured purely in one direction; rather the personality of the mother, her disciplinary style (which may be informed to some extent by her personality) as well as the child's temperament were included for examination.

Another example of developmentally sensitive research is the Soubhi (2004) study on childhood injury. His research was both longitudinal and cross-sectional in design. The inclusion of relationship factors as well as the broader social context of the neighbourhood resulted in this study being contextually rich.

On the other hand, though some of the studies appeared to operate from a constructivist framework initially, as many variables were included for analysis, many of these studies were compromised by research designs that were not developmentally sensitive, which often meant that correlational statistical methods were used (Karrass & Braungart-Rieker, 2004; Lorensen, Wilson & White, 2004; McBryde, Ziviani & Cuskelly, 2004). However, this could easily be corrected if regression analyses and other interaction-sensitive statistical methods were used.

Other studies did not purport to be constructivist, but It is interesting to note that this could be remedied quite simply by using statistical methods that document interaction effects more effectively (e.g. by using regression analyses) or by including the thorough descriptions of the participants among the variables for measurement of their interaction effects (Burgess, Marshall, Rubin & Fox, 2003; Clark, Kochanska & Ready, 2000; Eisenberg, Shepard, Fabes, Murphy & Guthrie, 1998).

Another factor that compromised findings in these studies (which is easily corrected) is captured by Gunnar (1986, in Kohnstamm et al., 1989), where he notes that researchers tend to easily slip back into simple dichotomies when discussing the findings of their research. This was especially true of the Joyce, McKenzie, Luty, Mulder, Carter, Sullivan and Cloninger's (2003) study, in which risk factors for borderline and avoidant personality disorders were studied. This study appeared, on initial examination, to be ecosystemic in approach, as the number of variables it considered was fairly high. However, in-depth analysis suggests that instead of using the research design to help elucidate the various interacting variables that contributed to the development of borderline or avoidant personality characteristics, the study was engineered to focus on establishing a unilear, causal link between temperament and the disorders.

Findings from this review seem to suggest that while researchers acknowledge intellectually the significance of including contextual variables in their research, this is not always carried out in practice. One of the reasons for this could be seen as conceptual, i.e. if the conceptualizations that underpin thinking about a certain research problem still reflect principles that stem from the psycho-medical model, for example, methodological design is likely to reflect psychomedical model principles, in spite of conscious desires to do the opposite. This trend is evident in many of the reviewed studies, where, although many variables are included for study, and statistical methods often include multiple regression analyses, it is evident in the hypotheses of the research that the researcher is intending to link temperament directly (and unilinearly) to, for example, drug use and abuse (Giancola & Mezzich, 2003), sex offenses (Russel, Hart, Robinson, and Olsen, 2003), behavioural problems (Lemery, Essex & Smider, 2002) and delinquency (Agnew, Brezina, Wright, & Cullen, 2002). This phenomenon suggests that while many researchers appear to be consciously aware of social constructivism, unconsciously they continue to favour a more psycho-medical approach to research. This is not too hard to understand, since constructively speaking, it takes time and experience to develop new structures of thought.

IMPLICATIONS OF THE FINDINGS OF THIS REVIEW

In summary, there has been a general increase in research in temperament over the last seven years. Many of the studies used sound methodology, and many researchers appear to be valiantly endeavoring to work from a constructivist framework. In addition, the reviewed corpus showed that many of the studies built on previous research findings, and that many developmentally sensitive themes were pursued over the seven years under review.

However, in spite of these positive findings, it appears that researchers still need more time and thought in terms of moving towards using a contextual, ecosystemic framework on a conceptual level when researching temperament. It is hoped that this review will help crystallize and highlight the need for this shift in future temperament research.

This review also elucidated that shifts in conceptualization have often been achieved and a need to use more developmentally sensitive statistical analyses is all that is needed, as regression analyses, for example, would highlight the interplay between the many variables and effects studied in many of the reviewed studies. In addition, it is suggested that research designs could

incorporate elements of qualitative research into their designs in order to emphasize the contex more effectively. Finally, the review highlights the need for at least three independent evaluations of temperament to be included in temperament studies.

A very important implication of the findings of this review is that though there appears to be consensus regarding the necessity of studying temperament in a developmental context, from a constructivist viewpoint, hardly any study of 'temperament-in-practice' was documented. It is clear that researchers are not providing practitioners with the evidence they need to help and collaborate with educators, psychologists and so forth in using temperament interventions to improve developmental outcomes for children and youth.

Finally, this review highlights that that though the research reviewed originates from a variety of countries, the USA continues to be the most active in researching temperament and its interaction effects. It is also interesting to note that as far as can be ascertained from the literature search for this study, South Africa has not published any studies on temperament over the last seven years. It is possible that some countries, such as South Africa, are not doing research in this area due to limitations in financial and/or intellectual resources as a result of historically political and/or geographical disadvantage factors. It is interesting to note however, that some countries have not contributed to this body of research as much as their various resources predict they could. This is particularly true of the UK, a very well resourced country. It is also true of South Africa, even though it is a developing and previously historically and politically disadvantaged country, as over the past few years considerable resources have been allocated for the express purpose of improving educational practice and the overall well-being of children. Developmentally sensitive temperament research could help South African practitioners, parents, teachers and youth realise that a sound understanding of temperament can help buffer stress effects and promote development on many levels.

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APPENDIX 1:

TABLE 2: CODING DECISIONS FOR INTERNAL VALIDITY

TABLE 2: INTERNAL VALIDITY CRITERIA RESULTS

Study	Random assignment	Control group intervention	Research Design	Number of variables studied	Mortality rates of participants	Operationalised measures	Reliability of measures reported	Sufficiently large N	Type 1 error controlled	Satisfactory statistical analysis	Effect sizes reported
Agnew, Brezina, Wright & Cullen, 2002	1	0	2	3	0	1	1	1	0	2	1
Aksan & Kochanska, 2004	0	0	2	1	1	1	2	1	1	3	1
Al Yagon, 2003	0	1	0	3	1	1	1	1	1	3	1
Anderson, Carter, Mcintosh, Joyce, & Bulik, 2002	0	0	0	3	0	1	2	1	0	1	0
Babor, Webb, Burleson & Kaminer, 2002	1	0	3	3	1	1	2	1	1	2	1
Belsky, Friedman & Hsieh, 2001	0	1	2	3	1	1	2	1	1	3	1
Bokhorst, Bakermans-Kranenburg, Fearon, IJzendoorn, Fonagy, & Schuengel, 2003	0	0	0	2	0	1	2	0	1	1	1
Boyce, Essex, Alkon, Smider Pickrell & Kagan, 2002	0	1	2	2	1	1	2	1	1	2	1
Burgess, Marshall, Rubin & Fox, 2003	0	0	2	2	1	1	1	1	1	1	1
Buss & Goldsmith, 1998	0	0	1	2	1	1	2	1	1	3	1
Bussing, Gary, Mason, Leon, Sinha & Garvan, 2003	1	0	0	1	1	1	2	1	1	1	0
Chang & Burns, 2005	0	0	0	3	0	1	1	1	1	2	1
Churchill, 2003	0	0	1	3	1	1	2	1	1	1	0
Clark, Kochanska, Ready, 2000	0	0	2	2	1	1	2	1	1	2	1
Coplan, Prakash, O'Neil & Armer, 2004	0	1	0	3	0	1	2	1	1	2	1
Denham, Mason, Caverly, Schmidt, Hackney, Caswell, & DeMulder, 2001	0	0	2	3	1	1	2	1	1	1	0
Dixon & Hull Smith, 2000	0	0	2	2	1	1	2	1	1	1	1
Dudley, Roy, Kelk & Bernard, 2001	0	1	1	3	1	1	2	1	1	2	1
Edelstein, Weede Alexander, Shaver, Schaaf, Quas, Lovas & Goodman, 2004	0	0	0	3	0	1	1	1	1	2	1
Edhborg, Seimyr, Lundh & Widström, 2000	0	1	2	3	1	1	2	1	1	1	1

2000											
Eisenberg, Guthrie, Fabes, Shepard, Losoya, Murphy, Jones, Poulin & Reiser, 2000	0	0	2	3	1	1	2	1	1	3	1
Eisenberg, Liew & Pidada, 2004	0	0	2	2	1	1	2	1	1	1	1
Eisenberg, Pidada & Liew, 2001	0	0	0	2	0	1	2	1	1	2	1
Eisenberg, Shepard, Fabes, Murphy & Guthrie, 1998	0	0	2	2	1	1	2	1	1	2	1
Eisenberg, Zhou, Losoya, Fabes, Shepard, Murphy, Reiser, Guthrie & Cumberland, 2003	0	0	2	3	1	1	2	1	1	3	1
Elliot & Thrash, 2002	0	0	0	2	0	1	1	1	1	2	0
Engström, Brandström, Sigvardsson, Cloninger & Nylander, 2003	0	0	0	3	0	1	2	1	1	1	1
Engström, Brandström, Sigvardsson, Cloninger, & Nylander, 2004	0	1	0	3	1	1	2	1	1	1	1
Etter, Pélissolo, Pomerleau & De Saint-Hilaire, 2002	0	0	0	2	0	1	2	1	1	1	0
Fabes, Eisenberg, Jones, Smith, Guthrie, Poulin, Shepard & Friedman, 1999	0	0	0	3	0	1	1	1	1	2	1
Fabes, Leonard, Kupanoff & Martin, 2001	0	1	0	3	0	1	2	1	1	2	1
Ghazinour, Richter, Emami & Eisemann, 2002	0	0	1	3	0	1	2	1	1	2	1
Giancola & Mezzich,2003	0	1	0	3	1	1	2	1	1	2	1
Giancola, Mezzich & Tarter, 1998	1	1	0	2	1	1	2	1	1	1	1
Giotakos, Voudakis, Markianos, Spandoni & Christodoulou, 2004	0	1	0	2	0	1	1	1	1	2	1
Golombok, Murray, Jadva,	1	1	0	3	1	1	2	1	1	1	0
Gomez & Baird, 2005	0	1	0	1	1	1	1	1	1	1	0

Graziano, Jensen-Campbell, & Sullivan-Logan	0	0	0	2	0	1	2	1	1	1	1
Gutteling, de Weerth, Willemsen-Swinkels, Huizink, Mulder, Visser & Buitelaar, 2005	0	0	2	3	1	1	2	1	1	2	0
Hagekull & Bohlin, 2003	1	0	2	2	1	1	2	1	1	2	1
Heinonen, Räikkönen & Keltkangas-Järvinen, 2003	0	0	2	3	0	1	1	1	1	3	1
Henderson, Fox & Rubin, 2001	0	0	2	3	1	1	2	1	1	2	1
Hyde, Else-Quest, Goldsmith & Biesanz, 2004	0	0	3	3	1	1	2	1	1	3	1
Ivarsson & Winge-Westholm, 2004	1	1	0	2	1	1	2	1	1	1	1
Jackson & Center, 2002	0	1	1	1	1	1	2	0	1	1	1
Jenkins, Rasbash & O'Connor, 2003	0	0	0	3	1	1	1	1	1	3	0
Jensen, Stjernqvist, 2002	0	0	0	1	0	1	1	1	1	1	0
Johnson & Harris, 2004	0	0	0	3	0	1	1	1	1	1	0
Joyce, McKenzie, Luty, Mulder, Carter, Sullivan & Cloninger, 2003	0	0	0	3	0	1	2	1	0	1	1
Karrass & Braungart-Rieker, 2004	0	0	2	3	1	1	2	1	1	1	1
Kiang, Moreno & Robinson, 2004	1	1	2	3	1	1	2	1	1	2	1
Kim-Cohen, Moffitt, Caspi & Taylor, 2004	1	1	2	3	1	1	2	1	1	2	1
Kochanska, Coy, Tjebkes & Husarek, 1998	0	0	2	2	0	1	2	1	1	1	1
Kochanska, Friesenborg, Lange & Martel, 2004	0	0	2	2	0	1	2	1	1	2	1
Kristensen & Torgensen, 2002	0	1	0	2	1	1	2	1	1	1	1
Laible, 2004	0	0	0	3	0	1	2	1	1	2	1
Lemery, Essex & Smider, 2002	0	0	3	1	0	1	1	1	1	3	1
Lonigan, Phillips & Hooe,2003	0	0	2	2	1	1		1	1	3	1
Lorensen, Wilson & White, 2004	0	0	2	3	0	1	1	1	1	1	0
Manian, Strauman, Denney, 1998	0	0	0	2	0	1	1	1	1	2	1
Mayseless & Scher, 2000	0	0	2	3	1	1	2	1	1	2	1

