Peer Networks, Body Dissatisfaction and Disordered Eating in Adolescent Girls

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Summary

Major aetiological theories propose that friends and peers are a particularly important source of influence in the development and maintenance of body dissatisfaction and disordered eating during adolescence. Although a growing body of research suggests that the peer environment is associated with adolescent girls' weight-related attitudes and behaviours, the literature is limited by an over-reliance on cross-sectional methodologies and assessments of perceived (rather than actual) influence. Further, empirical studies have concentrated exclusively on peer socialisation effects, neglecting to investigate the possible role of peer selection processes.

This thesis aimed to overcome these previous limitations by examining the contribution of friends and peers to adolescent girls' body dissatisfaction and disordered eating using a combination of longitudinal and experimental research designs. Three separate studies were conducted. The first used longitudinal structural equation modelling to investigate the interrelationships between perceived friend influence, body dissatisfaction and disordered eating. Specific mediational pathways proposed in aetiological models were tested in a large community sample of adolescent girls. The second study utilised sophisticated social networking analyses to examine the way in which friend selection and socialisation processes simultaneously contributed to body dissatisfaction and disordered eating over time. In this study, actual (peer-reported) attitudes and behaviours rather than adolescents' perceptions were used. The final study focused on the interaction between peer and media factors, using a novel experimental design to test whether peer norms influenced the way in which adolescent girls responded to thin-ideal images. The influence of less familiar peers, rather than friends, was examined in this study.

Results showed that changes to adolescent girls' weight-related attitudes and behaviours were not predicted by either perceived or actual friend influences, however, body dissatisfaction and disordered eating were important in friend selection processes. In addition,

younger adolescents were more likely to be influenced by peer norms in their response to thin-ideal images than older adolescents. These findings suggest that adolescents may not be as passive in being shaped by peer influences as previously thought, and highlight important developmental differences in susceptibility to peer influences. Together, the studies make a significant contribution to current understanding of how peers contribute to adolescent girls' body dissatisfaction and disordered eating and have important implications for prevention and intervention.

Statement by Candidate

I certify that the work in this thesis entitled "Peer networks, body dissatisfaction and disordered eating in adolescent girls" has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree to any other university or institution other than Macquarie University. All information sources and literature used are indicated in the thesis. I also certify that the thesis is an original piece of research and it has been written by me. The contributions of each of the authors listed for the three papers contained in this thesis are detailed by chapter below.

Chapter 2: Kathryn Rayner was responsible for formulation of research questions, application for Ethics Committee approval, data preparation, statistical analysis and preparation of this paper. Dr Carolyn Schniering and Professor Ron Rapee supervised the design, statistical analysis and writing of this paper. Dr Delyse Hutchinson provided the data set used in this study.

Chapter 3: Kathryn Rayner was responsible for formulation of research questions, study design, application for Ethics Committee approval, data preparation, statistical analysis and preparation of this paper. Dr Carolyn Schniering and Professor Ron Rapee supervised the writing of this paper. Dr Alan Taylor supervised the statistical analysis in this paper. Dr Delyse Hutchinson provided the data set used in this study.

Chapter 4: Kathryn Rayner was responsible all aspects of the development and management of this study including design, methodology, application for Ethics Committee approval, data collection, statistical analysis, and the preparation of this paper. Professor Ron Rapee and Dr Carolyn Schniering supervised the design, statistical analysis, and writing of this paper.

The research presented in this thesis was approved by Macquarie University Ethics Review Committee, reference numbers: HE25JUL2008-D06008L&P on the 20th August, 2008 and 5201100121 on 2nd May, 2011.

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Date:

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Chapter One

Introduction

Body Dissatisfaction and Disordered Eating in Adolescence

Over 25 years ago, researchers coined the phrase "normative discontent" to refer to the finding that body dissatisfaction was so common among women that it could be considered a natural aspect of the female experience (Rodin, Silberstein, & Striegel-Moore, 1984). Today, body image concerns and associated disordered eating behaviours continue to be widespread among adolescent and adult women (Mission Australia, 2010; Swami et al., 2010). Adolescence represents a particularly high-risk period for the development of body image concerns. Studies have consistently found that the prevalence of body dissatisfaction in community samples of adolescent girls is high (e.g., Bearman, Presnell, Martinez, & Stice, 2006; Stice & Whitenton, 2002), with the proportion of girls desiring a thinner body being as high as 76.8% (Ricciardelli & McCabe, 2001). Furthermore, in a recent large-scale survey, body image was rated as the top personal concern of Australian adolescent girls, above other stressors such as family conflict, coping with stress, and study problems (Mission Australia, 2010).

Rates of disordered eating are similarly high among female adolescents (Lewinsohn, Striegel-Moore, & Seely, 2000; Linde, Wall, Haines, & Neumark-Sztainer, 2009). Disordered eating encompasses a range of behaviours, including unhealthy dieting (e.g., severe caloric restriction and skipping meals), binge eating, and various compensatory behaviours used in an attempt to control body weight, such as self-induced vomiting, laxative abuse and excessive exercise (Littleton & Ollendick, 2003; Shisslak, Crago, & Estes, 1995). In an American survey of adolescent risk behaviours, 60.3% of female students in grades 9-12 reported that they were trying to lose weight, with 16.3% not eating for 24 or more hours, 7.5% taking diet pills, powders or liquids, and 6.4% vomiting or taking laxatives in order to lose weight or keep from gaining weight (Center for Disease Control, 2008). The peak ages of onset of both anorexia nervosa and bulimia nervosa occur during adolescence (Striegel-Moore & Bulik, 2007), and while the prevalence rates of full syndrome eating disorders are relatively low

(0.6% and 1.6% for anorexia nervosa and bulimia nervosa respectively; Stice, Marti, Shaw, & Jaconis, 2009), these rates increase to 10-15% when subclinical cases are also considered (Smolak & Thompson, 2009; Stice et al., 2009).

Body dissatisfaction and disordered eating represent serious mental health problems for youth. Both are predictive of numerous negative mental and physical health outcomes, including low self-esteem, depression, obesity, externalising problems, and substance abuse (Aimé, Craig, Pepler, Jiang, & Connolly, 2008; Davison & McCabe, 2006; Haines, Neumark-Sztainer, Wall, & Story, 2007; Johnson & Wardle, 2005; Marmorstein, von Ranson, Iacono, & Malone, 2008; Measelle, Stice, & Hogansen, 2006; Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006; Paxton, Neumark-Sztainer, Hannan, & Eisenberg, 2006; Stice, Presnell, & Bearman, 2001; Stice & Shaw, 2002). Poor body image has also been implicated in the use of cosmetic surgery procedures and steroid abuse (Cafri, Yamamiya, Brannick, & Thompson, 2005). Furthermore, the link between body dissatisfaction and disordered eating has been clearly established, with body dissatisfaction being one of the most consistent predictors of the development and maintenance of disordered eating and eating disorders (Stice, 2002; Stice & Shaw, 2002). Eating disorders have one of the highest rates of mortality and suicide of any psychiatric disorder and are highly comorbid with other mental health problems (Hoek, 2006; Stice, 2002). Subclinical levels of eating pathology are also associated with significant emotional distress and functional impairment across many life domains (Aimé et al., 2008; Stice et al., 2009) and can cause long-term medical complications, such as growth retardation, menstrual dysfunction and osteopenia (Fisher et al., 1995).

Importantly, disordered eating behaviours that appear during adolescence tend to remain stable or worsen in the transition to young adulthood, with those who are engaged in these behaviours during adolescence being at increased risk 10 years later (Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011). Thus disordered eating is not merely a “teenage phase” but rather has enduring adverse effects. It is therefore imperative that research identifies risk

factors that contribute to the development and maintenance of body image and eating disturbances in order to inform prevention and early intervention programs. This need is underscored by evidence that selective prevention programs with high-risk individuals are more effective than universal programs at reducing eating pathology (Stice, Shaw, & Marti, 2007).

The Role of Gender

To date, the majority of research on body image and eating dysfunction has been conducted with female samples, primarily owing to the large gender discrepancy in clinical presentations of eating disorders (Grogan, 2006). Consequently, the ways in which these constructs have typically been operationalised and measured are gender-biased. However, a growing body of evidence has indicated that boys and men are also vulnerable to body dissatisfaction and use of unhealthy weight control behaviours (e.g., Cafri, Thompson, et al., 2005; Ricciardelli & McCabe, 2004).

Investigating how these issues affect males represents an important area of study that has thus far been neglected. However, there also remains value in focusing exclusively on females for several reasons. Firstly, prevalence rates of body dissatisfaction, disordered eating, weight loss behaviours and eating disorders in female adolescents have consistently been found to outweigh prevalence rates in males (e.g., Aimé et al., 2008; Bearman et al., 2006; Feingold & Mazella, 1998; Halliwell & Harvey, 2006; Hargreaves & Tiggemann, 2002; Jones, 2004; Knauss, Paxton, & Alsaker, 2007; McCabe & Ricciardelli, 2006; Neumark-Sztainer et al., 2007; Presnell, Bearman, & Stice, 2004). Being female remains the best predictor of developing an eating disorder (Striegel-Moore & Bulik, 2007). Secondly, the physical changes that occur during puberty move girls further away from the female “thin-ideal” of beauty, while boys typically move towards the bulkier, “mesomorphic” male ideal (Bearman et al., 2006). Thirdly, pressures to conform to the thin-ideal appear to be stronger, more consistent and start earlier for females than for males (e.g., Smolak, 2004; Striegel-

Moore, 1997; Wolf, 1991). Females report greater internalisation of the thin ideal (Knauss et al., 2007; Lawler & Nixon, 2011) and pressure from parents and peers to be thin than do boys (Shomaker & Furman, 2009).

There are also conceptual differences between the development of body image dissatisfaction and disordered eating in females compared to males. For the vast majority of girls (70%), body dissatisfaction is associated with a desire to be thinner, whereas male adolescents who are body dissatisfied are divided between wanting to be leaner (31%) and wanting a bigger or more muscular physique (24%) (Lawler & Nixon, 2011; Ricciardelli, McCabe, Mussap, & Holt, 2009). Gender differences in body dissatisfaction and disordered eating behaviours mean that statistical analyses are often conducted separately for male and female adolescents, even when both sexes are included in the sample (e.g., Aimé et al., 2008; Jones, 2004; McCabe & Ricciardelli, 2005; Petrie, Greenleaf, & Martin, 2010; van den Berg et al., 2007). Disparities in the nature and strength of risk factors between males and females have led some researchers to suggest that programs for preventing disordered eating should be sex-specific (Field et al., 2008). For these reasons, the focus of the present thesis has been constrained to body image and disordered eating in female adolescents.