McBryde, Ziviani & Cuskelly, 2004	1	0	0	3	1	1	1	1	0	2	1
McClowry, Faan, & Galehouse, 2002	0	1	2	3	0	1	1	1	1	2	0
McCrae, Costa, Teraccino, Parker, Mills, De-Fruyt, & Mervielde, 2002	0	0	3	1	1	1	2	1	1	1	1
Murray & Kochanska, 2002	0	0	2	2	1	1	2	1	1	1	1
Neitzel & Dopkins Stright, 2004	0	0	0	3	0	1	1	1	1	2	0
Nixon, 2001	1	1	2	2	0	1	1	1	1	1	1
Olson, Bates, Sandy & Schilling, 2002	0	1	2	3	1	1	2	1	1	2	1
Pearce & Ayers, 2005	0	0	2	3	1	1	2	1	1	1	1
Pike & Atzaba-Poria, 2003	0	0	0	3	1	1	2	1	1	2	1
Putnam & Stifer, 2005	1	0	2	3	1	1	2	1	1	2	1
Rapee, Kennedy, Ingram, Edwards & Sweeney, 2005	1	1	2	2	1	1	2	1	1	3	0
Reed-Victor, 2003	1	1	1	3	0	1	2	1	1	2	1
Riser-Danner, 2003	0	1	2	3	1	1	0	1	1	2	1
Rothbart, Ellis, Rueda & Posner, 2003	0	0	1	2	1	1	2	1	1	1	1
Rubin, Burgess & Hastings, 2002	0	0	2	3	1	1	2	1	1	2	1
Rubin, Burgess, Dwyer & Hastings, 2003	0	0	2	3	0	1	2	1	1	2	1
Russel, Hart, Robinson & Olsen, 2003	0	0	0	3	0	1	1	1	1	2	1
Saudino, Wertz, Gagne & Chawla, 20040	0	0	0	3	0	1	2	1	1	1	1
Scher, Zuckerman & Epstein, 2005	0	1	2	3	1	1	1	1	1	2	0
Scwebel & Plumert, 1999	0	0	2	2	1	1	2	1	1	2	1
Secco & Moffatt, 2003	0	0	2	3	0	1	1	1	1	2	1
Seifer, LaGasse, Lester, Bauer, Shankaran, Bada, Wright, Smeriglio & Liu, 2004	0	1	2	3	1	1	2	1	1	2	1
Shamir-Essakow, Ungerer, Rapee & Safier, 2004	0	1	0	2	1	1	2	1	1	1	1
Sherrad, Tonge & Ozanne-Smith, 2002	0	0	2	3	0	1	2	1	1	2	1
Soubhi, 2004	1	1	3	3	0	1	2	1	1	2	1
St. Jonn-Seed & Weiss, 2002	0	0	2	3	1	1	2	1	1	2	1

Stams, Juffer & IJzendoorn, 2002	1	1	2	3	1	1	2	1	1	2	1
Thorell, Bohlin & Rydell, 2004	1	0	2	3	1	1	2	1	1	3	1
Tripi, Palermos, Thomas, Goldfinger & Florentino-Pineda, 2004	1	1	0	2	0	1	2	1	1	1	1
Valiente, Eisenberg, Fabes, & Sheppard, 2004	0	1	0	3	1	1	2	1	1	2	1
van der Mark, IJzendoorn & Bakermans-Kranenburg, 2002	0	0	2	3	1	1	2	1	1	2	1
Vachha & Adams, 2005	0	0	0	1	0	1	2	1	0	1	1
Volling, McElwain & Miller, 2002	0	1	2	3	1	1	1	1	0	2	1
Vorria, Papligoura, Dunn, van IJzendoorn, Steele, Kontopoulou & Sarafidou, 2003	0	1	3	3	1	1	1	1	1	1	1
Weinfild, Whaler & Egeland, 2004	1	0	2	3	1	1	2	1	1	2	1
Wills, Sandy, Yaeger and Shinar, 2001	0	0	2	3	1	1	2	1	1	3	1
Wilson, White, Cobb, Curry, Greene & Popovich, 2000	0	0	2	3	1	1	2	1	1	2	1
Windle & Mason, 2004	0	0	2	3	1	1	2	1	1	3	1
Wolke, Rizzo & Woods, 2002	0	1	2	1	1	1	2	1	1	1	1
Zhou, Eisenberg, Reiser & Wang, 2004	0	0	0	3	1	1	2	1	1	2	1
Zimmerman & Stansbury, 2003	0	0	0	3	0	1	2	1	1	2	1
TOTAL	19	34	125	260	64	102	175	100	96	183	85
RATIO	19/102	34/102	125/306	260/306	64/102	102/102	175/204	100/102	96/102	183/306	85/102

APPENDIX 2:

TABLE 3: CODING DECISIONS FOR EXTERNAL VALIDITY

TABLE 3: EXTERNAL VALIDITY CRITERIA RESULTS

Study	Rationale for the study	Participant selection	Age	Gender	Grade	Ethnicity	SES	Political	Location	Inter-rater reliability	Assessment Tools
Agnew, Brezina, Wright & Cullen, 2002	1	0	1	1	N/A	1	2	0	1	1	1
Aksan & Kochanska, 2004	1	1	1	1	N/A	1	1	0	0	0	1
Al Yagon, 2003	1	1	1	1	1	0	0	0	1	0	1
Anderson, Carter, Mcintosh, Joyce, & Bulik, 2002	1	1	1	1	N/A	0	0	0	1	0	1
Babor, Webb, Burleson & Kaminer, 2002	1	1	1	1	N/A	1	1	0	1	0	1
Belsky, Friedman & Hsieh, 2001	1	1	1	1	N/A	1	1	0	1	1	1
Bokhorst, Bakermans-Kranenburg, Fearon, IJzendoorn, Fonagy, & Schuengel, 2003	1	1	1	1	N/A	1	1	0	1	0	1
Boyce, Essex, Alkon, Smider Pickrell & Kagan, 2002	1	1	1	1	N/A	1	1	0	1	1	1
Burgess, Marshall, Rubin & Fox, 2003	1	1	1	1	N/A	1	1	0	0	2	1
Buss & Goldsmith 1998	1	1	1	1	N/A	1	1	0	1	1	1
Bussing, Gary, Mason, Leon, Sinha & Garvan, 2003	1	1	1	1	N/A	1	1	0	1	0	1
Chang & Burns, 2005	1	1	1	1	N/A	1	2	0	0	0	1
Churchill, 2003	1	1	1	1	N/A	1	2	0	1	1	1
Clark, Kochanska & Ready, 2000	1	1	1	1	N/A	1	1	0	0	0	1
Coplan, Prakash, O'Neil & Armer	1	1	1	1	N/A	1	1	0	1	0	1
Denham, Mason, Caverly, Schmidt, Hackney, Caswell, & DeMulder, 2001	1	1	1	1	N/A	1	1	0	1	0	1
Dixon & Hull Smith, 2000	1	1	1	1	N/A	1	1	0	0	0	1
Dudley, Roy, Kelk & Bernard, 2001	1	1	1	1	N/A	1	1	0	1	1	1
Edelstein, Weede Alexander, Shaver, Schaaf, Quas, Lovas & Goodman, 2004	1	1	1	1	N/A	1	1	0	0	0	1
Edhborg, Seimyr, Lundh & Widström, 2000	1	1	1	1	N/A	0	0	0	1	1	1
Eisenberg, Guthrie, Fabes, Shepard, Losoya, Murphy, Jones, Poulin & Reiser, 2000	1	1	1	1	1	1	1	0	1	0	1
Eisenberg, Liew & Pidada, 2004	1	1	1	1	1	1	1	0	1	1	1
Eisenberg, Pidada & Liew, 2001	1	1	1	1	1	1	1	0	1	1	1
Eisenberg, Shepard, Fabes, Murphy & Guthrie, 1998	1	1	1	1	1	1	1	0	1	1	1

Eisenberg, Zhou, Losoya, Fabes, Shepard, Murphy, Reiser, Guthrie & Cumberland, 2003	1	1	1	1	1	1	1	0	1	1	1
Elliot & thrash, 2002	1	1	0	1	N/A	0	0	0	0	0	1
Engström, Brandström, Sigvardsson, Cloninger & Nylander, 2003	1	1	1	1	N/A	1	1	0	1	0	1
Engström, Brandström, Sigvardsson, Cloninger, & Nylander, 2004	1	1	1	1	N/A	1	1	0	1	0	1
Etter, Pélissolo, Pomerleau & De Saint-Hilaire, 2002	1	1	1	1	N/A	0	1	0	1	0	1
Fabes, Eisenberg, Jones, Smith, Guthrie, Poulin, Shepard & Friedman, 1999	1	1	1	1	1	1	1	0	0	1	1
Fabes, Leonard, Kupanoff & Martin, 2001	1	1	1	1	1	1	1	0	1	2	1
Ghazinour, Richter, Emami & Eisemann, 2002	1	1	1	1	N/A	1	1	1	1	0	1
Giancola & Mezzich,2003	1	1	1	1	N/A	1	1	0	1	0	1
Giancola, Mezzich & Tarter, 1998	1	1	1	1	N/A	1	1	0	1	0	1
Giotakos, Voudakis, Markianos, Spandoni & Christodoulou, 2004	1	1	1	1	N/A	0	0	0	1	0	1
Golombok, Murray, Jadva, MacCallum, & Lycett, 2004	1	1	1	1	N/A	0	1	0	1	0	1
Gomez & Baird 2005	1	1	1	1	N/A	1	1	0	1	0	1
Graziano, Jensen-Campbell & Sullivan-Logan, 1998	1	1	1	1	N/A	1	0	0	1	1	1
Gutteling, de Weerth, Willemsen-Swinkels, Huizink, Mulder, Visser & Buitelaar, 2005	1	1	1	1	N/A	1	1	0	1	0	1
Hagekull & Bohlin, 2003	1	1	1	1	N/A	1	1	0	1	2	1
Heinonen, Räikkönen & Keltkangas-Järvinen, 2003	1	1	1	1	N/A	1	0	0	1	0	1
Henderson, Fox & Rubin, 2001	1	1	1	1	N/A	1	1	0	1	1	1
Hyde, Else-Quest, Goldsmith & Biesanz, 2004	1	1	1	1	N/A	1	1	0	1	1	1
Ivarsson & Winge-Westholm, 2004	1	1	1	1	N/A	0	0	0	1	0	1
Jackson & Center, 2002	1	1	1	1	1	1	1	1	1	1	1
Jenkins, Rashbash, O'Connor, 2003	1	1	1	1	N/A	0	2	0	1	0	1
Jensen, Stjernqvist, 2002	1	1	1	1	N/a	1	1	0	1	0	1
Johnson & Harris, 2004	1	1	1	1	0	0	0	0	1	0	1
Joyce, McKenzie, Luty, Mulder, Carter, Sullivan & Cloninger, 2003	1	1	1	1	N/A	0	0	0	1	0	1
Karrass & Braungart-Rieker, 2004	1	1	1	1	N/A	1	1	0	1	0	1
Kiang, Moreno & robinson, 2004	1	1	1	1	N/A	1	1	0	1	0	1

Kim-Cohen, Moffitt, Caspi & Taylor, 2004	1	1	1	1	N/A	1	2	0	1	0	1
Kochanska Friesenborg, Lange & Martel, 2004	1	1	1	1	N/A	1	1	0	1	1	1
Kochanska, Coy, Tjebkes & Husarek, 1998	1	1	1	1	N/A	1	1	0	1	1	1
Kristensen & Torgensen, 2002	1	1	1	1	N/A	0	1	0	1	0	1
Laible, 2004	1	1	1	1	N/A	1	0	0	1	0	1
Lemery, Essex & Smider, 2002	1	1	1	1	N/A	1	1	0	1	2	1
Lonigan, Phillips & Hooe, 2003	1	1	1	1	1	1	0	0	1	0	1
Lorensen, Wilson & White, 2004	1	1	1	1	N/A	1	1	1	1	0	1
Manian, Strauman, & Denney, 1998	1	1	1	1	N/A	0	0	0	1	0	1
Mayseless & Scher, 2000	1	1	1	1	N/A	0	1	0	1	0	1
McBryde, Ziviani & Cuskelly, 2004	1	1	1	1	N/A	0	1	0	0	1	1
McClowry, Faan, & Galehouse, 2002	1	1	1	1	N/A	1	2	0	1	0	1
McCrae, Costa, Teraccino, Parker Mills, De-Fruyt & Mervielde, 2002	1	1	1	1	1	1	1	0	1	0	1
Murray & Kochanska, 2002	1	1	1	1	N/A	1	1	0	1	1	1
Neitzel & Dopkins Stright, 2004	1	1	1	1	N/A	1	1	0	1	0	1
Nixon, 2001	1	1	1	1	1	1	1	0	1	0	1
Olson, Bates, Sandy & Schilling, 2002	1	1	1	1	N/A	0	1	0	1	3	1
Pearce & Ayers, 2005	1	1	1	1	N/A	1	2	0	1	0	1
Pike & Atzaba-Poria, 2003	1	1	1	1	N/A	1	1	0	1	1	1
Putnam & Stifer, 2005	1	1	1	1	N/A	1	0	0	1	1	1
Rapee, Kennedy, Ingram, Edwards & Sweeney, 2005	1	1	1	1	N/A	1	1	0	1	2	1
Reed-Victor, 2003	1	1	1	1	N/A	1	2	0	1	1	1
Rieser-Danner, 2003	1	1	1	1	N/A	1	1	0	0	2	1
Rothbart, Ellis, Rueda & Posner, 2003	1	1	1	1	N/A	0	0	0	0	0	1
Rubin, Burgess & Hastings, 2002	1	1	1	1	N/A	1	1	0	1	2	1
Rubin, Burgess, Dwyer & Hastings, 2003	1	1	1	1	N/A	1	1	0	1	1	1
Russel, Hart, Robinson & Olsen, 2003	1	1	1	1	N/A	1	1	0	1	0	1
Saudino, Wertz, Gagne & Chawla, 2004	1	1	1	1	N/A	1	2	0	1	1	1
Scher, Zuckerman & Epstein, 2005	1	1	1	1	N/A	1	1	0	1	0	1
Schwebel & Plumert, 1999	1	1	1	1	1	1	1	0	1	1	1
Secco & Moffatt, 2003	1	1	1	1	N/A	1	2	0	1	0	1

Seifer, LaGasse, Lester, Bauer, Shankaran, Bada, Wright, Smeriglio & Liu, 2004	1	1	1	1	N/A	1	1	0	1	0	1
Shamir-Essakow, Ungerer, Rapee & Safier, 2004	1	1	1	1	N/A	1	1	0	0	1	1
Sherrad, Tonge & Ozanne-Smith, 2002	1	1	1	1	N/A	1	2	0	1	0	1
Soubhi, 2004	1	1	1	1	N/A	1	2	0	1	0	1
St. Jonn-Seed & Weiss, 2002	1	1	1	1	N/A	1	1	0	1	0	1
Stams, Juffer & IJzendoorn, 2002	1	1	1	1	N/A	1	1	0	1	0	1
Thorell, Bohlin & Rydell, 2004	1	1	1	1	1	1	0	0	1	2	1
Tripi, Palermos, Thomas, Goldfinger & Florentino-Pineda, 2004	1	1	1	1	N/A	1	1	0	1	0	1
Valiente, Eisenberg, Fabes, & Sheppard, 2004	1	1	1	1	N/A	1	1	0	1	2	1
van der Mark, IJzendoorn & Bakermans-Kranenburg, 2002	1	1	1	1	N/A	1	1	0	1	1	1
Vachha & Adams, 2005	1	1	1	1	N/A	1	1	0	1	0	1
Volling, McElwain & Miller, 2002	1	1	1	1	N/A	1	1	0	0	2	1
Vorria, Papligoura, Dunn, van IJzendoorn, Steele, Kontopoulou & Sarafidou, 2003	1	1	1	1	N/A	1	1	1	1	1	1
Weinfild, Whaler & Egeland, 2004	1	1	1	1	N/A	1	1	0	1	1	1
Wills, Sandy, Yaeger & Shinar, 2001	1	1	1	1	1	1	2	0	1	1	1
Wilson, White, Cobb, Curry, Greene & Popovich, 2000	1	1	1	1	N/A	1	2	0	1	1	1
Windle & Mason, 2004	1	1	1	1	1	1	2	0	1	0	1
Wolke, Rizzo & Woods, 2002	1	1	1	1	N/A	0	1	0	1	1	1
Zhou, Eisenberg, Reiser & Wang, 2004	1	1	1	1	1	1	1	0	1	1	1
Zimmerman & Stansbury, 2003	1	1	1	1	N/A	1	1	0	1	1	1
TOTAL	102	101	101	102	17	84	101	4	89	58	102
RATIO	102/102	101/102	101/102	102/102	17/18	84/102	101/204	4/204	89/102	58/306	102/102

APPENDIX 3:

TABLE 4: EMERGENT THEMES IN TEMPERAMENT RESEARCH FOR THE PERIOD 1998-2005

Author	Year	Country of Origin	Research Question	Research Design	Number of variables	Participants: who	Statistical Analysis	Theory
Agnew, Brezina, Wright, & Cullen	2002	USA	Hypothesis: juveniles high in negative emotionality and low in constraint will be more likely to react to strain with delinquency.	2	3	Juveniles	2	Ecosystemic: strain is related to delinquency. Temperament is theorised as having a fundamental effect on the experience and reaction to strain.
Aksan, Kochanska	2004	USA	The study proposed an indirect link between reactive inhibition to novelty (fearfulness) and later emerging effortful inhibition of prepotent response tendencies.	2	1	Children	3	Psycho-medical temperament (reactive inhibition to novelty and voluntary effortful inhibitory control) is a predictor of a variety of outcomes e.g. social competence, socialisation, and psychological functioning.
Al-Yagon	2003	Israel	Examine a multidimensional model of risk factors contributing to the explanation of adaptive functioning among children with mild developmental delays in general education settings	0	3	Mothers and children	3	Ecosystemic: risk for maladjustment depends on many variables such as child characteristics, maternal and familial ecological variables, child's attachment style.

Anderson, Carter, Mcintosh, Joyce, & Bulik	2002	USA	Explore, in the context of temperament, how women with bulimia who engage in self-harming behaviour differ from women with bulimia without self harming behaviours and from women with bulimia who attempt suicide with lethal intent	2	3	Women	1	Psycho-medical: biological mechanisms underlying temperament and self harm are linked. Temperament may be a risk factor for self harming behaviour in bulimic women.
Babor, Webb, Burleson & Kaminer	2004	USA	To what extent, among other variables, are the links between temperament and substance abuse evident?	3	3	Adolescents	2	Psycho-medical: temperament can be used to identify adolescents who are prone to substance abuse/use
Belsky, Friedman & Hsieh	2001	UK, London	Does early attentional persistence moderate the effect of infant negative emotionality on social competence, problem behaviour and school readiness at age 3?	2	3	Infants	3	Psycho-medical: temperament (emotional regulation) impacts on socioemotional development (social competence). Social competence plays a role in school readiness.
Bokhorst, Bakermans-Kranenburg, Fearon, van IJzendoorn, Fonagy & Schuengel	2003	Netherlands	Explore role for a genetic component in disorganized attachments. Do individual differences in organized patterns of attachment behaviour show a substantial influence of the shared environment? Explore heritability of genetic component of temperament.	0	2	Infants and mothers	1	Ecosystemic: Behaviour and development are a function of dynamic interaction of interpersonal and intrapersonal factors.

Boyce, Essex, Alkon, Smider, Pickrell & Kagan	2002	USA	Identify associations between tympanic membrane (TM) temperature asymmetries and biobehavioural attributes of 4-8yr old children. This study is expected to elucidate bio-temperament links for anxious children with behavioural problems.	2	2	Children	2	Psycho-medical: TM temperature linked to expression of temperament.
Burgess, Marshall, Rubin & Fox	2003	USA	Examine the extent to which both individual child temperament and parent-child relationship quality independently and/or interactively predicted physiological, psychosocial and behavioural 'outcomes'	2	2	Parents and children	1	Ecosystemic: Social and emotional development research should be holistic. Interactions of temperament, attachment, cognition and emotion impact on relationships with peers.
Buss & Goldsmith	1999	USA	Examine whether putative regulatory behaviours widely assumed to be conceptually associated with infant strategies are actually empirically associated with the changes in fearful and angry distress in 6, 12 and 18 mnth old infants	1	2	Infants	3	Psycho-medical: Emotion-based theory of temperament: emotions are regulators of social interactions and regulation becomes an integral part of the experience of emotion. Emotions are viewed as both regulators (infants reaction to environment) and as regulated (e.g. soothing)
Bussing, Gary, Mason, Leon, Sinha & Garvan	2003	USA	Investigate the relationship between child-reported dimensions of temp and ADHD as well as other indicators of child psychopathology, including disruptive disorders, depression and anxiety. Examine whether difficult child temperament scores independently predict caregiver strain.	0	1	Children	1	Psycho-medical: difficult temperament is a risk for developing disruptive disorders and may also predict parental strain

Chang & Burns	2005	USA	Examine how individual differences in children's temperament and motivation relate to attention skills in children from economically disadvantaged families. Examine the relationship between effortful control (temperament) and attention; motivation and attention. Interactions between motivation and temperament relating to attention.	0	3	Mothers and children	2	Psycho-medical: Attention is important for school readiness but can not be studied in isolation. Motivate an integrated approach to research: study interaction with other developing systems including socioemotional, cognitive. Temperament posited to play a mediating role in systems.
Churchill	2003	USA	Study potential fit between teachers and parents regarding parenting behaviours and child temperament and behavioural characteristics. Higher parent teacher agreement leads to higher child competency especially for social and cognitive outcomes	1	3	Parents, teachers and children	1	Ecosystemic: dynamic interactions between home and school are important for social and cognitive development in children.
Clark, Kochanska & Ready,	2000	USA	Examination of mothers' personality and its interaction with infants' negative emotionality as predictors for parenting behaviour.	2	2	Mothers & their infants	2	Ecosystemic: approach-avoidant behaviour in children is a result of dynamic interactions between parenting personality, behaviour and child characteristics.
Coplan, Prakash, O'Neil, & Armer, 2004	2004	Canada	Distinguish two types of social withdrawal: conflicted shyness (of which temperament is one underlying mechanism) and social disinterest	0	3	Parents and children	2	Ecosystemic: Overprotective or oversolicitious parenting, authoritative parenting linked to maladjustment across the life span.

Denham, Mason, Caverly, Schmidt, Hackney, Caswell, & DeMulder, 2001	2001	USA	Examine the social competence of preschool playgroups differing in emotional competence and explore the possible contributors to this emotional competence. Look at preschoolers emotional expression and reaction to the emotional expression of others (i.e. group influences)	2	3	Preschoolers	1	Psycho-medical: Emotional competence impacts on social competence. Negative emotionality (temperament) impacts not only on individual's behaviour but also interpretation of others' emotional expression.
Dixon & Hull Smith, 2000	2000	USA	Determine whether temperament-language relationships could be obtained. Consider whether correspondences between temperament and language could be observed for language comprehension. Examine predictions from temperamental instability to language acquisition	2	2	Mothers and toddlers	1	Psycho-medical: Emotion and language are forms of interpersonal expression which because of common function co-jointly draw from a pool of underlying cognitive resources. Thus some temperament characteristics may be important for language acquisition.
Dudley, Roy, Kelk & Bernard	2001	Australia	Questions: Do depressed mothers and fathers have similar correlates of depression and more of these correlates than control group? Do problematic personality traits and coping mechanisms make an significant contribution to explaining parental depression and if one partner is depressed is it more likely that the other will be depressed as well?	1	3	Parents	2	Psycho-medical model: role of the father is important in future socioemotional development of children. Father-child interaction is impacted on by presence of paternal postpartum depression. Depression has both interpersonal and intrapersonal contributors.