The Adolescent Peer Environment

It is widely accepted that the aetiology of body dissatisfaction and disordered eating is multifactorial (Eisenberg & Neumark-Sztainer, 2010) and numerous theoretical models have been proposed to account for their development and maintenance (e.g., Fairburn, Cooper, & Shafran, 2003; Levine & Smolak, 1992; McCarthy, 1990; Polivy & Herman, 1985; Ricciardelli, McCabe, Holt, & Finemore, 2003; Stice & Agras, 1998; Thompson, Heinberg, Altabe, & Tanteleff-Dunn, 1999; Vohs, Bardone, Joiner, Abramson, & Heatherton, 1999). However, theories that ascribe particular importance to sociocultural factors, such as the media, family and peers, have been dominant in guiding research on the onset of body dissatisfaction and disordered eating (e.g., Levine & Smolak, 1992; Ricciardelli et al., 2003;

Stice & Agras, 1998; Thompson et al., 1999). While the contributions of media and familial influences to the development of these issues have been the focus of numerous investigations, peers have received comparatively less attention. Given that peers are particularly pertinent during adolescence, this represents a notable limitation in the literature.

It has long been recognised that peer relationships are important to the social, emotional and cognitive development of children and adolescents (Erikson, 1968; Piaget, 1932; Sullivan, 1953). From an attachment theory perspective, peers fulfil the need for interpersonal connection, providing individuals with a sense of security and reducing anxiety (Bowlby, 1969). Peer relationships are particularly important during the transition from childhood to adolescence, when adolescents face significant changes not only in terms of physical, but also emotional and social development (Coleman, 1980). During this period, adolescents begin to spend less time with their family and more time with friends (Larson & Richards, 1991) and great importance is placed on belonging to a group (Erikson, 1968). For girls, early adolescent friendships are characterised by high levels of intimacy, self-disclosure and caring (Rubin, Bukowski, & Parker, 2006). Having good peer relationships is predictive of adolescent adaptation and well-being (Laible, Carlo, & Raffaelli, 2000; Nelis & Rae, 2009).

Peers are clearly important to adolescent development and psychological health. However, research has shown that peers are also associated with the adoption of less desirable attitudes and behaviours. For instance, peer influence has been shown to play a significant role in the development of adolescent delinquency (Dishion, Spracklen, Andrews, & Patterson, 1996), substance use (Curren, Stice, & Chassin, 1997; Urberg, Degirmencioglu, & Pilgrim, 1997), sexual behaviours (Billy & Udry, 1985), aggression (Cohen & Prinstein, 2006), and internalising problems, such as depression and anxiety (Mercer & Derosier, 2010; Stevens & Prinstein, 2005).

Susceptibility to peer influence appears to be strongest during early adolescence, when teenagers show more conformity and less resistance to peer influence than their pre- and late

adolescent counterparts (Costanzo & Shaw, 1966; Landsbaum & Willis, 1971; Steinberg & Monahan, 2007). The importance of being part of a group and having close friends during early to mid adolescence is reflected in the changes that occur in the structure of peer relationships. During late childhood and early adolescence, there is a shift from a relatively undifferentiated and cohesive whole to distinct groups or cliques (Degirmencioglu, Urberg, Tolson, & Richard, 1998; Rubin et al., 2006). In the later adolescent years, clique relationships become less tight-knit and the importance of belonging to a group decreases as individuals become more autonomous (Rubin et al., 2006). The confluence of increased vulnerability to peer influence and heightened risk of body image and eating problems during early-mid adolescence indicates that examining the interplay of peers with body image and eating problems during this developmental period is important.

Theoretical Models of Body Dissatisfaction and Disordered Eating

Examining the role of the peer environment fits within a broader sociocultural approach to understanding body image and eating problems. In fact, although empirical attention to peers has only increased significantly in the last few years, peers have previously been implicated in several major aetiological models of adolescent body dissatisfaction and disordered eating. These models are described below.

Tripartite Influence Model

The tripartite influence model (Thompson et al., 1999) has been instrumental in guiding understanding of body image concerns and eating pathology. This model places primary importance on the causal role of sociocultural factors. Specifically, it posits that the current societal ideal of female beauty inordinately emphasises thinness as being attractive and desirable. Thinness is equated with happiness and success, while those who are overweight or obese are stigmatised and considered lazy and socially inept (Greenleaf, Chambliss, Rhea, Martin, & Morrow Jr, 2006; Thompson et al., 1999). The model points to three specific sociocultural forces responsible for perpetuating and reinforcing the thin-ideal of beauty; the

media, family and peers. It is argued that these sources generate body dissatisfaction by reinforcing the importance of thinness, and perpetuating the false idea that body shape and weight are completely under the individual's control. Elevated body dissatisfaction subsequently promotes disordered eating behaviour in an attempt to modify one's body to be in line with the societal ideal. Two psychological processes (social comparison and internalisation of the thin ideal) are proposed to mediate the relationship between the three sociocultural factors and body dissatisfaction. Specifically, individual differences in the extent to which individuals compare their physical appearance to others and the degree to which they "buy into" societal ideals of beauty contribute to the variability in body dissatisfaction (Thompson et al., 1999).

Empirical research has provided support for the tripartite model as a general framework for understanding factors that lead to the development of body dissatisfaction and disordered eating. As noted previously, body dissatisfaction has been well-established as a causal risk factor for disordered eating (Stice, 2002). In line with the idea that the further one is from the thin-ideal, the more dissatisfied they are with their weight and shape, studies have consistently found that having a higher body mass index (BMI) is related to lower body satisfaction in adolescent girls (e.g., Jones, 2004; Jones & Crawford, 2006; Paxton, Neumark-Sztainer, et al., 2006; Presnell et al., 2004; Rancourt & Prinstein, 2010; Stice, 2002; Stice & Whitenton, 2002). Furthermore, having a higher BMI is predictive of higher levels of dieting (e.g., Eisenberg, Neumark-Sztainer, & Story, 2005; Field et al., 2001; Stice, 2002).

Cross-sectional studies have found that both direct and indirect pathways exist between sociocultural influences and body dissatisfaction (Dunkley, Wertheim, & Paxton, 2001; Keery, van den Berg, & Thompson, 2004; Shroff & Thompson, 2006b; van den Berg, Thompson, Obremski-Brandon, & Coovert, 2002), suggesting that internalisation and social comparison may not fully mediate this relationship. A recent meta-analysis showed that social comparison is moderately and significantly related to body dissatisfaction, and that this

relationship is stronger among younger individuals (Myers & Crowther, 2009). Evidence for the role of internalisation has been mixed. Some studies have found that the extent to which adolescent girls internalise the thin-ideal is associated with their level of body comparison (Durkin, Paxton, & Sorbello, 2007) and weight control behaviours (Smolak, Levine, & Thompson, 2001), however, others have found that internalisation does not mediate the relationship between peer pressure and body dissatisfaction (Shroff & Thompson, 2006b) and does not prospectively predict adolescent girls' body dissatisfaction at all (Bearman et al., 2006).

In a meta-analytic review of prospective and experimental studies (Stice, 2002), perceived pressure to be thin from the media, family and peers and thin-ideal internalisation were determined to be causal risk factors for body dissatisfaction, dieting, and bulimic symptoms. However, the majority of studies included in this analysis only examined short-term effects of media exposure, thus the relative impact of family and peer influences was not clear. Findings from other studies suggest that there is disparity between the effects of different sociocultural factors. For instance, Shroff and Thompson (2006b) found significant cross-sectional pathways from media influences to both social comparison and thin-ideal internalisation, a pathway from peer influence to social comparison but not to internalisation, and no significant pathways from parental influence to either proposed mediator. Some support exists from longitudinal and experimental studies for specific model pathways (Groesz, Levine, & Murnen, 2002), however, prospective tests of the tripartite model in its entirety are lacking. Together, the findings from empirical studies suggest that the tripartite model may be improved through inclusion of additional variables and pathways (Keery et al., 2004; Shroff & Thompson, 2006b).

Dual-Pathway Model

The dual-pathway model (Stice & Agras, 1998) was developed to explain the onset and maintenance of bulimic pathology, synthesising earlier sociocultural (Striegel-Moore,

Silberstein, & Rodin, 1986), dietary restraint (Polivy & Herman, 1985), and affect regulation (McCarthy, 1990) models of eating disturbances. This model shares many similarities with the tripartite influence model, proposing that pressure to be thin from peers, as well as family and the media, promotes internalisation of the thin-ideal, which in turn produces body dissatisfaction and subsequent disordered eating. However, Stice and his colleagues propose that there are two pathways that lead from body dissatisfaction to bulimic symptomology, one through dieting and one through negative affect. Specifically, binge eating is thought to result from caloric deprivation as well providing a way to regulate negative affect. Negative affect arises both directly from body dissatisfaction and as a result of typically failed dieting attempts and the natural effect of caloric restriction on mood (Stice, 2001).

This model has received empirical support from several longitudinal studies (e.g., Blodgett Salafia & Gondoli, 2011; Field et al., 2008; Harden, Mendle, & Kretsch, 2012; Neumark-Sztainer et al., 2007; Stice, 2001; Stice & Agras, 1998; Stice, Akutagawa, Gaggar, & Agras, 2000; Stice, Killen, Hayward, & Taylor, 1998; Stice, Presnell, & Spangler, 2002). There is also evidence for possible bidirectional relationships between some of the risk factors, which may create a self-perpetuating cycle that maintains body image and eating disturbances. For instance, Bradford and Petrie (2008) found a reciprocal predictive relationship between depressive affect and disordered eating in female college students, while in adolescent samples, higher levels of dietary restraint and negative affect have been shown to predict higher body dissatisfaction two years later (Bearman et al., 2006; McCabe & Ricciardelli, 2006).

Developmental Transitions Model

The developmental transitions model (Levine & Smolak, 1992, 1996) is a cumulative stressor model of disordered eating that aims to explain individual differences in the level of girls' body dissatisfaction and disordered eating. This model is unique in that it provides an explanation for the increase in body dissatisfaction and disordered eating that occurs during

the transition from childhood to early adolescence (Wertheim, Paxton, & Blaney, 2008). According to the developmental transitions model, several normative but important changes occur with the onset of adolescence: weight increase due to puberty, increased academic stress and the commencement of dating. It is argued that these changes are not only individually associated with increases in body dissatisfaction and disordered eating, but also interact with pre-existing individual vulnerabilities (such as internalisation of the thin-ideal) to amplify girls' risk even further. Girls are most vulnerable to poor body image, dieting and other disordered eating behaviours when multiple changes occur simultaneously, or within the same year (Smolak, Levine, & Gralen, 1993).

Support for the developmental transitions model has been obtained in several empirical studies. Girls who experience the simultaneous onset of puberty and dating (particularly in the context of elevated academic pressure) suffer from more body image and eating problems than those who experience one change at a time (Levine, Smolak, & Hayden, 1994; Smolak et al., 1993). Additionally, the relationship between early menarche and negative affect is stronger when other life stressors, such as school transitions, co-occur (Blyth, Simmons, & Zakin, 1985). More recent research suggests that increased mixed-sex interactions, as opposed to dating per se, prospectively predict body dissatisfaction in young adolescent girls, and that this relationship is mediated by perceived peer pressure to be thin (Gondoli, Corning, Blodgett Salafia, Bucchianeri, & Fitzsimmons, 2011). This risk is heightened when the onset of puberty is early relative to peers (Smolak et al., 1993). Rancourt and Prinstein (2010) observed that more advanced pubertal development prospectively predicted increases in adolescent girls' negative weight related cognitions, although this did not extend to use of weight management behaviours.

The developmental transitions model is further supported by findings from a recent longitudinal study (Harden et al., 2012), which found that both genetic and environmental factors are important in explaining the link between pubertal timing and dieting. Specifically,

genes that contribute to early pubertal development increase the risk of dieting, but girls' perception of their physical maturation relative to their peers also predicts increased risk for dieting. Further, Harden et al. (2012) found that girls' subjective sense of their maturation relative to their peers was more important than their actual pubertal status in predicting dieting. Girls who mature early are likely to be less emotionally and cognitively equipped to manage these developmental changes (Ge & Natsuaki, 2009), and may experience a heightened sense of thin-ideal disparity in the presence of smaller, pre-pubertal peers (Harden et al., 2012). Together, these studies provide support for the developmental transitions model's central premise; that the timing of normative adolescent changes contributes to the development of body dissatisfaction and disordered eating. Within this framework, peers are important as targets for body comparisons and in terms of burgeoning heterosexual interactions.

Biopsychosocial Models

More recent aetiological theories of adolescent body dissatisfaction and disordered eating attempt to integrate a range of sociocultural, biological and psychological factors in order to better predict body image and weight control behaviours in children and adolescents (e.g., Jones & Smolak, 2011; Ricciardelli et al., 2003; Wertheim et al., 2008). These integrative, biopsychosocial models purport that body dissatisfaction and use of weight control strategies are a product of interactions between biological (e.g. BMI, pubertal timing, genetics), psychological (e.g., self-esteem, negative affect, perfectionism) and sociocultural (e.g., pressure from media, peers, family and romantic partners, ethnicity, socioeconomic status) factors.

A few empirical studies have examined a combination of risk factors from each of these three domains in samples of adolescent girls and have obtained support for the biopsychosocial framework (e.g., McCabe & Ricciardelli, 2005; Muris, Meesters, van de Blom, & Mayer, 2005; Petrie et al., 2010). However, no studies to date have examined these

models in their entirety. This is not surprising given the myriad of risk factors and pathways proposed in this framework, which reflects the complex way in which body image and disordered eating develop.

Together, the models described above highlight the complex aetiology of adolescent body image and eating disturbances. There are likely to be multiple ways in which these problems can develop, with no one risk factor being necessary nor sufficient for determining outcome. Across the different models, peers are conceptualised to be part of the local adolescent environment, interacting with a range of proximal and distal sociocultural, biological and psychological risk factors to enhance or diminish individual adolescent girls' risk of developing problematic levels of body dissatisfaction or disordered eating. Thus in order to obtain an accurate understanding of the role of peers in the development of these issues, it is important to account for multiple risk factors from various domains.

Research on Peers, Body Image and Disordered Eating

The impact of peers on adolescent body dissatisfaction and disordered eating has been investigated in several different ways, reflecting the variety of overt and subtle ways in which peers may influence individual adolescents (Thompson et al., 1999). Although the term "peer" is typically used, most research has focused on the role of friends. Specific aspects of the peer environment which have been examined include the level of similarity of body image and eating problems between friends, perceived peer pressure to be thin, weight-related teasing and criticism, appearance conversations, social comparisons, and the link between body dissatisfaction and disordered eating and quality of peer relationships. Each of these aspects is reviewed in turn below.

Similarity Between Friends

In line with a range of other attitudes and behaviours, researchers have found that adolescent girls tend to resemble their friends on measures of body image concerns and eating pathology. Typically, this similarity has been examined using cross-sectional sociometric

friendship nomination procedures, in which adolescent girls nominate their friends from a class or grade roster, allowing the adolescent's own weight related attitudes and behaviours to be directly compared to those reported by her friends (e.g., Hutchinson & Rapee, 2007; Paxton, Schutz, Wertheim, & Muir, 1999). Using this methodology, Paxton et al. (1999) found that grade 10 girls belonging to the same friendship group were similar to one another in terms of their body image concerns, dietary restraint and BMI, but not binge eating. Similarly, Woelders et al. (2010) found that 14-year-old Dutch girls were similar to their friends in body image concerns and dieting, controlling for BMI and other demographic variables. In a slightly younger Australian sample, Hutchinson and Rapee (2007) found that grade 7 girls and their friends were alike in their level of dietary restraint and extreme weight loss behaviours, but not body image concerns. Further, they found that girls were similar to their friends in terms of binge eating. Conversely, Shroff and Thompson (2006a) found that girls' body dissatisfaction, drive for thinness and bulimic symptoms were not significantly associated with those of their friends in senior school grades, suggesting that there may be some developmental differences between early and late adolescence.

This similarity between friends is known as homophily, and has been explained by two, non-mutually exclusive processes: selection and socialisation (Kandel, 1978a, 1978b). That is, girls may choose to become friends with other girls whose pre-existing attitudes and behaviours are similar to their own, they may be influenced by their friends to become more similar to one another over time, or both of these processes may operate together. However, theoretical models and empirical studies have tended to focus solely on the way in which adolescents' body image and disordered eating may change as a result of peer influence, neglecting the potential contribution of friend selection processes. While there is some evidence that adolescents tend to select friends who have a similar body size to themselves (de la Haye, Robins, Mohr, & Wilson, 2011; Valente, Fujimoto, Chou, & Spruijt-Metz, 2009),

no research to date has examined whether adolescents are more likely to befriend those who share similar levels of body dissatisfaction or eating pathology.

Perceived Pressure to be Thin

One of the most frequent ways in which peer influence on adolescent body image and disordered eating has been investigated is by examining adolescents' perceptions of their friends' weight-related attitudes and behaviours. Having friends who place importance on appearance or engage in weight control strategies themselves has been conceptualised as a form of peer pressure that can increase the risk of an individual adolescent girl developing her own body image concerns or becoming eating disordered. In this way, group norms relating to weight and eating may be established and maintained (Lieberman, Gauvin, Bukowski, & White, 2001).

Numerous cross-sectional studies have found that greater perceived friend concern with thinness and dieting, perceived pressure from friends to be thin, perceived social reinforcement, and the importance of friends as a source of influence are associated with higher body dissatisfaction and disordered eating (e.g., Dunkley et al., 2001; Hutchinson & Rapee, 2007; Hutchinson, Rapee, & Taylor, 2010; Mackey & La Greca, 2008; Paxton et al., 1999; Schutz & Paxton, 2007; Shroff & Thompson, 2006a; Taylor et al., 1998; Thompson et al., 2007). Similarly, greater perceptions of peer engagement in and modelling of weight loss behaviours are also concurrently related to adolescent girls' body image concerns and weight control behaviours (e.g., Eisenberg et al., 2005; Lieberman et al., 2001).

However, the findings from longitudinal studies have been somewhat less consistent. Perceived importance of thinness to friends has prospectively predicted individual body image concerns in some studies (Gondoli et al., 2011), but not others (Field et al., 2001; Presnell et al., 2004). In addition, some research has found developmental differences, with perceived friend dieting predicting body dissatisfaction across early to mid, but not mid to late, adolescence (Paxton, Eisenberg, & Neumark-Sztainer, 2006). Examined longitudinally,

greater perceptions of peer dieting and concern with thinness have been shown to predict increases in dieting, purging and extreme weight loss behaviours (Eisenberg & Neumark-Sztainer, 2010; Field, Camargo, Taylor, Berkey, & Colditz, 1999; Linde et al., 2009; Neumark-Sztainer et al., 2007; Stice, 1998). In contrast, prospective investigations of the relationship between perceptions of friends' disordered eating and individual binge eating have produced inconsistent results, with both significant (Eisenberg & Neumark-Sztainer, 2010; Stice, 1998) and non-significant (Neumark-Sztainer et al., 2007) findings.

There is some evidence that adolescents' perceptions of peer weight-related attitudes and behaviours vary according to their own body mass, however, findings are equivocal about the exact nature of this relationship. For instance, some studies have found that girls with a higher BMI report more perceived pressure to be thin and diet compared to their smaller sized peers (Dunkley et al., 2001; Jones & Crawford, 2006), while other studies have found that perceived peer influence variables are more associated with bulimic symptoms (Thompson et al., 2007) and other unhealthy weight control behaviours (Eisenberg et al., 2005) in average weight than in overweight adolescent girls. These studies point to the importance of including BMI in future investigations in order to clarify the way in which adolescents' body mass may interact with perceptions of peer influence.

Weight-Related Teasing and Criticism

Sadly, weight-related teasing is a common adolescent experience, and peers are frequent perpetrators (Eisenberg, Neumark-Sztainer, & Story, 2003; Haines, Neumark-Sztainer, Eisenberg, & Hannan, 2006). It has been suggested that this kind of negative interpersonal feedback serves as a way of communicating and enforcing appearance norms (Jones, 2004; Paxton, Eisenberg, et al., 2006; Thompson et al., 1999). A recent meta-analysis found that weight-related teasing has moderate effects on body dissatisfaction, dietary restraint and bulimic behaviours, and that these effects are stronger in children and adolescents than in adults for both body dissatisfaction and dietary restraint (Menzel et al.,

2010). However, this analysis did not account for teasing source; hence the impact of weight-related teasing by peers specifically was unclear.

In cross-sectional studies, self-reported weight-related teasing by friends and peers is associated with body dissatisfaction, dieting, bulimic behaviours and general disordered eating (Ata, Ludden, & Lally, 2007; Eisenberg et al., 2003; Hutchinson & Rapee, 2007; Hutchinson et al., 2010; Lawler & Nixon, 2011; Paxton et al., 1999; Shroff & Thompson, 2006a). However, these findings are not always replicated, with some cross-sectional studies finding no significant relationships between weight-related teasing by peers and body dissatisfaction or disordered eating (Hutchinson & Rapee, 2007; Lieberman et al., 2001; Paxton et al., 1999). Others have found that teasing indirectly increases dieting and bulimic behaviours through changes to body dissatisfaction (Hutchinson et al., 2010). Interestingly, weight-related teasing as reported by peers (as opposed to adolescents' self-report) has been shown to be significantly associated with individual adolescents' concurrent bulimic behaviours, but not dieting or body satisfaction (Lieberman et al., 2001).