Edelstein, Weede Alexander, Shaver, Schaaf, Quas, Lovas & Goodman	2004	USA	Examine the association between self-reported attachment style and parental responsiveness during a stressful event	0	3	Parents & children	2	Ecosystemic: infant temperament and parental attachment style impact differently in stress and non-stress situations on parent-child interactions.
Edhborg, Seimyr, Lundh & Widstrom	2000	Sweden	Investigate whether maternal postnatal depression in a family influences parental perceptions of child's temperament and their experiences of parenthood.	2	3	Parents	1	Psycho-medical: transition to parenthood affects mothers and fathers differently. Role changes leave (especially) mothers more vulnerable for depression. This impacts on mother-father interpersonal relationship. The attachment relationship is further impacted on by infant temperament.
Eisenberg, Guthrie, Fabes, Shepard, Losoya, Murphy, Jones, Poulin & Reiser, 2000	2000	USA	Examine the moderating role of individual difference in negative emotionality in the relations of behaviour and attentional (emotional) regulation to externalizing problem behaviours.	2	3	Children	3	Psycho-medical model: Temperament (Regulatory capabilities and emotional/reactivity) are important for understanding psychopathology and problem behaviour.
Eisenberg, Liew & Pidada	2004	USA	Examine data on individual differences in children's regulation, emotionality, quality of socioemotional functioning and shyness (longitudinal continued of 3rd grade Indonesian children)	2	2	Children	1	Psycho-medical: Emotionality and regulative capacities linked to social competence and adjustment. Cross cultural study may imply that aspects of temperament are not impacted by culture

Eisenberg, Pidada & Liew	2001	USA	Examine the relations of individual differences in regulation and negtive emotionality to 3rd grade Indonesian children's social skills/low externalizing problem behaviour, sociometric status and shyness.	0	2	Childrens	2	Psycho-medical: temperament (negative emotionality and regulation) impacts on behaviour (shy, aggressive etc.) which impacts on peer relationships and ultimately socioemotional development.
Eisenberg, Shepard, Fabes, Murphy & Guthrie	1998	USA	Examine relations of teachers and parents reports of children's shyness at ages 6-8, 8-10 and 10-12 to dispositional regulation, dispostional emotionality and coping in peer contexts.	2	2	Teachers & infants	2	Psycho-medical: Understanding shyness from a temperament perspective. Temperament characteristics underlie 'shy' behaviour.
Eisenberg, Zhou, Losoya, Fabes, Shepard, Murphy, Reiser, Guthrie & Cumberland	2003	USA	Examine the relations of observed parental warmth and positive expressivity and children's effortful control and ego control with children's high versus low emotional expressivity in a 2 wave study of 108 children	2	3	Parents & children	3	Ecosystemic: control over emotional expression is an aspect of temperament which impacts on a child's behaviour and overall socio-emotional development. Children who are highly expressive or nonexpressive are often perceived to be maladjusted.
Elliot & Thrash	2002	USA	Examine the role of approach and avoidance motivation in models of personality : approach /avoidance temperaments represent the foundation of several basic dimensions espoused in the trait adjective, affective disposition and motivation system approaches to personality.	0	2	Children	2	Psycho-medical: dynamic interaction between temperament and emotion impacts on motivation
Engstrom, Brandstrom, Sigvardsson, Cloninger & Nylander	2003	Sweden	Examine whether temperament and character interact with age of onset in bipolar disorder	0	3	Adults	1	Psycho-medical: Temperamental characteristics may act as risk factors for individuals impacting on age of onset of bipolar disorder

Engstrom, Brandstrom, Sigvardsson, Cloninger, & Nylander, 2004	2004	Sweden	Examine whether temperament and character influence suicide attempts in bipolar patients.	0	3	Adults	1	Psycho-medical: Interpersonal and intrapersonal factors linked to suicide attempts in bipolar patients
Etter, Pelissolo, Pomerleau & De Saint-Hilaire	2002	Switzerland	Examine the link between temperament traits and smoking	0	2	Anonymous respondents	1	Psycho-medical: inheritable temperament traits may lead to likihood of smoking.
Fabes, Eisenberg, Jones, Smith, Guthrie, Poulin, Shepard & Friedman	1999	USA	Relations of regulatory control to the qualities of children's everyday peer interactions were examined.	0	3	Children and peers	2	Ecosystemic: individual differences in emotional regulation (temperament) interact with situational factors impacting on children's social competence
Fabes, Leonard, Kupanoff & Martin	2001	USA	Examine the relation between parents' reactions to children's negative emotions and social competence. Examine the role of parental emotional distress in childrens' emotional socialization	0	3	parents & children	2	Ecosystemic: dynamic interaction between parenting behaviour and neg emotional expressivity of child temperament impacts on child's social competence.

Ghazinour, Richter, Emami & Eisemann	2002	Sweden	Investigate relationships between temperament, character and perceived parental rearing among Iranian refugees resettled in Sweden. Hypothesis: these factors exert buffering effect against post-traumatic stress disorder.	1	3	Refugees	2	Ecosystemic: PTSD depends on vulnerability to trauma (genetic and biological risk factors as well as contextual factors). Factors include: family history, parenting, temperament, prevalence of trauma.
Giancola & Mezzich	2003	USA	Determine whether temperament mediates the relation between executive functioning (EF) and drug use involvement and whether EF and temperament interact to account for unique variance in drug use involvement	0	3	Adolescents	2	Psycho-medical: Difficult temperament interacts with executive functioning (cognition) which may play a role in the development of substance abuse disorder.
Giancola, Mezzich & Tarter	1998	USA	Determine whether conduct disordered females (adolescent) are more impaired on neuropsych executive cognitive functioning (ECF) tests and exhibit more difficult temperament compared with controls. Examine combined influence ECF and difficult temperament associated with aggressive and nonaggressive delinquent behaviour.	0	2	Adolescent girls	1	Psycho-medical: difficult temperament and executive cognitive functioning (ECF) in conjunction with each other may lead to delinquent behaviour

Giotakos, Vaidakis, Markianos, Sandoni, Christodoulou	2004	Greece	Examine the relationship between temperamental traits e.g. novelty seeking, harm avoidance and self transcendence, and parenting of sex offenders	0	2	Rapists, molesters and healthy controls	2	Psycho-medical: Criminal Behaviour development based on environmental influences, attachment relationships and individual temperament
Golombok, Murray, Jadva, MacCallam & Lycett	2004	UK	42 surrogacy families, 51 egg donor families and 80 natural conception families compared in terms of, parental adjustment. Measures included psychological well-being of parents, quality of parent child-relationships and infant temperament.	0	3	Mothers, fathers and children	1	Ecosystemic: Dynamic interactions between environment, child and parent are significant

Gomez & Baird	2005	USA	Will parents of children diagnosed with autism report that their children exhibited significantly more self-regulatory difficulties at 1yr than parents of control group? Will parents of children diagnosed with autism report that their children had similar profiles of self-regulatory difficulties at 1yr?	0	1	Parents & children	1	Psycho-medical: Self-regulation problems (temperament) are early risk factors for autism. Temperament profiles promote early identification and intervention to improve adjustment outcomes for the child and less strain for parents.
Graziano, Jensen-Campbell & Sullivan-Logan	1998	USA	Examined the relations among motor activity differences, temperament and expectations about future personality in preschool children. Expect that links are moderated by sex of the child. Sociable behaviour should be related to expectations for adult extraversion and agreeableness and emotionality to teachers' expectations for adult emotional instability.	0	2	Preschoolers and their teachers	1	Ecosystemic: parental/teacher expectations of temperament may impact on development trajectory. Parental beliefs regarding child's behaviour impacts on parenting behaviour. Different temperament characteristics are valued at different times in development and for genders. Goodness of fit model.
Gutteling, de Weerth, Willemsen-Swinkels, Huizink, Mulder, Visser & Buitelaar	2005	Netherlands	Explore the effects of prenatal stress on temperament and problem behaviour on 27-month-old toddlers	2	3	Mothers	2	Psycho-medical: Maternal stress during pregnancy in interaction with genetic factors may have long lasting consequences on the brain and behaviour development of children
Hagekull and Bohlin	2003	Sweden	Measurement of the prospective relations between infant temperament and attachment and middle childhood personality	2	2	Children	2	Psycho-medical: temperament forms the basis of personality. Temperament is important for socioemotional development.

Heinonen, Raikkonen, Keltikangas-Jarvinen	2003	Finland	Hypothesis: mother's emotional rejections of the child, her perceptions of the child as being high in both activity and negative emotionality and low in cooperatetiveness (difficult child), her intolerance of the child's behaviour, and strict disciplinary style, as well as low satisfaction as a mother and as a spouse and with work when the child was young will predict the child's low self-esteem in adolescence.	2	3	Mothers and children	3	Ecosystemic: Self-esteem results through dynamic interaction of interpersonal and intrapersonal factors (including temperament)
Henderson, Fox & Rubin	2001	USA	Examine direct and indirect influences of early temperament and physiological disposition as measured by EEG on later development	2	3	Children	2	Psycho-medical: Temperament provides basis for trajectory of emotional and social development. Final trajectory depends on individual characteristics, social and developmental processes.
Hyde, Else-Quest, Goldsmith and Biesanz	2004	USA	What is the potential impact of children and their behaviour on the functioning of their employed parents? Difficult temp in infants is associated with poorer work outcomes. Behaviour problems with preschoolers – poorer work outcomes. Mothers' affect and sense of parenting competence mediates relationship between temp and work outcomes. Spillover is immediate but in some cases persists over months perhaps yrs.	3	3	Mothers and children	3	Ecosystemic: difficult infant temperament impacts on maternal satisfaction and experience of competence which in turn impacts on occupational effectiveness/functioning.
Ivarsson & Winge-Westholm	2004	Sweden	Two hypotheses of OCD: the presence of behavioural inhibition (BI) and high levels of emotionality	0	2	Children	1	Psycho-medical: temperament which has biological base could provide genetic heterogeneity for OCD.

Jackson & Center	2002	USA	Determine if individuals who are low on both extraversion and neuroticism traits report better behaviour than a contrast group that is high on both traits. If participants that are low on both E and N report significantly better behaviour, the stronger system of conditioned inhibitions predicted to be present in such individuals will be indirectly supported.	1	1	Children suspended from school	1	Psycho-medical: Antisocial behaviour is a barrier to learning. It is the result of dynamic interaction between social, cognitive factors and temperament.
Jenkins, Rashbash & O'Connor	2003	Canada	Examine the role of the shared family context in understanding differential parental treatment of children. Child specific and family context predictors of differntial parental positivity and negativity were examined.	0	3	Children & their families	3	Ecosystemic: shared environment and child characteristics influence differential treatment of children by parents
Jensen, Stjernqvist, 2002	2002	Sweden	Investigate whether differences concerning acceptance of dental treament and amnesia after rectal sedation with midazolarn can be explained by temperament traits in the child	0	1	Children	1	Ecosystemic: Parents' understanding of their child's temperament plays a role in whether or not they are able to anticipate the intensity of their child's distress for medical procedures.

Johnson & Harris	2004	UK	Investigate oral-motor-function, illness and mealtime negativity as possible predictors of feeding problems in late infancy.	0	3	Infants and mothers	1	Ecosystemic: difficult temperament (emotional negativity) especially during feeding is very stressful for the mother. Insensitive or inappropriate responses exacerbate feeding difficulties leading to long-term mealtime negativity
St. Jonn-Seed & Weiss	2002	USA	Hypotheses: Positive relationship between the amount of a caregiver's negative expressive emotionality (EE) and the extent of a child's emotional behavioural problems at 2yrs. Emotional overinvolvement related to emotional/behaviour problems at 2yrs. Infant temperament will moderate the effect of caregiver EE.	2	3	Caregivers & children	2	Ecosystemic: Mental health problems of low birth weight infants seem related to infant's perinatal complications and temperament as well as psychosocial variables in the environment.
Joyce, McKenzie, Luty, Mulder, Carter, Sullivan & Cloninger	2003	New Zealand	Evaluate childhood experiences (neglect and abuse), temperament and childhood and adolescent psychopathology as risk factors for avoidant and borderline personality disorders in depressed clients	0	3	Depressed patients	1	Psycho-medical: temperament profiles are useful in identifying risk factors for psychological disorders.