In contrast, longitudinal studies have consistently found that weight-related teasing and criticism specifically from friends and peers do not predict adolescent girls' future body dissatisfaction or disordered eating (Field et al., 1999; Helfert & Warschburger, 2011; Jones, 2004; Neumark-Sztainer, Wall, Story, & Sherwood, 2009; Neumark-Sztainer et al., 2007; Paxton, Eisenberg, et al., 2006; Shomaker & Furman, 2009). It may be that cross-sectional studies have overestimated the role of teasing by peers in the development of these issues by not controlling for initial levels of pathology (Jones, 2004). This view is supported by Menzel et al.'s (2010) meta-analysis which found that effect sizes were significantly smaller for longitudinal compared to cross sectional studies. Alternatively, the impact of teasing by peers may operate over shorter time frames than those examined in longitudinal studies (ranging from one to five years).

Associations between BMI and weight-related teasing have been found, with overweight girls reporting being teased by friends and peers more than average weight girls (Jones & Crawford, 2006). Further, when controlling for initial levels of the outcome variables, higher BMIs prospectively predict weight-related teasing by peers (Cattarin & Thompson, 1994) and weight teasing by peers predicts being overweight five years later (Neumark-Sztainer et al., 2007). However, another study (Thompson et al., 2007) found that friend teasing about weight was concurrently associated with body dissatisfaction, drive for thinness and bulimic behaviours only in average weight, not overweight adolescent girls. While the relationships between these variables require further clarification in order to explain inconsistencies in previous research, collectively these studies highlight the importance of considering body mass when examining the effects of peer factors on adolescent girls' body satisfaction and weight control behaviours.

Appearance Conversations

Adolescent girls frequently engage in discussions about appearance, weight and weight loss behaviours with their friends (Jones, 2004). A particular aspect of these appearance conversations is "fat talk", that is, the way in which females talk negatively about their body weight and shape, labelling themselves as "fat" even when this is not objectively true (Clarke, Murnen, & Smolak, 2010; Nichter & Vuckovic, 1994). Nichter and Vuckovic (1994) observed that fat talk serves a number of functions, such as strengthening peer group affiliation and seeking reassurance from friends. However, frequent appearance conversations also reinforce the importance of appearance and indicate to adolescents that this is something to be valued. Jones (2004) has labelled this process "appearance training", likening it to the way in which discussions between adolescent boys shape each other's aggressive behaviour ("deviancy training"; Dishion et al., 1996).

Cross-sectionally, more frequent appearance conversations with friends are associated with higher body dissatisfaction and a range of disordered eating behaviours, including

dieting, extreme weight loss behaviours and bulimic behaviours (Lawler & Nixon, 2011; Paxton et al., 1999; Shroff & Thompson, 2006a; Thompson et al., 2007). Overweight girls report being involved in appearance conversations more than average and underweight girls (Jones & Crawford, 2006). Lawler and Nixon (2011) found that internalisation mediated the relationship between appearance conversations and body dissatisfaction. The only prospective study to have examined the effects of appearance conversations in adolescence found that conversations did not directly promote body dissatisfaction, but that this relationship was mediated by social comparisons (Jones, 2004).

Although girls also report receiving positive comments about their appearance from friends (McCabe, Ricciardelli, & Ridge, 2006), how this impacts on body image and eating behaviours has not been examined. Shroff and Thompson (2006a) found that the frequency of anti-dieting advice from friends was positively associated with frequency of conversations about appearance and perceived peer preoccupation with weight; suggesting that even if girls are advised by friends not to diet, this may be undermined by perceptions that weight and thinness are important to friends.

Social Comparisons

As described above, social comparison has been implicated in theoretical models as a mediator between sociocultural pressures and body dissatisfaction (e.g., Thompson et al., 1999). In line with social comparison theory (Festinger, 1954), body comparisons serve as a means by which individuals can evaluate their physical appearance in relation to others in their environment. Peers represent a common comparison target for adolescents; with girls comparing their bodies more frequently to friends than to more distant peers, and more often to peers than to same-sex family members (Schutz, Paxton, & Wertheim, 2002). Further, adolescent girls are equally as likely to compare their weight and shape to peers as they are to models (Jones, 2001). Typically the outcomes of body comparisons appear to be unfavourable (upward comparisons), with adolescent girls who more frequently compare their appearance

to their friends having higher levels of concurrent body image concern, dieting, extreme weight loss behaviours and bulimic behaviours (Jones, 2001; Paxton et al., 1999; Schutz et al., 2002). Additionally, overweight adolescent girls have been found to be more likely to compare their body to their peers than average and underweight girls (Jones & Crawford, 2006).

Currently, there is a dearth of research examining the effects of making body comparisons to friends and peers over time. While one study found that peer comparisons prospectively predicted body dissatisfaction over one year (Jones, 2004), whether these comparisons extend to disordered eating and weight loss behaviours remains uncertain.

Quality of Peer Relationships

Finally, some studies have examined the way in which adolescents' body dissatisfaction and disordered eating is related to the quality of their peer relationships. Again, adolescents' body mass appears to play an important role in the way in which these variables are linked. For instance, peers rate adolescent girls with higher BMIs as less popular (Wang, Houshyar, & Prinstein, 2006) and sociometric studies have found that overweight adolescents receive fewer reciprocated friendship nominations and are more likely to receive no friendship nominations than average weight adolescents (Strauss & Pollack, 2003). Additionally, girls who are overweight are more likely to believe that peers will be more accepting of them if they were thinner (Jones & Crawford, 2006). However, there is also evidence to suggest that any girl who believes that being thinner will lead to improved friendships is more likely to diet, regardless of their actual body size (Gerner & Wilson, 2005). This may in part be an accurate view, given evidence that girls with lower BMIs become more likeable over time (Rancourt & Prinstein, 2010). Further, adolescents who are perceived by their peers as more popular (using a reputation-based measure) but less well liked (based on peer preferences) are more at risk of developing negative weight related cognitions and behaviours over time, suggesting that being liked may promote body satisfaction (Rancourt & Prinstein, 2010).

Conversely, adolescents' beliefs that friends will be more accepting if they were thinner, perceived exclusion due to appearance and level of connectedness to friends have not been predictive of body dissatisfaction or disordered eating over time (Helfert & Warschburger, 2011; Jones, 2004; Neumark-Sztainer et al., 2009; Neumark-Sztainer et al., 2007). Additionally, another study found that the concurrent relationship between friendship quality and body dissatisfaction and disordered eating was no longer significant once depressive symptoms were taken into account (Schutz & Paxton, 2007). These studies indicate that the way in which body image and eating problems are associated with the quality of peer relationships is complex, and highlight the importance of including additional individual and biological covariates in future investigations.

Summary of Empirical Research

To summarise, there is substantial cross-sectional support for the role of friends and peers in adolescent body image concerns and disordered eating, particularly in terms of perceived pressure to be thin, appearance conversations, and social comparisons. There also appears to be a connection between the quality of adolescent girls' peer relationships and how they feel about their weight and shape. However, far fewer studies have examined the way in which friends and peers may influence adolescents' weight-related attitudes and behaviours over time, with those that have producing inconsistent findings. Furthermore, while past research indicates that adolescent girls are similar to their friends in terms of body dissatisfaction and eating pathology, studies which investigate the possible contribution of peer selection processes to this similarity are lacking. Lastly, it is clear from the reviewed research that BMI should always be considered when investigating the way in which the peer environment may contribute to adolescents' body dissatisfaction and disordered eating.

Limitations of Past Research

While empirical research has made a significant contribution to our understanding of the role of peers in the development of adolescent girls' body dissatisfaction and disordered

eating, several key weaknesses are apparent in the literature. Firstly, there has been an overreliance on cross-sectional designs. While this type of research is useful in providing initial explorations that can guide more costly and time-consuming prospective studies, it cannot control for initial levels of outcome variables nor establish temporal precedence. It is therefore possible that cross-sectional studies have overestimated the influence of peers, a hypothesis supported by meta-analytic studies which have found that the magnitude of effect sizes for general sociocultural pressures (Cafri, Yamamiya, et al., 2005) and teasing (Menzel et al., 2010) is typically smaller for longitudinal than cross-sectional studies. Furthermore, cross-sectional research cannot detect possible reciprocal relationships between variables. Thus cross-sectional studies cannot provide definitive information about risk factors.

According to risk factor definitions proposed by Kraemer et al. (1997), extant cross-sectional research has shown the peer environment to be a *correlate* of adolescent girls' body dissatisfaction and eating pathology. To establish a variable as a causal risk factor, the variable must be shown to prospectively predict a subsequent pathological outcome, over and above the temporal stability of that outcome (Kraemer et al., 1997). In addition, experimental manipulation of the variable must lead to predictable changes in the outcome variable. Although peer influence has been investigated in a few longitudinal studies, only a handful have used more than two waves of data and findings have been inconsistent. Additionally, no studies have examined whether experimentally manipulating peer factors produces changes in adolescents' body dissatisfaction or disordered eating. Longitudinal and experimental research is now needed in order to draw accurate conclusions about the nature of peers as risk factors for body image and eating pathology.

Secondly, although aetiological models (e.g., Stice & Agras, 1998; Thompson et al., 1999) have proposed that peer influence increases disordered eating indirectly via changes to body dissatisfaction, existing prospective studies have tended to neglect the examination of this mediational pathway. Similarly, studies which investigate the ways in which peer

variables may interact with other sociocultural factors, such as the media, are also lacking. There is a need for research examining multivariate models to improve knowledge of how putative risk factors work together to promote body image and eating disturbances.

A third limitation of the literature is that no studies to date have comprehensively examined whether homophily of body dissatisfaction and disordered eating between adolescent friends is attributable to selection processes, socialisation processes, or both. It is conceivable that both processes may foster an environment in which appearance and weight are seen as important by adolescents, thereby increasing and maintaining risk for the development of body dissatisfaction and associated disordered eating for individual girls (Paxton, Eisenberg, et al., 2006). Disentangling the relative contribution of each of these homophilic processes has important clinical implications for the design of effective prevention and intervention programs.

Another important limitation of the extant literature is that the majority of studies have assessed peer influence via adolescent girls' perceptions of peer attitudes and behaviours. It is difficult to ascertain whether peer variables measured in this way are an accurate reflection of reality, or whether they are a function of the adolescents' appearance concerns. Individuals have been shown to be unreliable predictors of others' attitudes and behaviours, and may perceive others to be more similar to themselves than they actually are ("false consensus effect"; Ross, Greene, & House, 1977), may perceive themselves to be substantially different from others in their beliefs or attitudes based on misperceived norms ("pluralistic ignorance"; Miller & McFarland, 1987) or may perceive others to be more vulnerable to influence than themselves ("third person effect"; Perloff, 1993). Accordingly, it is possible that girls with higher levels of body dissatisfaction may have an attentional bias for weight or appearance related information in their social environment which they interpret as increased peer concern with thinness or pressure to lose weight (Stice & Tristan, 2005). A limited number of studies have found small to moderate correlations between adolescents' perceptions and peer-

reported behaviours indicating that while there is some degree of overlap, these factors are actually distinct predictors of risk (Hutchinson et al., 2010; Mackey & La Greca, 2008; Shomaker & Furman, 2009). Thus, both perceived and actual peer influences are important to investigate. However, examinations of actual or peer-reported peer influence factors are lacking, particularly in prospective studies. It is crucial to understand the interplay between perceived and actual peer influences at both a clinical and theoretical level.

Finally, although the term "peers" is typically used, past studies have tended to focus primarily on the role of friends in the development of adolescent girls' body image and eating pathology. However, it is also possible that the broader peer group may also be influential in this domain. Peer relationships are complex and consist of several interrelated levels beyond the individual, including dyads, cliques, loose groups, and crowds (Rubin et al., 2006). Perhaps the perceived or observable attitudes, judgements and behaviours of less familiar peers are more likely to contribute to girls' feelings of self-consciousness or engagement in body change strategies, while friends provide a more accepting, supportive environment (Giordano, 2003). It is important that researchers begin to examine whether varying levels of peer relationship differentially affect adolescents' body image and eating difficulties in order to determine appropriate targets for intervention.

Summary and Purpose of this Thesis

In summary, there exists a substantial amount of cross-sectional research indicating that peers are important in the development and maintenance of body dissatisfaction and disordered eating. However, there are a number of limitations in the extant literature that need to be overcome in order to better understand the role of peers in this domain and subsequently guide effective prevention and intervention strategies. Specifically, there is a need for more rigorous examinations of peer influence in longitudinal and experimental studies in order to draw sound conclusions about its role as a risk factor. There is also a need to elucidate the way in which both peer selection and socialisation processes contribute to adolescent girls'

body image and eating disturbances, as research to date has focused exclusively on socialisation. Additionally, investigating the influence of actual, peer-reported attitudes and behaviours (as opposed to adolescents' perceptions), as well as different levels of peer relationships is necessary to develop a clearer understanding of the complexities of peer influence.

The central aim of this thesis, therefore, was to investigate the role of peer factors in the development and maintenance of body dissatisfaction and disordered eating in adolescent girls using a combination of longitudinal and experimental studies. Specifically, the research in this thesis aimed to examine peer influence from a number of different standpoints, including both perceived and actual influence, selection and socialisation processes, and influence from friends and less familiar peers. Although this research was primarily concerned with evaluating one particular aspect of aetiological models, a multivariate approach was taken in each of the studies given that body dissatisfaction and disordered eating are determined by multiple factors. In line with biopsychosocial models of risk, biological (e.g. BMI) and psychological (e.g. negative affect, self-esteem) variables were also included in analyses to account for variance that may be attributable to other risk factors.

Three separate studies were conducted; each implementing sophisticated statistical analyses and strong research designs. The study presented in chapter two was a longitudinal examination of the way in which perceived friend influence contributes to changes in body dissatisfaction and disordered eating over time, controlling for initial levels of the outcome variables. In particular, this study was concerned with investigating the mediational pathway between these factors as proposed in aetiological models. The research contained in chapter three aimed to delineate peer selection and socialisation processes that may contribute to the development of homophily of body dissatisfaction and disordered eating among friendship groups. This research is unique in being the first study to simultaneously examine these processes in relation to body image and eating pathology and utilised a specialised social

network analysis methodology. Finally, the study presented in chapter four investigated the way in which influence from less familiar peers may interact with another established sociocultural influence – the media. This study employed a novel experimental design and included participants with a greater age range in order to investigate possible developmental differences in response to peer factors. Taken together, the results of these three studies make an important contribution to our understanding of the ways in which the peer environment contributes to adolescent body dissatisfaction and disordered eating. As the results of these studies are presented in a series of self-contained papers, a degree of overlap between the papers was unavoidable.

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CHAPTER TWO

A longitudinal investigation of perceived friend influence on adolescent girls' body dissatisfaction and disordered eating

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Abstract

Although major aetiological models highlight the importance of peers in the development of adolescent body image and eating problems, there is a lack of longitudinal studies which comprehensively investigate possible direct and mediational relationships between these variables. Thus, this study aimed to examine prospective interrelationships between perceived friend influence, body dissatisfaction and disordered eating in early adolescent girls, and whether these relationships differed across levels of body mass index. Data were collected from a large community sample of female high school students (N = 1094) at three yearly intervals. Height and weight were also measured at each time point. Structural equation modelling was used to investigate two separate models, in which Time 2 body dissatisfaction was hypothesised to mediate the relationship between Time 1 perceived friend influence and Time 3 dieting and bulimic behaviours. No significant direct or indirect pathways were found between friend influence and disordered eating. Unexpectedly, however, body dissatisfaction was found to prospectively predict girls' perception of friend influence. Findings were similar in both healthy weight and overweight girls. These results have important implications for current theoretical understanding of the role of friends in body image and disordered eating during adolescence.

Body dissatisfaction and weight control behaviours are widespread among adolescent girls in Western cultures (Stice, 2001). In community samples, 24-55% of adolescent girls report that they are unhappy with their weight and shape (Clark & Tiggemann, 2008; Stice & Whitenton, 2002), and surveys indicate high rates of weight loss attempts via fasting, diet pills, vomiting and laxative use (Center for Disease Control, 2008). Both body dissatisfaction and unhealthy weight control behaviours are predictive of many adverse mental and physical health outcomes, including low self-esteem, depression, obesity and eating disorders (Johnson & Wardle, 2005; Stice, 2002; Stice & Shaw, 2002). Therefore, it is important to identify risk factors for the onset and maintenance of body dissatisfaction and disordered eating so that effective prevention and intervention strategies can be developed.

Etiological models point to sociocultural factors as being critical in the development and maintenance of body image and eating problems. A central feature which is common to several major theoretical models (e.g. Ricciardelli, McCabe, Holt, & Finemore, 2003; Stice & Agras, 1998; Thompson, Heinberg, Altabe, & Tanteleff-Dunn, 1999) is that the pervasive "thin-ideal" of female beauty in Western society is propagated and reinforced by the media, family and peers. Pressure to be thin from these sources is thought to increase body dissatisfaction, in turn promoting use of weight loss behaviours (Stice, 2001). While media and family factors have received substantial empirical attention (for a review see Littleton & Ollendick, 2003), researchers have only recently begun to focus specifically on the role of peers in the aetiology of body image and eating pathology.

Early adolescence is a pertinent time to examine the role of peers in the development of body dissatisfaction and disordered eating. Peers become an important source of influence during this time, providing guidance as to what is acceptable and appropriate (Coleman, 1980). Friendships, a specific type of peer relationship, have been found to be particularly influential across a variety of domains in adolescence, including substance use (Urberg, Degirmencioglu, & Pilgrim, 1997), delinquency (Dishion, Spracklen, Andrews & Patterson,

1996) and suicidal behaviour (Prinstein, Boergers, & Spirito, 2001). Further, young adolescents are more likely to conform to influence from friends and other peers than pre- or late adolescents (Steinberg & Monahan, 2007). Thus, it is reasonable to suggest that friends will influence early adolescent girls' weight-related attitudes and behaviours.

Cross-sectional research has provided substantial evidence indicating that friends do play an important role in how adolescents feel about their bodies and their use of weight loss strategies. For instance, perceived friend concern with thinness and weight loss and perceived pressure to lose weight are associated with higher levels of body dissatisfaction and disordered eating in individual adolescent girls (e.g., Hutchinson & Rapee, 2007; Jones, 2004; Paxton, Schutz, Wertheim, & Muir, 1999). In line with theoretical models of disordered eating, a small number of cross-sectional studies have also examined whether body dissatisfaction mediates the link between perceived friend influence and eating pathology (Hutchinson, Rapee, & Taylor, 2010; Lam et al., 2009). Interestingly, these studies found that while body dissatisfaction partially mediated this pathway, a direct pathway from friend influence to dieting was also evident. This suggests that higher levels of perceived friend influence may lead to an increase in disordered eating, even when body satisfaction remains unchanged. However, cross-sectional studies cannot provide accurate information about the role of risk factors over time because they do not control for initial levels of each risk factor (Jones, 2004). Longitudinal designs not only allow far more rigorous investigation of the relationships between variables, which enables more robust inferences to be drawn (Cole & Maxwell, 2003), but are also crucial in establishing mechanisms of change which may be targeted in interventions (Kazdin, 2007).

Considerably less research has examined the role of friend influence on body image and disordered eating prospectively, and results from these studies have been inconsistent. For instance in some studies, perceived friend dieting (Paxton, Eisenberg, & Neumark-Sztainer, 2006) and appearance conversations (Jones, 2004) were predictive of adolescent girls' body

dissatisfaction one to five years later, while other studies found that the same variables did not predict change in body satisfaction over time (Clark & Tiggemann, 2008; Field et al., 2001; McCabe & Ricciardelli, 2005). Studies assessing the role of friends in the development of bulimic symptoms in early adolescence have produced relatively more consistent findings, showing that importance of thinness to friends and peers (Field et al., 2008), friend modelling and social reinforcement (Stice, 1998) predict the onset of binging and purging. Very few studies have examined the role of friends in the development of adolescent dieting over time. Perceived pressure from best female friends predicted an increase in general weight loss strategies in one study (McCabe & Ricciardelli, 2005), yet other studies have found that importance of thinness to friends and friendship group levels of body image concern and dieting did not predict later individual dieting (Field et al., 2001;Woelders, Larsen, Scholte, Cillessen, & Engels, 2010). It is worth noting that the inconsistencies in previous studies may be due in part to variations in the way in which friend influence has been measured. Currently, there is no standard definition of friend or peer influence. The many ways in which it has been operationalised reflects the multi-faceted nature of this construct (e.g., friends' concern with thinness, appearance-related conversations, modelling of weight loss behaviours, weight-related teasing and criticism, social reinforcement and direct pressure to be thin). These varying interpretations of the construct make it difficult to compare across studies, and indicate that greater conceptual clarity is needed around the definition of both friend and peer influence.