Karrass, Braungart-Rieker	2004	USA	To what extent do dimensions of infant negative temperament in the first year predict IQ at age 3. Do these associations depend on the quality of the infant-mother attachment relationship?	2	3	Mothers and infants	1	Ecosystemic: Learning occurs through interaction with the world. Individual differences in temperament are likely to affect the infant/child's engagement with the social and physical environment. Expression of temperament may be lessened or heightened by contextual factors such as parenting.
Kiang, Moreno & Robinson	2004	USA	Examine the influence of maternal perceptions on child difficult temperament at 6mnths and maternal sensitivity at 12-15mnths. Do these 3 variables predict empathy in infants at 21-24months?	2	3	Mothers and infants	3	Ecosystemic: maternal preconceptions influence temperament and temperament influences development of empathy.
Kim-Cohen, Moffitt, Caspi & Taylor	2004	UK	Test gentic and environmental contributions to young children's resilience and vulnerability to SES deprivation	2	3	Children and mothers	2	Ecosystemic: Resilience in children is a function of interpersonal and intrapersonal factors. Important systemic factors include: child characteristics, the parent-child relationship and social support.
Kochanska, Coy, Tjebkes & Husarek	1998	USA	Multimethod investigation of early emotionality: observed responses to std procedures consisting of brief episodes that elicited joy, fear, anger and discomfort to aversive stimulation	2	2	Mothers, fathers and infants	1	Psycho-medical: Emotion-based theory of temperament. Effortful control in temperament is linked to negative emotionality. Expressed negative emotionality impacts on mother-infant relationship.

Kochanska, Friesenborg, Lange & Martel	2004	USA	Examine the contributions of infant's temperament and parent's personality on their relationship.	2	2	Parents & infants	2	Ecosystemic: mother and father personality interacts with child characteristics impacting on interpersonal relationships between them.
Kristensen & Torgersen	2002	Norway	Do temperament characteristics measured by EAS temp survey differentiate selective mutism (SM) children with and without an additional communication disorder (CoD)? Do temperament characteristics measure by EAS (adult version) differentiate the parent in the respective subgroups of SM?	0	2	Children and parents	1	Psycho-medical: individuals may have a genetic vulnerability for selective mutism due to an inhibited temperament.
Laible	2004	USA	Does attachment security and child temperament predict differences in the elaboration and emotional content of mother-child discourse in 2 contexts? Are these differences related to a child's socioemotional development?	0	3	Mothers and infants	2	Ecosystemic: Based on Vygotsky's social constructivist theory of development.

Lemery, Essex & Smider	2002	USA	Examine link between temperament traits and behavioural problems later in childhood.	3	1	Families	3	Psycho-medical: temp and behaviour problems are either distinct or they are different manifestations of the same underlying process. Temperament profiles are important for identifying children at risk.
Lonigan, Phillips & Hooe	2003	USA	Examine the link between temperament characteristics and depression and anxiety. Hypothesised that different aspects of temperament will relate to depression and anxiety.	2	2	Children	3	Psycho-medical: link different physiological aspects of temperament characteristics to depression and anxiety. Use temperament to understand either the co-morbidity of depression and anxiety or to assess risk for either anxiety or depression
Lorensen, Wilson & White	2004	Norway/ USA	What are the relationships among family dynamics, parent-fetal attachment and infant temperament? To what extent is there congruence between mothers' and fathers' perceptions of family dynamics and fetal attachment? What changes in family dynamics occur over the transition to parenthood?	2	3	Mothers and fathers	1	Psycho-medical: Development includes family dynamics, attachment, temperament and environment. Interactions are bi-directional.

Manian, Strauman, & Denney	1998	USA	2 studies testing the developmental postulates of self-discrepancy theory (SDT). Temperament and dominant modes of catertaker-child interaction appear to underlie the acquisition of emotion regulatory systems	0	2	Adult volunteers	2	Pyscho-medical: Emotional problems in adulthood linked to temperament characteristics and socialization experiences during childhood. Temperament and dominant modes of catertaker-child interaction appear to underlie the acquisition of emotion regulatory systems
Mayseless & Scher	2000	Israel	Examine joint contribution of maternal versus paternal attachment concerns together with the perception of the infant's temperament	2	3	Mothers & fathers	2	Psycho-medical: maternal security in relationship with her spouse, and infant temperament impact on mother-child attachment.
McBryde, Ziviani & Cuskelly	2004	Australia	Investigate the factors that influence the decision making of parents and teachers regarding children's school readiness	0	3	Preschool children, parents, teachers and childcare workers	2	Ecosystemic: Shift from preschool to primary school termed critical period and significant long term effects. Adjustment/maladjustment is a function of dynamic relationship between individuals and their environment.

McClowry, Faans & Galehouse	2002	USA	Pilot study aims: Test psychometric properties of intended instruments. Obtain preliminary data: occurrence of behavioural problems and level of difficulty, level of maternal psychological distress, relation of maternal distress to behaviour problems. Assess feasibility of the study. Verify the appropriateness of the research to clinical practice	2	3	Mothers and children	2	Ecosystemic: Intervention programmes for high risk status of inner-city dwelling disadvantaged children need to be dynamic, relevant and culturally sensitive. Effective programmes are systemic, targeting parental distress, perceptions and parent-child transactional patterns. Temperament intervention impacts on all these
McCrae, Costa, Terracciano, Parker, Mills, De-Fruyt & Mervielde	2002	USA	Assess mean level changes in personality and temperament development during adolescence	3	1	Adolescents	1	Psycho-medical: temperament develops during the course of development. Impact of socialisation is evident in gender differences.
Murray & Kochanska	2002	USA	Two aims: explore structure of effortful control (EC) in normally developing sample and examine the relations between effortful control and adaptive functioning	2	2	Mothers	1	Psycho-medical: temperament is implicated in multiple developmental processes. Emotional regulation is especially important for socialisation. Extremes in effortful control (temperament) may result in behaviour problems

Neitzel & Dopkins-Stright, 2004	2004	USA	Child temperament, parent openness to experience, conscientiousness, parent education, and parent assessment of the task were examined in relation to parenting behaviours during child problem solving.	0	3	Children and parents	2	Ecosystemic: Child problem solving requires cognitive, emotional and autonomy support which is linked to children's self regulatory behaviours (temperament). Interpersonal and intrapersonal factors related to support given during problem solving
Nixon	2001	Australia	Examine the effect of parent-child-interaction-therapy (PCIT) on hyperactivity and temperament on oppositional preschoolers. Focus on improving child-parent relationships. Equip parents with skills to manage disruptive behaviour	2	2	Preschoolers	1	Ecosystemic: ADHD and difficult temperament are risk factors for maladjustment. Although both are considered to have biological basis, the impact of the environment is consider significant e.g. parents attributions of child behaviour influences parenting behaviour impacting on overall 'maladjustment'.
Olson, Bates, Sandy & Schilling	2002	USA	Examine relation between an observational index of toddler attentional disengagement and individual differences to impulsivity and inattention. Examine contribution of preverbal developmental and social factors (specifically caregiving factors) to impulsivity and inattention in toddlers. Examine the interrelationships between these different categories of risk. Examine contribution of gender differences in the development of self regulatory competence.	2	3	Mothers and children	2	Ecosystemic: Self regulatory problems can be linked to ADHD, conduct disorders, oppositional defiant disorders, learning difficulties and peer rejection. Risk for self-regulatory problems result from dynamic interaction of early caregiving relationships (hostility, harsh discipline), infant/toddler temperament, suboptimal levels of infant/toddler cognitive functioning

Pearce & Ayers, 2005	2005	UK	Do women's perceptions of their infant remain stable between late pregnancy and the early postnatal period? What is the effect of women's expectations and evaluations of their infant on the mother-baby bond?	2	3	Mothers	1	Psycho-medical: depression and anxiety of pregnant mothers impacts on their perceptions/expectations of infant temperament. Mismatch between between expectations and actual baby temperament has significant implications for attachment.
Pike & Atzaba-Poria	2003	UK	Are the same temperamental traits associated with both sibling and friend relationships? To what degree do genetic, shared and nonshared environmental influences account for variability seen in these relationships? To what extent do genetic and environmental components account for covariance between temperament and these close relationships?	0	3	Child twins and peers	2	Ecosystemic interpersonal and interapersonal aspects all play a role in relationship quality of both sibling and friendship relationships.
Putnam & Stifter	2005	UK	Provide an initial effort to examine relationship among the separable components of positivity, negativity and approach-inhibition in low-high intensity situations. Explore relations between approach-inhibition and problem behaviour	2	3	Children	2	Psycho-medical: approach-inhibition behaviour (temperament) is linked to problem behaviour
Rapee, Kennedy, Ingram, Edwards & Sweeney	2005	Australia	Early intervention program aimed at preventing the development of anxiety in preschool children.	2	2	Preshoolers and parents	3	Ecosystemic: temperament may be linked to vulnerability for anxiety. Use temperament profiles to diagnose disorders

Reed-Victor	2003	USA	How do teachers view child temperament and personality dimensions in relations to the child's adaptation to classroom behavioural, social and learning expectations? Other variables: age, gender, risk status and setting characteristics: school level, teacher education and experience, were also considered as contributors to school adjustment	1	3	Children and teachers	2	Ecosystemic: Adjustment is a dynamic process: interactions between biological and environmental risk factors (intra/interpersonal factors) including temperament.
Rieser-Danner	2003	USA	Study one: Infants rated as more fearful by mothers, by lab observers or both would perform at a lower level during the standardized testing situation. Study two: examining the role of fear in a nonsocial testing situation – involved no infant-tester interaction. To control for familiarity half infants and mother had play session in testing rm prior to testing	2	3	Infants	2	Psycho-medical: temperament (expressed emotionality) impacts on cognitive development as affect interferes with performance. Caregiver, teacher etc. perceptions impact on interpersonal interactions which impact on academic performance.
Rothbart, Ellis, Rueda & Posner	2003	USA	Investigate the development of attentional mechanisms that underlie effortful control as indexed by their performance in a) making anticipatory eye movement to ambiguous locations, b) resolving conflict between location and identity in spatial conflict task	1	2	Toddlers	1	Psycho-medical: Temperament is important for social emotional development as it mediates stress responses, conflict resolution, empathy, conscience and adjustment/maladjustment.

Rubin, Burgess, Dwyer & Hastings	2003	Canada	Toddlers' temperament, frequency with which they initiated conflictual and aggressive interaction and quality of parent-child interactions (maternal behaviours and parenting styles) were considered together as precursors to the development of an externalizing profile	2	3	Parents, children and peers	2	Ecosystemic: Maladjustment/Externalizing problems are a product of dynamic interactions between development, temperament, parenting and peer response to aggressive etc. behaviours
Rubin, Burgess & Hastings	2002	Canada	Ascertain whether different types of behavioural inhibition were stable from toddler to preschool age and whether inhibited temp and/or parenting style would predict children's subsequent social and behavioural problems	2	3	Parents & children	2	Ecosystemic: Social and emotional adaptation/development is a result of interpersonal as well as intrapersonal factors. Extraneous factors such as parenting are as important as the biologically mechanisms underlying temperament.

Russel, Hart, Robinson, and Olsen	2003	USA/Australia	Main goal compare samples from US and Australia on: Parent and teacher reports of children's temp and social behaviour with peers. Parent reports of parenting styles. Links among child behaviour and parenting measures with sex and child temperament considered as moderating factors	0	3	Families with preschoolers.	2	Ecosystemic: Temperament-parenting interactions are a possible predictor of development of children's adjustment. This is a function of culture as parents differ culturally in their beliefs, values, goals and practices.
Saudino, Wertz, Gagne & Chawla	2004	USA	Examine whether parent ratings of siblings exaggerate temperamental differences between them. Measured activity level and shyness	0	3	Parents & children	1	Ecosystemic focus on contribution of both environment and genetic contribution of temperament with special emphasis on strength of influence of parental expectations in sibling behaviour.
Scher, Zuckerman & Epstein	2005	Israel	How do night waking and settling difficulties contribute to the subjective perception of the infant's sleep problem? Which characteristics of the infants' sleep problems persist into early childhood? What is the relationship btwn early sleep difficulties and subsequent behavioural and/or sleep problems at the preschool stage.	2	3	Children	2	Ecosystemic: Variability in sleep wake cycles are affected by dynamic interaction of maturation, learning processes, temperament, parenting characteristics, maternal well being, mother-child relationships. Early sleep problems may be linked to subsequent problems in preschool (including behavioural)

Schwebel & Plumert	1999	USA	This study examined longitudinal and concurrent relations between temperament, ability estimation and injury proneness	2	2	Children	2	Psycho-medical: temperament impacts on estimation of child's ability which in turn impacts on injury proneness.
Secco & Moffatt	2003	Canada	What is the relationship between the age of adolescent mothers, parenting stress and enacted social support? What is the association between perceived infant care competence and later measures of enacted social support, infant temperament and parenting stress? What effect do situational variables, maternal and infant characteristics have on explaining the outcomes of total parenting stress, parenting sense of competence and depression?	2	3	Adolescent mothers	2	Psycho-medical: Numerous situational, parent and child factors contribute to parenting stress and competence. Stress among adolescent mothers has been significantly associated with the occurrence of child maltreatment.
Seifer, LaGasse, Lester, Bauer, Shankaran, Bada, Wright, Smeriglio & Liu	2004	USA	Hypotheses: prenatal cocaine and opiate exposure associated with higher rates of insecure and disorganized attachment. Caregiver characteristics and infants' temperament will predict attachment classification. Attachment will be associated with behaviour problems. postnatal use by caregivers will be associated with more insecure and disorganized attachment.	2	3	Caregivers & infants	2	Ecosystemic: Attachment develops from interplay of child characteristics and family influences as well as environmental factors.
Shamir-Essakow, Rapee, Rapee & Safier	2004	Australia	Examine differences in caregiveing representations of mothers of 3-4yr old behaviourally inhibited and uninhibited children with secure or insecure attachments	0	2	Mothers & children	1	Ecosystemic: infant temperament influences parenting responses. Infants that are securely attached lead to confident moms which are in turn more competent

Sherrad, Tonge, & Ozanne-Smith	2002	Australia	Investigate the relationship between injury occurrence and biological, psychological and social variables in the Australian Child and Adolescent Development Programme	2	3	Children and adolescents	2	Psycho-medical: temperament, psychopathology and physical disability are identified risk factors for young people with intellectual disability (ID).
Soubhi	2004	Canada	Describe by child's age, the relationships between childhood injury, child temperament and behaviour, parenting, and a broader context that includes family functioning and neighbourhood characteristics	3	3	Parents and children	2	Ecosystemic: Childhood injury is a function of the dynamic interaction of neighbourhood, family and child characteristics.