There is also a dearth of longitudinal research examining body dissatisfaction as a mediator between friend influence and disordered eating, as proposed by major theoretical models. In one study, Stice (2001) found both direct and indirect effects between pressure to be thin and girls' dieting over time, with body dissatisfaction partially mediating this relationship. This finding is consistent with previous cross-sectional studies (Hutchinson et al., 2010; Lam et al., 2009) and suggests that pressure to be thin can promote later dieting

even when body satisfaction does not change. However, the specific effects of friend influence are unclear from Stice's study, as "pressure to be thin" was an amalgamation of perceived pressure from multiple sources. Examining peer and parental influences separately, Blodgett Salafia and Gondoli (2011) found that body dissatisfaction tended to completely mediate the pathway from perceived friend influence to dieting and subsequent bulimic behaviours. This finding is in line with sociocultural models, but contrasts with past studies that found an additional direct pathway from influence from friends to disordered eating. Although the researchers controlled for baseline bulimic symptoms, they did not do so for body dissatisfaction or dieting, which may have produced an inaccurate estimate of the effect of friend influence on these latter variables. Studies that control for prior levels of all mediating and outcome variables provide a more rigorous test of mediation (Cole & Maxwell, 2003).

It is also important to consider the role of body mass on body image concerns and disordered eating. Body mass has been shown to be the most consistent predictor of body dissatisfaction, with girls who have a higher body mass index (BMI) being more dissatisfied with their weight and shape and more likely to diet (Clark & Tiggemann, 2008; Jones, 2004; Stice, 2002). Although many studies have included BMI as a covariate or predictor of body dissatisfaction and eating pathology, few have examined how BMI may affect the role of friend or peer influence in the aetiology or maintenance of these issues. There is some evidence from a small number of cross-sectional studies that overweight girls are more likely to receive negative feedback about their appearance and feel more pressure to diet in order to be accepted by peers than healthy weight girls (Jones & Crawford, 2006; Thompson et al., 2007; van den Berg, Wertheim, Thompson, & Paxton, 2002). These findings suggest that overweight girls may be more susceptible to increases in body dissatisfaction and eating problems due to greater levels of perceived friend and peer influence. This hypothesis has important clinical implications in terms of identifying particular high-risk groups that may

benefit most from intervention programs. However, no studies to-date have examined this hypothesis using longitudinal data.

In summary, aetiological theories and previous research indicate that peer factors, and friends in particular, play an important role in the development and maintenance of body image concerns and eating pathology during early adolescence. However, previous research has been limited by an over-reliance on cross-sectional designs, with the few extant longitudinal studies providing inconsistent results. Furthermore, stringent prospective investigations of possible direct and mediational relationships between friend influence, body dissatisfaction and disordered eating, and whether these relationships vary according to BMI, are lacking. In order to overcome these issues and investigate possible mechanisms of change associated with influence from friends, rigorous longitudinal studies with multiple assessment points are needed (Kazdin, 2007).

Thus, the main aim of the present study was to examine the interrelationships between perceived friend influence, body dissatisfaction and disordered eating in adolescent girls using a multi-wave prospective research design. The sample was limited to females, as body image and eating issues are far more common to girls than boys (e.g. Littleton & Ollendick, 2003) and studies suggest that girls perceive more messages to lose weight from peers than boys (e.g., McCabe & Ricciardelli, 2005). Given the varied results from previous longitudinal studies, dieting and bulimic behaviours were examined in two separate models in order to see whether perceived friend influence had a differential effect on these different symptom clusters (Figure 1). It was hypothesised that higher ratings of perceived friend influence would predict higher levels of both dieting and bulimic behaviours over time. Secondly, it was hypothesised that body dissatisfaction would partially mediate the relationship between perceived friend influence and eating problems, such that friend influence would have both a direct and indirect relationship with disordered eating. A second aim of the study was to investigate whether the relationships between these variables differed relative to BMI, a

hypothesis which has not been examined in past research. It was hypothesised that the mediational models would be a better fit for overweight compared to healthy weight girls.

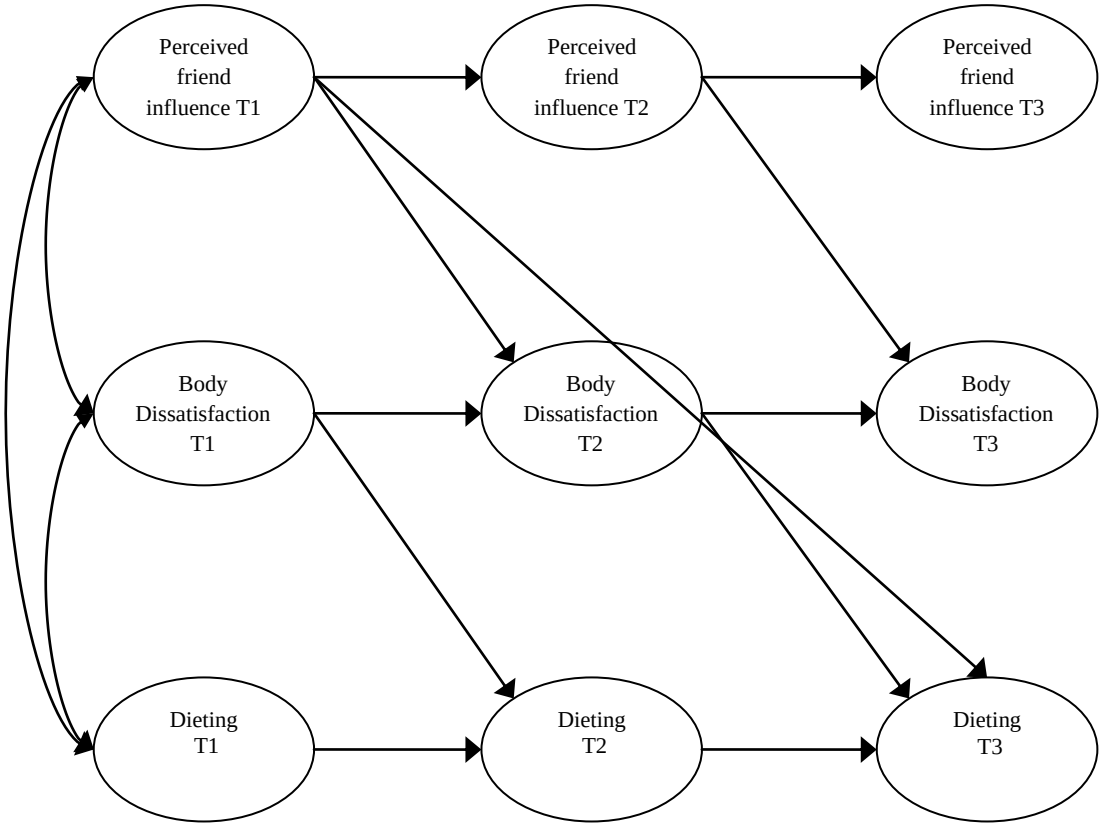

Figure 1. The hypothesised mediation model for the outcome variable "Dieting". The hypothesised Bulimic Behaviours mediation model is equivalent except that the latent variable "Bulimic Behaviours" replaces the latent variable "dieting".

Method

Participants

Participants were recruited from 10 girls' high schools in New South Wales, Australia. The schools represented a broad range of socio-economic backgrounds, including five private schools, three state schools and two Catholic schools. All grade 7 students at each school were invited to participate in the study. Active written parental consent was obtained prior to

the first assessment. The baseline sample comprised 1094 girls aged 10-14 years (*M* = 12.3, *SD* = .52), equating to 78% of all invited grade 7 students. Most participants were born in Australia (84.1%), followed by Asia (10.1%), the Middle East (1.2%), New Zealand (0.9%) and the United Kingdom (0.8%; other locations represented less than .7% each). Cross-sectional results for the Time 1 sample have been reported elsewhere (Hutchinson & Rapee, 2007; Hutchinson et al., 2010). Of the baseline sample, 979 (89.5%) participated at Time 2, and 913 (83.5%) at Time 3 (79.4% participated at all waves), comparable to retention rates in other studies (e.g., Jones, 2004; McCabe & Ricciardelli, 2005). Time points were separated by one year. Attrition was mostly due to girls leaving the school (10.4%), followed by absenteeism and study withdrawal. Approval for the study was granted by the university Ethics Committee and the State Department of Education and Training.

Measures

Demographics. Demographic data were collected on participant age, date of birth, country of birth, language spoken at home, relationship to adults living at home, number of siblings, and maternal and paternal country of birth and occupation.

Perceived friend influence. Three scales served as indicators for the latent variable "Perceived Friend Influence". First, the 13-item Friends' Concern with Thinness and Dieting Scale (FCON; Paxton et al., 1999) was used to measure perceptions of friends' concern about weight and weight loss. Internal consistency for this scale was .71 at Time 1, .74 at Time 2 and .73 at Time 3, comparable to the reliability found by the original authors (Cronbach's α = .70, Paxton et al., 1999). The 5-item Friends as a Source of Influence Scale (FINFL; Paxton et al., 1999) was used to assess to what extent friends were considered important in influencing individual body attitudes and weight loss behaviours. This scale has shown good internal reliability (Paxton et al., 1999) and in the current study Cronbach's α was .89, .88 and .86 at Times 1, 2 and 3 respectively. Lastly, the Peer Influence to be Thin and Diet Scale (PEER; Hutchinson & Rapee, 2007) was used to measure perceptions of more direct friend pressure to

be thin and diet, such as frequency of discussion related to weight loss, encouragement to lose weight, and effect of friends' dieting attempts on individual attitudes and behaviours. This scale has demonstrated good internal consistency (Hutchinson & Rapee, 2007). In the current sample, α = .84 at Time 1 and α = .86 at Times 2 and 3.

Body dissatisfaction. Two scales were used to measure the latent variable "Body Dissatisfaction". First, participants completed the 9-item Body Dissatisfaction subscale from the Eating Disorder Inventory (EDI-BD; Garner, Olmstead, & Polivy, 1983). This subscale has been shown to have good validity and reliability in non-clinical samples using untransformed responses (Schoemaker, van Strien, & van der Staak, 1994). Thus scores were calculated using untransformed responses, with the most asymptomatic response scoring 1 and the most symptomatic scoring 6. Cronbach's α was .93 at Time 1 and .94 at Times 2 and 3. Body image concerns were then assessed by summing the Body Disparagement, Feeling Fat, Lower Body Fatness and Salience of Weight and Shape subscales from the Ben-Tovim Walker Body Attitudes Questionnaire (BAQ; Ben-Tovim & Walker, 1991). This scale has demonstrated good reliability and construct validity (Ben-Tovim & Walker, 1991) and in the current sample demonstrated a Cronbach's α of .95, .94 and .95 at Times 1-3 respectively.

Bulimic behaviours. The 7-item Bulimia subscale of the Eating Disorder Inventory (EDI-B; Garner et al., 1983) was used to measure the extent to which individuals think about and engage in binge eating and purging. Again, this scale has demonstrated good psychometric properties in non-clinical populations using untransformed responses (Schoemaker et al., 1994); thus participants' total subscale scores were calculated this way. Reliability was slightly lower in this sample (α = .71 at Time 1 and α = .78 at Times 2 and 3) than previously reported (α = .83). The EDI-B subscale was separated into two parcel indicators to assess bulimic symptoms as a latent variable using structural equation modelling methods. The parcels were created by balancing the level of skewness and kurtosis within each one in order to bring the distribution closer to normal (Nasser & Wisenbaker, 2003).

Dieting. The 10-item Restraint subscale of the Dutch Eating Behaviour Questionnaire (DEBQ-R; van Strien, Frijters, Bergers, & Defares, 1986) was used to assess dieting. This scale has demonstrated good construct validity and internal reliability in adolescent samples (Banasiak, Wertheim, Koerner, & Voudouris, 2001). Cronbach's α was .92 at Time 1, .93 at Time 2 and .94 at Time 3. This scale was separated into two parcel indicators to assess dieting as a latent variable in the analyses. Again, skewness and kurtosis were balanced within each parcel to bring the distribution closer to normal (Nasser & Wisenbaker, 2003).

Body Mass Index (BMI). Height and weight were measured using a tape measure and electronic weight scales in order to calculate body mass index (BMI = kg/m^2).

Auxiliary Variables. Several additional variables were measured at each time point and included in the attrition and imputation analyses (but not the main analyses) in order to identify and reduce potential biases in the sample. These variables included self-esteem (Rosenberg Self Esteem Scale; Rosenberg, 1965), the four remaining EDI subscales (Drive for Thinness, Ineffectiveness, Perfectionism, and Interoceptive Awareness; Garner et al., 1983), negative affect (Positive and Negative Affect Scale – Expanded Form; Watson & Clark, 1994), trait anxiety (State-Trait Anxiety Inventory; Spielberger, Gorsuch, & Lushene, 1983), depressive symptoms (Centre for Epidemiologic Studies Depression Scale for Children; Weissman, Orvaschel, & Padian, 1980), and three single items, 1) "Do you think your friends would like you to be heavier than you are now?", 2) "Compared to other things in your life, how important is body weight and shape to you?", and 3) "In comparison to your friends, how concerned are you about weight, weight loss and dieting?" (rated on 5-point Likert scales, with higher scores representing greater concern with weight and weight loss).

Procedure

Questionnaires were administered during class time and took 90 minutes to complete. Participants were given a word glossary to improve consistency in the interpretation of questionnaire items. Participants' height and weight were measured privately by a female

researcher. A follow-up was arranged to collect data from students who were absent during the initial testing days. Data were collected in the same way at Time 2 and Time 3.

Results

Attrition Analyses

A multivariate analysis of variance (MANOVA) was used to examine whether girls who participated at all three time points differed from those who dropped out of the study. In addition to the main variables of interest, the auxiliary variables were also entered into the MANOVA in order to identify potential discrepancies between the groups. The MANOVA was significant, F (19, 753) = 2.20, p = .002; Wilks' λ = .95; partial η^2 = .05, indicating that those who completed all assessments differed from those who dropped out on the combined dependent variables. Examining results for the dependent variables separately revealed that the only key variables to reach significance were BMI, F (1, 771) = 9.20, p = .003, Cohen's d = .19, and BAQ scores, F (1, 771) = 9.77, p = .002, Cohen's d = .25 (using a Bonferroni adjusted alpha level of .003). Participants who dropped out of the study had slightly higher baseline BMI (M = 21.09, SD = 3.88 vs. M = 20.17, SD = 3.27) and BAQ scores (M = 78.68, SD = 25.08 vs. M = 71.91, SD = 24.56) compared to those who completed all assessments.

Of the auxiliary variables, completers scored significantly lower than dropouts on ineffectiveness, negative affect, trait anxiety, and depressive symptoms, but higher on self-esteem (specific mean differences available from the primary author on request). Although the effect sizes of these differences were small (all Cohen's ds ranged from .20 - .32), suggesting that any bias introduced into the sample through attrition was also likely to be small, efforts to reduce potential biases due to missingness are described below.

Multiple Imputation of Missing Data

Multiple imputation was employed to address missing values in the data set. This technique has been shown to outperform other missing data methods typically used in psychological research (e.g., listwise deletion, mean substitution) across a range of missing

data conditions (Newman, 2003). The performance of multiple imputation procedures can be further improved by including extra variables in the imputation model (particularly those that may be related to the mechanism of missingness), even when these variables are not used in the main analyses of interest (Collins, Schafer, & Kam, 2001). In the present study, 20 fully imputed datasets were generated using Predictive Analytics Software (PASW) 17.0. PASW uses a fully conditional specification approach, which is an iterative Markov chain Monte Carlo (MCMC) method. Demographic data, auxiliary variables and the key variables of interest were all included in the imputation model. Non-normal variables were normalised using square root and log transformations prior to imputation (Graham, 2009). All reported statistics are pooled results from across the 20 imputed data sets.

Descriptive Statistics

Descriptive statistics were generated using PASW 17.0. Variable means and standard deviations are presented in Table 1. As expected, friend influence variables were positively correlated with body dissatisfaction, dieting and bulimic behaviours (Table 2). In general, friend influence variables were more strongly correlated with dieting than bulimic behaviours within and across time points. BMI percentiles were calculated based on age and gender (using the 2000 CDC growth charts) in line with recent recommendations (Barlow, 2007). While most participants fell in the healthy weight category (71-76%), a substantial number of girls fell in the overweight (15-19%) and obese (6-7%) categories. A small number of girls were classified as underweight (2-3%). This distribution is comparable to the general Australian youth population (Australian Bureau of Statistics, 2008).

Table 1

Means and Standard Deviations of Variables for Participants at Times 1, 2 and 3

Variables	Time 1 *M* (*SD*)	Time 2 *M* (*SD*)	Time 3 *M* (*SD*)	Possible range of scores
Friend Influence				
PEER	11.89 (5.17)	12.44 (5.36)	13.40 (5.52)	7 – 35
FCON	8.54 (3.51)	9.57 (3.72)	10.84 (3.56)	2 – 21
FINFL	4.89 (5.08)	5.51 (4.82)	6.13 (4.83)	0 – 20
Body Dissatisfaction				
EDI-BD	28.43 (12.47)	29.88 (12.32)	32.13 (12.09)	9 – 54
BAQ	73.63 (24.97)	80.44 (24.31)	81.48 (25.47)	33 – 165
Eating Problems				
DEBQ-R	19.14 (8.88)	19.89 (9.14)	21.67 (10.00)	10 – 50
EDI-B	13.07 (5.26)	13.53 (5.56)	14.49 (5.64)	7 – 42

Note. PEER = Peer Influence to be Thin and Diet Scale; FCON = Friends' Concern with Thinness and Dieting Scale; FINFL = Friends as a Source of Influence Scale; EDI-BD = Eating Disorder Inventory – Body Dissatisfaction subscale; BAQ = Body Attitudes Questionnaire; DEBQ-R = Dutch Eating Behaviour Questionnaire – Restraint subscale; EDI-B = Eating Disorder Inventory – Bulimia subscale.

Table 2

Correlations Between Key Variables Over Time

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
1. T1 PEER	-																			
2. T1 FCON	.53	-																		
3. T1 FINFL	.64	.47	-																	
4. T1 EDI-BD	.62	.36	.44	-																
5. T1 BAQ	.74	.39	.53	.78	-															
6. T1 DEBQ-R	.63	.43	.53	.60	.66	-														
7. T1 EDI-B	.44	.28	.32	.44	.51	.40	-													
8. T2 PEER	.52	.32	.40	.50	.54	.45	.31	-												
9. T2 FCON	.31	.42	.28	.23	.24	.25	.18	.48	-											
10. T2 FINFL	.36	.28	.45	.32	.36	.36	.26	.59	.39	-										
11. T2 EDI-BD	.48	.27	.34	.68	.60	.47	.32	.63	.30	.41	-									
12. T2 BAQ	.52	.29	.37	.60	.66	.47	.37	.71	.34	.47	.79	-								
13. T2 DEBQ-R	.46	.30	.37	.46	.52	.62	.32	.64	.34	.48	.60	.65	-							
14. T2 EDI-B	.36	.24	.30	.38	.40	.34	.52	.48	.31	.32	.46	.51	.46	-						
15. T3 PEER	.46	.28	.35	.42	.45	.38	.29	.65	.37	.42	.54	.58	.54	.39	-					
16. T3 FCON	.26	.31	.22	.20	.19	.22	.17	.33	.50	.26	.26	.27	.28	.27	.49	-				
17. T3 FINFL	.32	.25	.35	.23	.27	.32	.19	.41	.33	.46	.29	.34	.37	.28	.59	.45	-			
18. T3 EDI-BD	.41	.21	.30	.59	.51	.40	.25	.51	.27	.29	.74	.65	.48	.35	.63	.31	.33	-		
19. T3 BAQ	.46	.22	.34	.52	.56	.42	.29	.57	.28	.33	.66	.71	.54	.39	.74	.34	.45	.82	-	
20. T3 DEBQ-R	.40	.24	.34	.38	.43	.50	.24	.51	.24	.34	.50	.54	.67	.37	.66	.29	.44	.60	.69	-
21. T3 EDI-B	.33	.23	.24	.31	.34	.28	.42	.42	.30	.26	.38	.47	.43	.60	.52	.36	.37	.45	.53	.48

Note. All correlations significant at $p < .0005$. T1 = Time 1; T2 = Time 2; T3 = Time 3; PEER = Peer Influence to be Thin and Diet Scale; FCON = Friends' Concern with Thinness and Dieting Scale; FINFL = Friends as a Source of Influence Scale; EDI-BD = Eating Disorder Inventory – Body Dissatisfaction subscale; BAQ = Body Attitudes Questionnaire; DEBQ-R = Dutch Eating Behaviour Questionnaire – Restraint subscale; EDI-B = Eating Disorder Inventory – Bulimia subscale.