Stams, Juffer & van IJzendoorn	2002	Netherlands	Examine relations between: Maternal sensitivity, infant attachment and temperament in early childhood predict adjustment in middle childhood: the case of adopted children and their biologically unrelated parents.	2	3	Mothers & children	2	Ecosystemical: socioemotional and cognitive development is subject to dynamic interactions of maternal sensitivity, the attachment relationship and the child's individual characteristics.
Thorell, Bohlin & Rydell	2004	Sweden	Investigate 2 inhibitory concepts: exectutive inhibition and inhibition to the unfamiliar. Study relation between 2 as well as how they are related to development of hyperactivity, social anxiety and social competence.	2	3	Children	3	Psychomedical: interaction between inhibition toward the unfamiliar (linked to social competence/withdrawl) and executive inhibition (effortful control) is linked to social competence/rejection.
Tripi, Palermos, Thomas, Goldfinger, Florentino-Pineda	2004	USA	Tested 3 hypotheses: Parental presence during emergence from anesthesia diminishes frequency and severity of emergence distress in children. Parental presence during emergence distress reduces frequency of negative behavioural changes in postoperative period. Children with anxious parents, separation anxiety, or prior evidence of sleep disturbance are more likely to have emergence distress behaviour	0	2	Parents and children	1	Ecosystemic: temperament places a child at risk for postop emergence distress. Postop emergence distress is also a function of interactions between parent characteristics and parent-child interaction.
Valiente, Eisenberg, Fabes, & Sheppard	2004	USA	Examine the linear and interactive relations of children's effortful control and parents' emotional expressivity to children's empathy-related responses	0	3	Parents & children	2	Ecosystemic: temperament (emotional arousal) linked to individual development/capacity for empathy. Empathy is important for prosocial behaviour and social competence.

Van der Mark, IJzendoorn, Bakermans-Kranenburg	2002	Netherlands	Aims: describe the development of empathic concern to the distress of mother as well as stranger and test if empathy is increasing in 2nd half of 2nd year. examine whether parents' sensitive approach to their children's needs stimulates empathic concern for other's distress. Test a model in which temperament interacts with attachment security and parental sensitivity in shaping the child's empathic concern.	2	3	First born girls from middle class families and mothers	2	Ecosystemic: Empathy is a precursor of moral development. Development of empathy is a result of the dynmic interaction of interpersonal and intrapersonal factors.
Vachha & Adams	2005	USA	Examine temperament profiles of children who have Spina bifida and compare to normal controls. Discuss implications for support for these children.	0	1	Primary caregivers of children	1	Psycho-medical: Effective support systems applied in early childhood with children who have Spina bifida with MM will have positive influence in their transition to adolescence and adulthood. Emphasis on goodness of fit
Volling, McElwain, and Miller	2002	USA	Expand on the study of emotion regulation by examining the social emotion of jealousy and its regulation in early childhood	2	3	Mothers, toddlers and preschoolers	2	Ecosystemic: Jealousy can only be understood within a social context. Study of jealousy underscores the significance of the contribution of both intrapersonal and interpersonal contribution to emotional regulation.
Vorria, Papaligoura, Dunn, van IJzendoorn, Steele, Kontopoulou & Sarafidou	2003	Greece	Examine cognitive development, attachment and caregiver sensitivity of residential group care infants. Are differences in attachment related to children's observed behaviour, cognitive development or temperament and background variables?	3	3	Infants and caregivers	1	Ecosystemic: Infant-caregiver relationship is a result of the interplay between infant and caregiver characteristics – infant temperament may mediate parenting.
Weinfield, Whatler, Egeland	2004	USA	Examine continuity of attachment from infancy to late adolescence. Correlates of change in attachment will be explored within 3 domains: infant characteristics and experiences, maternal characteristics and experiences, and observation assessments of the families	2	3	Adolescents and mothers	2	Ecosystemic Attachment linked with temperament. Difficult temperament can result in a move from secure attachment to resistant attachment. Mom's perception of temperament more predictive of attachment security than actual temperament

Wills, Sandy, Yaeger, & Shinar	2001	USA	Test for moderation in the relation of family risk factors (parent-child conflict, family life events, and parental substance use) to early onset adolescent substance use (tabacco, alcohol and marijuana)	2	3	Mothers, fathers & adolescents	3	Ecosystemic: Maladjustment/resilience result of interaction effects: Temperament-family environment. Temperament can be a source of resilience or vulnerability for the child depending on environment
Wilson, White, Cobb, Curry, Greene & Popovich	2000	USA	What are the differences in partners' reports of fetal attachment and family dynamics? How do family dynamics change from the 3rd trimester to when the infant is 8 mnths old? What is the association between family dynamics and parental-fetal attachment and infant temperament?	2	3	Parents & infants	2	Ecosystemic: the family unit and its members are in continuous interaction with each other. This interaction creates the milieu in which the fetus is incorporated into the family, family relationships and roles are altered and the new child's temperament emerges.
Windle & Mason	2004	UK	Evaluate a four-factor model of 14 manifest variables representing the behavioural and emotional problem domain of polysubstance use, general delinquency, academic orientation and negative affect. Test stability and cross-lagged prediction of derived factors across 1 year intervals. Test specificity versus generality of prediction of different behavioural and emotional problems	2	3	10th & 11th graders	3	Psycho-medical: Adolescent adjustment/maladjustment depends on dynamic interaction of interpersonal and intrapersonal factors.
Wolke, Rizzo & Woods	2002	UK	To investigate whether persistent infant crying is associated with an increased risk for externalizing behaviour problems in childhood.	2	1	Infants	1	Psycho-medical: temperament (self regulation) linked to persistent crying (PC). Problems with behavioural control are precursosrs of behaviour control difficulties such as hyperactivity and conduct problems in childhood

Zhou, Eisenberg, Reiser & Wang	2004	China	Examine relations among authoritative and authoritarian parenting styles, children's effortful control and dispositional anger/frustration and children's social functioning	0	3	Parents & children	2	Ecosystemic: interaction between parenting style and temperament impacts on social functioning. Emphasis on checking contribution of culture through cross-cultural research.
Zimmerman & Stansbury	2003	USA	Investigate the relationships between emotion regulation, temperamental reactivity and situational context. Predicted: demand characteristics influence chosen strategies; Temperamental reactivity would be related to type of strategy used	0	3	Toddlers	2	Psycho-medical: Emotional regulation competence is situation specific and depends on available coping stratigies due to both level of stress and development.
				127	260		184	
				Research Design	**Number of variables**		**Statistical Analysis**	
				0.42	0.85		0.61	

Author	Biological/Environment	Stress, Coping, Resilience	Cognitive Development	Social Development	Emotional Development	Behavioural Development
Agnew, Brezina, Wright, & Cullen		People high in negative emotionality and low in constraint are much more likely than are others to react to strain with delinquency				
Aksan, Kochanska						Collectively findings indicate that differences in reactive inhibition, or fearfulness, tend to play both indirect and direct roles in fostering inhibitory control and that impulsivity causally links earlier reactive inhibition with later voluntary, effortful inhibitory control
Al-Yagon				Children with more difficult temperament tended to be more insecurely attached according to maternal perceptions, moms have lower sense of personal coherence and lower family cohesion	Children with more difficult temp tended to be more insecurely attached according to maternal perceptions, moms have lower sense of personal coherence and lower family cohesion	

Anderson, Carter, Mcintosh, Joyce, & Bulik				
Babor, Webb, Burleson & Kaminer				Externalizing disorders, onset age, difficult temperament and internalizing disorders were significantly predictive of substance abuse/use
Belsky, Friedman & Hsieh		High levels of negative emotionality were associated with low levels of social competence only when attentional persistence was poor.	High levels of negative emotionality were associated with low levels of social competence only when attentional persistence was poor.	
Bokhorst, Bakermans-Kranenburg, Fearon, van IJzendoorn, Fonagy & Schuengel	Genetic factors explained 77% of variance in temperamental reactivity, and unique environmental factors and measurement error explained 23%.		For secure vs. nonsecure attachment, 52% of variance in attachment security was explained by shared environment, and 48% of the variance was explained by unique environmental factors and measurement error.	

Boyce, Essex, Alkon, Smider, Pickrell & Kagan				Findings suggest that asymmetries in TM temperatures could be associated with behaviour problems that signal risk for developmental psychopathology
Burgess, Marshall, Rubin & Fox				Avoidant attachment and uninhibited temperament together predicted a higher incidence of externalizing problems
Buss & Goldsmith			The use of some putative regulatory behaviours (distraction and approach) reduced the observed intensity of anger but were less effective in reducing intensity of fear.	
Bussing, Gary, Mason, Leon, Sinha & Garvan			Depressive symptoms correlated significantly with difficult temperament	

Chang & Burns	Effortful control impacts on attention. Attention is a multi-faceted concept that relates to cognitive, socioemotional and motivational systems	Effortful control impacts on attention. Attention is a multi-faceted concept that relates to cognitive, socioemotional and motivational systems	Effortful control impacts on attention. Attention is a multi-faceted concept that relates to cognitive, socioemotional and motivational systems	
Churchill	Child-teacher goodness of fit linked to child's cognitive and social outcomes. Teacher-parent goodness of fit on parenting and child characteristics was linked with child social competence.	Child-teacher goodness of fit linked to child's cognitive and social outcomes. Teacher-parent goodness of fit on parenting and child characteristics was linked with child social competence.		
Clark, Kochanska & Ready,				Maternal personality alone and also in interactions with child emotionality predicted future parenting behaviours. Findings also highlight biderectionality of early parent child relationship.
Coplan, Prakash, O'Neil, & Armer, 2004	Children's cognitive skills undeveloped due to limited social interaction	Children's social skills undeveloped due to limited social interaction	Conflicted shyness linked to temperamental characteristics of fearfulness, negative emotionality, and perceived competence.	

Denham, Mason, Caverly, Schmidt, Hackney, Caswell, & DeMulder, 2001			Social competence lower in children with high negative emotionality and anger (reactivity).	
Dixon & Hull Smith, 2000		Adaptability and soothability mood and smiling/laughter and persistence and duration of orientation were all positively associated with language development (including comprehension)		
Dudley, Roy, Kelk & Bernard	While mothers appeared primarily influenced by their own personality, perinatal and infant-related factors, fathers appeared more influenced by mothers personality difficulties and unresolved past events and mothers' current meantal health and infant related problems as well as the state of the marital relationship.			While mothers appeared primarily influenced by own personality, perinatal and infant-related factors, fathers appeared more influenced by mothers personality difficulties and unresolved past events and mothers' current meantal health and infant related problems as well as the state of the marital relationship.

Edelstein, Weede Alexander, Shaver, Schaaf, Quas, Lovas & Goodman	Parents high on self-report attachment avoidance were more distressed during inoculation and parents high on avoidance were less responsive to child distress			
Edhborg, Seimyr, Lundh & Widstrom	The relationship between maternal depression and parental perception of difficult temperament impact on the mother-child relationship.		The relationship between maternal depression and parental perception of difficult temperament impact on the mother-child relationship.	
Eisenberg, Guthrie, Fabes, Shepard, Losoya, Murphy, Jones, Poulin & Reiser, 2000				Negative emotionality and attentional control linked to exteranalising behavioural problems
Eisenberg, Liew & Pidada		Shyness for both sexes tended to be associated with concurrent measures of low regulation, high negative emotionality and low quality of social competence.	Shyness for both sexes tended to be associated with concurrent measures of low regulation, high negative emotionality and low quality of social competence.	

Eisenberg, Pidada & Liew		Children's low socially approapriate behaviour/high problem behaviour and rejected peer status were related to low dispostional regulation and high neg emotionality	Children's low socially approapriate behaviour/high problem behaviour and rejected peer status were related to low dispostional regulation and high neg emotionality	Children's low socially approapriate behaviour/high problem behaviour and rejected peer status were related to low dispostional regulation and high negative emotionality
Eisenberg, Shepard, Fabes, Murphy & Guthrie		Parent rated shyness reflected primarily on social wariness with unfamiliar people whereas teacher rated shyness tapped social inhibiton due to social evaluative concerns.		
Eisenberg, Zhou, Losoya, Fabes, Shepard, Murphy, Reiser, Guthrie & Cumberland			Bidirectional relationship exists between parenting behaviour and temperament, impacting on emotional expressivity of the child. Patterns of relations between the two have predictive value for future emotional expressivity.	
Elliot & Thrash	Temperament constructs linked to achivement goals		Temperament constructs linked to achivement goals	
Engstrom, Brandstrom, Sigvardsson, Cloninger & Nylander				

Engstrom, Brandstrom, Sigvardsson, Cloninger, & Nylander, 2004				
Etter, Pelissolo, Pomerleau & De Saint-Hilaire				Smotking is associated with heritable temperament traits which have consequences for treatment and prevention of tobacco dependence.
Fabes, Eisenberg, Jones, Smith, Guthrie, Poulin, Shepard & Friedman		Individual differences in regulation interact with situational factors in influencing young children's socially competent responses		
Fabes, Leonard, Kupanoff & Martin	The relations between harsh parental coping strategies and children's emotional responding was moderated by parental distress.	Social competence is low for children whose distressed parents employ harsh coping strategies in response to negative emotionality.	Distressed parents who use harsh coping strategies in response to children's negative emotions have children who express emotion in relatively intense ways.	

Ghazinour, Richter, Emami & Eisemann	A high level of self-directedness appeared as having a possible buffering effect against PTSD after several severe trauma. Educational level and length of stay in Sweden represented important socio-cultural factors in decreasing psychological disturbances		
Giancola & Mezzich		Temperament mediated the relation between executive functioning and drug use	Temperament mediated the relation between executive functioning and drug use
Giancola, Mezzich & Tarter			Low ECF and difficult temperament was significantly related to delinquent behaviour with temperament impacting on non-agressive behaviour and ECF on aggressive behaviour.

Giotakos, Vaidakis, Markianos, Sandoni, Christodoulou			Both sex offender groups showed personality profiles with high novelty seeking, harm avoidance and self transcendence and low levels of reward dependence and perseverance. No significant difference in temp between molesters and rapists
Golombok, Murray, Jadva, MacCallam & Lycett			Greater psychological well being and adaptation to parenthood by mothers and fathers of children born through surrogacy than by natural conception. Infant temperament not found to moderate the quality of parenting of surrogates

Gomez & Baird			
Graziano, Jensen-Campbell & Sullivan-Logan		Expectations of socialising agents may link early temperamental differences to later personality structure	
Gutteling, de Weerth, Willemsen-Swinkels, Huizink, Mulder, Visser & Buitelaar	Perceived stress during pregnancy was a predictor of lower levels of restless/disruptive temperament, more total behavioural problems and more externalizing behaviour problems in 2yr olds.		Perceived stress during pregnancy was a predictor of lower levels of restless/disruptive temperament, more total behavioural problems and more externalizing behaviour problems in 2yr olds.
Hagekull and Bohlin		Temperament moderates effects of security on socialization outcome	

Heinonen, Raikkonen, Keltikangas-Jarvinen			Among girls almost all childhood variables individually predicted self-esteem, whereas among boys the associations were less evident. Perceived difficult temperament predicted hostile child-rearing attitudes at first follow-up, which further predicted low self-esteem among girls only	
Henderson, Fox & Rubin		Negative reactivity predicted social wariness for infants with right frontal EEG asymmetry, with girls more sociable than boys at age 4		
Hyde, Else-Quest, Goldsmith and Biesanz	Child's difficult temperament was significantly associated with mother's work outcomes, including work role quality and rewards from combining work and family.			Child's difficult temperament was significantly associated with mother's work outcomes, including work role quality and rewards from combining work and family.
Ivarsson & Winge-Westholm				

Jackson & Center			Study supports Eysenck's prediction that participants with low E and N would report less problem behaviour that participants high on both traits and thus these traits are related to the acquisition of behavioural inhibitions
Jenkins, Rashbash & O'Connor	Stressful family environments linked to differential parenting		Stressful family environments linked to differential parenting
Jensen, Stjernqvist, 2002	Shy children were at greater risk of unsatisfactory acceptance of dental treatment, Parental ratings of child's temperament are valuable in predicting a child's acceptance of dental treatment under sedation.		

Johnson & Harris	Illness not temperament was best predictor of feeding difficulties. However temperament can be seen as mediating variable.			Illness not temperament was best predictor of feeding difficulties. However temperament can be seen as mediating variable.
St. Jonn-Seed & Weiss			Temperament contributed the most variance to the development of emotional and behavioural problems	Temperament contributed the most variance to the development of emotional and behavioural problems
Joyce, McKenzie, Luty, Mulder, Carter, Sullivan & Cloninger				

Karrass, Braungart-Rieker	4-12 month distress to parenting style was not predictive of later IQ, but infants with greater distress to novelty at 4 months had higher IQs at 36mnths		
Kiang, Moreno & Robinson		Maternal sensitivity mediated link between preconceptions and child's prosocial responses	Maternal preconceptions significantly predicted child difficult temperament, maternal sensitivity and infant's empathy.
Kim-Cohen, Moffitt, Caspi & Taylor			
Kochanska, Coy, Tjebkes & Husarek			As predicted infants capacity for focused or effortful attention was modestly associated with better modulated negative emotionality.

Kochanska, Friesenborg, Lange & Martel	Mothers' neuroticism, empathy and conscientiousness and fathers' agreeableness, openness and extraversion related to the relationship with the infants. All measures of infant temperament also related to emerging relationship		Mothers' neuroticism, empathy and conscientiousness and fathers' agreeableness, openness and extraversion related to the relationship with the infants. All measures of infant temp also related to emerging relationship
Kristensen & Torgersen			
Laible	Attachment and temperament related to differences in quality and emotional content of mother child discourse. These differences are related to a child's socioemotional development. Pattern depends on context of discourse, mother's perception of temperament qualities and valence of emotion discussed.	Attachment and temperament related to differences in quality and emotional content of mother child discourse. These differences are related to a child's socioemotional development. Pattern depends on context of discourse, mother's perception of temperament qualities and valence of emotion discussed.	

Lemery, Essex & Smider			
Lonigan, Phillips & Hooe			Partial support for the role of temperament characteristics in the development of anxiety and depression symptoms in children
Lorensen, Wilson & White	Mothers reported increased role conflict during this time as well as more role conflict with their partners. First-time parents (133) perceived more positive family dynamics than second-time parents (97) as well as greater parent-fetal attachment. Maternal fetal attachment was greater than paternal-fetal attachment. Temperament not correlated with either family dynamics or fetal attachment		

Manian, Strauman, & Denney			Dynamic interactions of individual temperament and recollections of parenting styles of warmth and rejection were linked to emotional problems in adulthood.
Mayseless & Scher	Mother's attachment to husband and perception of her child's temperament predicted maternal separtion anxiety at 9mnths		Mother's attachment to husband and perception of her child's temperament predicted maternal separtion anxiety at 9mnths
McBryde, Ziviani & Cuskelly			

McClowry, Faans & Galehouse		Child temperament contributes strongly to children's behaviour
McCrae, Costa, Terracciano, Parker, Mills, De-Fruyt & Mervielde	Temperament variables, 1) neuroticism appeared to increase in girls and 2) openness to experience in boys and girls, meanwhile levels of extraversion, agreeableness and conscientiousness were stable.	
Murray & Kochanska		EC significantly associated with mother-reported total behaviour problems in a nonlinear fashion, with lower and higher levels of EC contributing to higher total problem scores.

Neitzel & Dopkins-Stright, 2004	Mothers with more education provided more metacognitive information. Mothers who perceived their children as difficult and who were less open to experiences were less likely to regulate task difficulty, encourage their child's efforts, and encourage child's active role in problem solving
Nixon	
Olson, Bates, Sandy & Schilling	Cognitive competence in toddler age children was the single best predictor of children's later self-regulatory competence. Cognitive competence also linked to maternal restrictiveness and cognitive stimulation

Pearce & Ayers, 2005		Women who expected more difficult temperament and then evaluated infant had poorer mother-baby bonds postpartum.			
Pike & Atzaba-Poria	Nonshared environment accounted for moderate amount of sibling relationship variability and explained most of variance for friendship components.		Negative aspects of the 2 relationships were related to emotionality, while positive aspects of the relationships were associated with sociability and activity.		
Putnam & Stifter			Study shows differentiation between socially disinterested (low in approach low in inhibition) and children who are shy (inhibited)		Positivity and negativity were correlated with externalizing and internalizing behaviours respectively
Rapee, Kennedy, Ingram, Edwards & Sweeney				Intervention did not change inhibition characteristic of temperament, but did decrease anxiety disorders	

Reed-Victor				
Rieser-Danner	Individual differences in affective tendencies do predict testing performance and cognitive development		Individual differences in affective tendencies do predict testing performance and cognitive development	
Rothbart, Ellis, Rueda & Posner		As executive attention develops, increasing capacities for self-control can provide a basis for continuing socialization – children have different capacities so important to know how best to introduce young children to contexts and situations that require self-regulation		

Rubin, Burgess, Dwyer & Hastings		Boys initiated more conflictual-aggressive interactions as toddlers and had more externalizing difficulties 2 yrs later. Temperament-externalising behaviour link at age 4 strongest for toddlers who incurred high levels of maternal negativity
Rubin, Burgess & Hastings	Maternal behaviours moderated the relation over time between peer inhibition as toddlers and social reticence in preschoolers.	

Russel, Hart, Robinson, and Olsen		Both US and Australia temperament consistently predicted child sociable and aggressive behaviours, with some evidence of father's authoritarian parenting also contributing. Cultural variables may influence both children's behaviour and perceptions of behaviour – culture impacts on expression of temperament
Saudino, Wertz, Gagne & Chawla	Contrast effects appear when parents have to rate the temperament of more than one child which exaggerates temperamental differences between children	
Scher, Zuckerman & Epstein		Fussy temperament during infancy linked to later behavioural problems

Schwebel & Plumert				Children who were high on extraversion and low on inhibitory control as toddlers and preschoolers tended to overestimate their physical abilities and to have more unintentional injuries at age 6.
Secco & Moffatt	Difficult temperament was the strongest and sole significant predictor of total parent stress. Younger mothers, more difficult temperament led to more punitive behaviour and negative mother-infant interaction quality			
Seifer, LaGasse, Lester, Bauer, Shankaran, Bada, Wright, Smeriglio & Liu			Attachment status at 18 mnths associated with temperament and caregiver-child interactions. Attachment status at 36 months associated with temperament, behaviour problems and caregivers' parenting esteem	Attachment status at 18 mnths associated with temperament and caregiver-child interactions. Attachment status at 36 months associated with temperament, behaviour problems and caregivers' parenting esteem

Shamir-Essakow, Rapee, Rapee & Safier		Mothers of inhibited children perceived their children as more vulnerable. Mothers of insecure inhibited children were less sensitive to their children's emotional experiences and were more intrusive
Sherrad, Tonge, & Ozanne-Smith		

Soubhi				Strongest most consistent correlates of childhood injury: age gender and difficult temperament (in toddlers) and aggressive behaviour among older children. Family characteristics include parenting and neighbourhood: SES disadvantage, parental perception of neighbourhood problems and cohesion
Stams, Juffer & van IJzendoorn		Easy temerament and cognitive development associated with higher levels of social development and fewer behaviour problems.	Easy temperament and cognitive development associated with higher levels of social development and fewer behaviour problems.	Easy temperament and cognitive development associated with higher levels of social development and fewer behaviour problems.
Thorell, Bohlin & Rydell			Inhibition to unfamiliar neg related to social initiative and pos related to social anxiety	Both types inhibition negatively related to nonclinical levels of hyperactivity in school 3 years later

Tripi, Palermos, Thomas, Goldfinger, Florentino-Pineda	Factors associated with emergence distress were: age, a history of negative emotionality, and/or separation anxiety		
Valiente, Eisenberg, Fabes, & Sheppard		EC negatively related to personal distress and positively related to empathy. Parental expressivity influenced child distress and situational empathy.	
Van der Mark, IJzendoorn, Bakermans-Kranenburg			A more fearful temperament and less attachment security predicted less empathic concern for stranger distress.
Vachha & Adams		A constellation of temp characteristics not commonly recognized may place these children at risk for being contributors to and recipients of misunderstandings of social cues and have implications for successful learning within academic, home/community and medical settings	
Volling, McElwain, and Miller			Younger siblings' jealous affect linked to their temperament, while older siblings jealous affect related to their emotional understanding

Vorria, Papaligoura, Dunn, van IJzendoorn, Steele, Kontopoulou & Sarafidou		Group care infants were found to be significantly more shy and expressed more negative affect, and were less active and sociable than infants reared in biological families	
Weinfield, Whatler, Egeland		Maternal perceptions of her child may be just as relevant as the child's actual behaviour, because they influence how she interacts with her child	
Wills, Sandy, Yaeger, & Shinar			
Wilson, White, Cobb, Curry, Greene & Popovich	Family dynamics and infant temperament impact on mother-child attachment especially if increased role conflict for mother.		Family dynamics and infant temperament impact on mother-child attachment especially if increased role conflict for mother.
Windle & Mason			

Wolke, Rizzo & Woods						
Zhou, Eisenberg, Reiser & Wang				High effortful control and low dispositional anger/frustration uniquely predicted Chinese children's high social functioning. Authoritarian parenting produced opposite effects.		
Zimmerman & Stansbury		Self-comforting strategies used related to attentional focusing: when reactive children direct their attention toward the stressor it increases levels of reactivity resulting in fewer cognitive strategies being used				
	2	18	11	30	28	30

Biological/Environment	Stress, Coping, Resilience	Cognitive Development	Social Development	Emotional Development	Behavioural Development
2	18	11	30	28	30

Author	Adjustment Maladjustment	Goodness of Fit	Academic Performance	Academic Instruction	Psychological Instruction	Intervention
Agnew, Brezina, Wright, & Cullen						
Aksan, Kochanska						
Al-Yagon	Difficult temperament linked to lower maternal sense of coherence and lower family cohesion.					

Anderson, Carter, Mcintosh, Joyce, & Bulik	High self-harm linked to high self-transcendence (temperament) which may signal a greater sense of dissociation and disconnectedness in bulimic women who self-harm		
Babor, Webb, Burleson & Kaminer			
Belsky, Friedman & Hsieh		High levels of negative emotionality predicted high levels of school readiness when attentional persistence was high.	
Bokhorst, Bakermans-Kranenburg, Fearon, van IJzendoorn, Fonagy & Schuengel			

Boyce, Essex, Alkon, Smider, Pickrell & Kagan	Findings suggest that asymmetries in TM temperatures could be associated with behaviour problems that signal risk for developmental psychopathology
Burgess, Marshall, Rubin & Fox	
Buss & Goldsmith	
Bussing, Gary, Mason, Leon, Sinha & Garvan	Combined subtype ADHD was associated with lower scores on task orientation and higher scores on general activity level. Difficult temperament linked to increased caregiver strain increasing liklihood of maladjustment

Chang & Burns		Effortful control was linked to motivation which is in turn impacts on school performance.	
Churchill	Child-teacher goodness of fit linked to child's cognitive and social outcomes. Teacher-parent goodness of fit on parenting and child characteristics was linked with child social competence.		
Clark, Kochanska & Ready,			
Coplan, Prakash, O'Neil, & Armer, 2004			

Denham, Mason, Caverly, Schmidt, Hackney, Caswell, & DeMulder, 2001
Dixon & Hull Smith, 2000
Dudley, Roy, Kelk & Bernard

Edelstein, Weede Alexander, Shaver, Schaaf, Quas, Lovas & Goodman	
Edhborg, Seimyr, Lundh & Widstrom	
Eisenberg, Guthrie, Fabes, Shepard, Losoya, Murphy, Jones, Poulin & Reiser, 2000	Negative emotionality and attentional control linked to exteranalising behavioural problems
Eisenberg, Liew & Pidada	

Eisenberg, Pidada & Liew			
Eisenberg, Shepard, Fabes, Murphy & Guthrie			
Eisenberg, Zhou, Losoya, Fabes, Shepard, Murphy, Reiser, Guthrie & Cumberland			
Elliot & Thrash			
Engstrom, Brandstrom, Sigvardsson, Cloninger & Nylander	Early onset positively temperament characteristics i.e. correlated with higher harm avoidance, fear of uncertainty and shyness.		

Engstrom, Brandstrom, Sigvardsson, Cloninger, & Nylander, 2004	Age of onset lower in patients with suicide attempts and who have higher in harm avoidance and reward dependence.	
Etter, Pelissolo, Pomerleau & De Saint-Hilaire		
Fabes, Eisenberg, Jones, Smith, Guthrie, Poulin, Shepard & Friedman		
Fabes, Leonard, Kupanoff & Martin		

Ghazinour, Richter, Emami & Eisemann	A high level of self-directedness appeared as having a possible buffering effect against PTSD after several severe trauma. Educational level and length of stay in Sweden represented important socio-cultural factors in decreasing psychological disturbances
Giancola & Mezzich	Temperament mediated the relation between executive functioning and drug use
Giancola, Mezzich & Tarter	Low ECF and difficult temperament was significantly related to delinquent behaviour with temperament impacting on non-agressive behaviour and ECF on aggressive behaviour.

Giotakos, Vaidakis, Markianos, Sandoni, Christodoulou	Both sex offender groups showed personality profiles with high novelty seeking, harm avoidance and self transcendence and low levels of reward dependence and perseverance. No significant difference in temp between molesters and rapists
Golombok, Murray, Jadva, MacCallam & Lycett	

Gomez & Baird	Since autistic children exhibit significantly more self regulatory difficulties at 1yr than comparison group it can be concluded that such early identification will lead to improved adjustment.			
Graziano, Jensen-Campbell & Sullivan-Logan				
Gutteling, de Weerth, Willemsen-Swinkels, Huizink, Mulder, Visser & Buitelaar				
Hagekull and Bohlin				

Heinonen, Raikkonen, Keltikangas-Jarvinen		
Henderson, Fox & Rubin		
Hyde, Else-Quest, Goldsmith and Biesanz		
Ivarsson & Winge-Westholm	OCD patients scored higher in BI than Shy controls, but lower on activity. OCD also scored higher on emotionality	

Jackson & Center
Jenkins, Rashbash & O'Connor
Jensen, Stjernqvist, 2002

Johnson & Harris		
St. Jonn-Seed & Weiss	Temperament contributed the most variance to the development of emotional and behavioural problems	
Joyce, McKenzie, Luty, Mulder, Carter, Sullivan & Cloninger	Avoidant personality: combination of high harm avoidance (Shy, anxious), childhood and adolescent anxiety disorders and parental neglect. Borderline: combination of childhood abuse and/or neglect, a borderline temperament (high novelty seeking and high harm avoidance), and childhood adolescent depression, hypomania, conduct disorder and alcohol and drug dependence	

Karrass, Braungart-Rieker	
Kiang, Moreno & Robinson	
Kim-Cohen, Moffitt, Caspi & Taylor	Maternal warmth, stimulating activities and children's outgoing temperament appeared to promote positive adjustment in children exposed to SES deprivation.
Kochanska, Coy, Tjebkes & Husarek	

Kochanska, Friesenborg, Lange & Martel	
Kristensen & Torgersen	SM children with CoD – more emotional stability and higher sociability than SM children without CoD
Laible	

Lemery, Essex & Smider	There is a relation between normal range temperament and extreme behaviour. Earlier temperament has predictive power for indicating possible DSM-IV symptoms	
Lonigan, Phillips & Hooe		
Lorensen, Wilson & White		

Manian, Strauman, & Denney	
Mayseless & Scher	
McBryde, Ziviani & Cuskelly	Chronological age, and presence of adaptability, well-developed social skills and the ability to persist with an activity until completed influenced parents' as well as teachers' perception of school readiness.

McClowry, Faans & Galehouse		Intervention with mothers helped them to understand their children's temperament and problem behaviour, also enabling them to feel more competent.	Pilot intervention with parents and community workers, was structured ecosystemically, regular evaluations led to adaptations of programmes to increase relevance and effectiveness for future programmes.
McCrae, Costa, Terracciano, Parker, Mills, De-Fruyt & Mervielde			
Murray & Kochanska			

Neitzel & Dopkins-Stright, 2004				
Nixon	PCIT significant improvement in behaviour and decrease in ADHD and difficult temperament severity due to improved goodness of fit.		Educated parents regarding their children's behaviour and worked with parent-child dyads to improve the relationship.	Intervention worked with parents, evaluated twice
Olson, Bates, Sandy & Schilling				

Pearce & Ayers, 2005			
Pike & Atzaba-Poria			
Putnam & Stifter			
Rapee, Kennedy, Ingram, Edwards & Sweeney		Education to help parents understand and anticipate children's vulnerability to anxiety	Targeted only one system: parents. Evaluation: longitudinal, measured twice.

Reed-Victor	Negative temperament attributes explained 58% of the variance in children's school adjustment ratings. Whereas positive temperament attributes accounted for 71% of school adjustment ratings. Of contextual factors only teacher experience was significant contributor to school adjustment
Rieser-Danner	
Rothbart, Ellis, Rueda & Posner	

Rubin, Burgess,
Dwyer & Hastings

Rubin, Burgess &
Hastings

Russel, Hart, Robinson, and Olsen
Saudino, Wertz, Gagne & Chawla
Scher, Zuckerman & Epstein

Schwebel & Plumert
Secco & Moffatt
Seifer, LaGasse, Lester, Bauer, Shankaran, Bada, Wright, Smeriglio & Liu
Shamir-Essakow, Rapee, Rapee & Safier

Sherrad, Tonge, & Ozanne-Smith	Psychopathology and overly sociable temp are associated with injury in young people with ID. The presence of epilepsy, having clinically significant levels of behavioural and emotional problems and having an overly sociable temperament are major independent risk factors for injury in young people with ID.	
Soubhi		

Stams, Juffer & van IJzendoorn	
Thorell, Bohlin & Rydell	
Tripi, Palermos, Thomas, Goldfinger, Florentino-Pineda	
Valiente, Eisenberg, Fabes, & Sheppard	

Van der Mark, IJzendoorn, Bakermans-Kranenburg	
Vachha & Adams	
Volling, McElwain, and Miller	
Vorria, Papaligoura, Dunn, van IJzendoorn, Steele, Kontopoulou & Sarafidou	
Weinfield, Whatler, Egeland	

Wills, Sandy, Yaeger, & Shinar	Adolescents were at higher risk for drug use/abuse if either parents or peers used drugs. Temperament (task orientation, mood and activity) was a mediating variable.	
Wilson, White, Cobb, Curry, Greene & Popovich		
Windle & Mason	Polydrug use, delinquency and negative affect were positively related to one another and negatively related to academic orientation	Polydrug use, delinquency and negative affect were positively related to one another and negatively related to academic orientation
Wolke, Rizzo & Woods	Significant differences found in parent rating of child temperament with PC children rated as more negative emotionality , more difficult-demanding and less adaptable. Infants who are referred for PC problems are at increased risk for hyperactivity and academic difficulties in childhood	

Zhou, Eisenberg, Reiser & Wang						
Zimmerman & Stansbury						
	22	2	5	0	3	3

Adjustment Maladjustment	Goodness of Fit	Academic Performance	Academic Instruction	Psychological Instruction	Intervention
22	2	5	0	3	3