Structural Equation Modelling

The main analyses consisted of several steps based on Cole and Maxwell's (2003) recommendations for testing longitudinal mediational models. Two mediational models were examined with dieting and bulimic behaviours as respective outcome variables (see Figure 1). All structural equation modelling and tests of mediation were conducted in Mplus Version 5 (Muthén & Muthén, 2007) using maximum likelihood estimation. Several goodness-of-fit indices were used to evaluate the models. The chi-square index assesses the discrepancy between the sample and estimated covariance matrices, with lower or non-significant values indicating better fit. However, as chi-square index is affected by sample size, with relatively good fitting models often rejected with large samples (Kline, 2005), other fit indices were also used to evaluate the models. Specifically, comparative fit index (CFI) and Tucker-Lewis index (TLI) values greater than .95, and root mean squared error of approximation (RMSEA) values less than or equal to .05 were considered to indicate good fit (Hu & Bentler, 1999).

Testing the Measurement Models

The measurement models were first examined to determine whether the observed variables loaded onto the latent variables they were intended to measure and that the error terms related to each other in expected ways (Cole & Maxwell, 2003). Both the dieting (DT) and bulimic behaviours (BB) measurement models fit the data well (see Table 3). Allowing measurement error of the observed variables to correlate across time points resulted in a significant improvement to the fit of both models, DT: $\chi^2_{diff} = (21) = 752$, $p < .001$; BB: $\chi^2_{diff} = (21) = 797.97$, $p < .001$. Thus correlated measurement error was retained in the measurement models and all subsequent models.

Table 3

Model Fit Indices for the Dieting and Bulimic Behaviours Models

Model	χ^2	*df*	*p*	χ^2_{diff}	CFI	TLI	RMSEA
Dieting Model							
Measurement model	235.71	132	.0000	-	.993	.989	.027
Factorial invariance	291.03	146	.0000	55.32***	.990	.985	.030
Equilibrium assumption	261.95	144	.0000	26.24**	.992	.988	.027
Reduced model	523.81	138	.0000	283.59***	.973	.959	.051
Mediational model	295.39	149	.0000	55.17***	.990	.986	.030
Final model	264.51	147	.0000	22.24	.992	.988	.027
Bulimic Behaviours Model							
Measurement model	232.59	132	.0000	-	.991	.986	.026
Factorial invariance	272.48	146	.0000	39.89***	.989	.984	.028
Equilibrium assumption	255.77	144	.0000	23.17*	.990	.985	.027
Reduced model	467.54	138	.0000	234.39***	.971	.955	.047
Mediational model	309.49	149	.0000	76.35***	.986	.980	.031
Final model	274.70	147	.0000	42.11***	.989	.984	.028

Note. CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation.

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

Next factorial invariance (the relationships between observed and latent variables remain constant across waves) and the equilibrium assumption (the within-wave variances and covariances of latent variables are consistent over time) were examined. In both the DT and BB models, constraining the factor loadings to be equal across waves resulted in a statistically significant reduction in the chi-square indices when compared to the measurement

models, DT: χ^2_{diff} = (14) = 55.32, $p < .001$; BB: χ^2_{diff} = (14) = 39.89, $p < .001$. However, the overall fit of the factorially invariant models remained excellent, with the other fit indices remaining relatively stable (see Table 3), suggesting that factorial invariance was a reasonable assumption. Similarly, the test of the equilibrium assumption revealed that constraining latent variable variances and covariances over time resulted in a significant chi-square difference for both models, DT: χ^2_{diff} = (12) = 26.24, $p = .010$; BB: χ^2_{diff} = (12) = 23.17, $p = .026$. Again, the CFI, TLI and RMSEA remained stable and within acceptable limits, suggesting that the equilibrium assumption was upheld (see Table 3).

The full path models were then compared to reduced models in which the error terms of downstream latent variables were not permitted to correlate. Full path models are statistically equivalent to the measurement models and include direct pathways from all upstream latent variables to all downstream latent variables (i.e., additional pathways that are not part of the mediational model; Cole & Maxwell, 2003). The reduced models for both dieting and bulimic behaviours provided a significant chi-square reduction in fit compared to the full models, DT: χ^2_{diff} = (6) = 283.59, $p < .001$; BB: χ^2_{diff} = (6) = 234.39, $p < .001$. Although the other fit indices remained adequate for the reduced model (see Table 3), the significant chi-square difference suggests that some of the covariation among the downstream latent variables may be explained by variables not included in the model. Therefore, the residuals of downstream latent variables were allowed to correlate in subsequent models. While it is important to acknowledge that the current models are unable to explain all of the residual covariation, the aim of this study was to examine the interrelationships between specific variables, rather than attempt to explain all of the variation in the outcome variables.

Testing the Hypothesised Mediation Models

The full path models were then compared to the hypothesised mediation models (see Figure 1). While the fit indices of both the DT and BB mediation models indicated good fit to the data, the chi-square indices were significantly lower than those for the full path models,

indicating that the reduced models were probably too parsimonious (see Table 3). Therefore, omitted pathways from the full path models were examined and those found to be significant and theoretically sensible were added to the reduced mediation models (Cole & Maxwell, 2003). While data-driven alterations to structural equation models have been aptly criticised for potentially capitalizing on chance findings (Kline, 2005), making these changes in the current analyses was considered appropriate given that the mediational relationships (rather than the overall models per se) were of interest. Further, the pathways of interest are less likely to be biased if other, potentially important relationships between variables are included.

Comparison of the amended DT model with the full path model revealed that there was no significant difference in the fit to the data, $\chi^2_{diff} = (15) = 22.24$, $p = .102$. Thus the hypothesised pathways were tested within this final amended model (shown in Figure 2). The BB mediation model was similarly modified to include all theoretically sensible, significant pathways from the full model, however, this still resulted in a significant chi-square difference when compared to the full model, $\chi^2_{diff} = (15) = 42.11$, $p < .001$. Although the other fit indices remained stable and indicated that the amended BB model provided a good fit to the data (see Table 3), the significant chi-square difference suggested that additional important pathways may have been excluded. Therefore, the analyses that follow were conducted with both the modified BB model and a fuller model, in which all significant pathways from the full model were included, in order to identify potential biases in results. As the two models provided the same results and had similar path estimates, results from the more parsimonious, modified model (see Figure 3) are reported in all subsequent analyses.

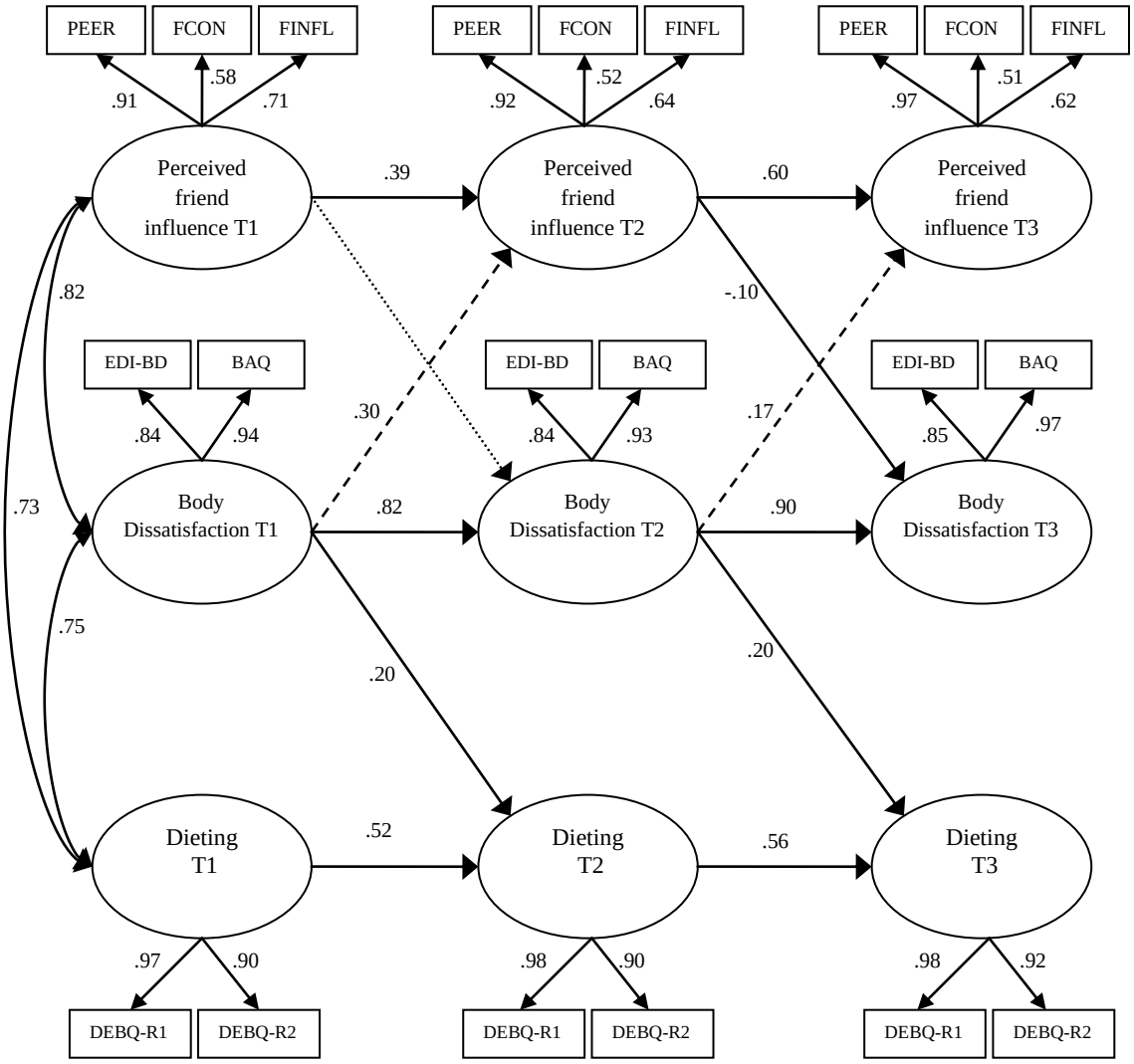

Figure 2. The final Dieting model showing standardised regression weights for all significant pathways ($p < .05$). Non-significant pathways are represented by dotted lines. Pathways added to mediation model from full model are represented by dashed lines. For reasons of simplification, error terms and their correlations are not shown. PEER = Peer Influence to be Thin and Diet Scale; FCON = Friends' Concern with Thinness and Dieting Scale; FINFL = Friends as a Source of Influence Scale; EDI-BD = Eating Disorder Inventory – Body Dissatisfaction subscale; BAQ = Body Attitudes Questionnaire; DEBQ-R1 = Dutch Eating Behaviour Questionnaire – Restraint subscale parcel indicator 1; DEBQ-R2 = Dutch Eating Behaviour Questionnaire – Restraint subscale parcel indicator 2.

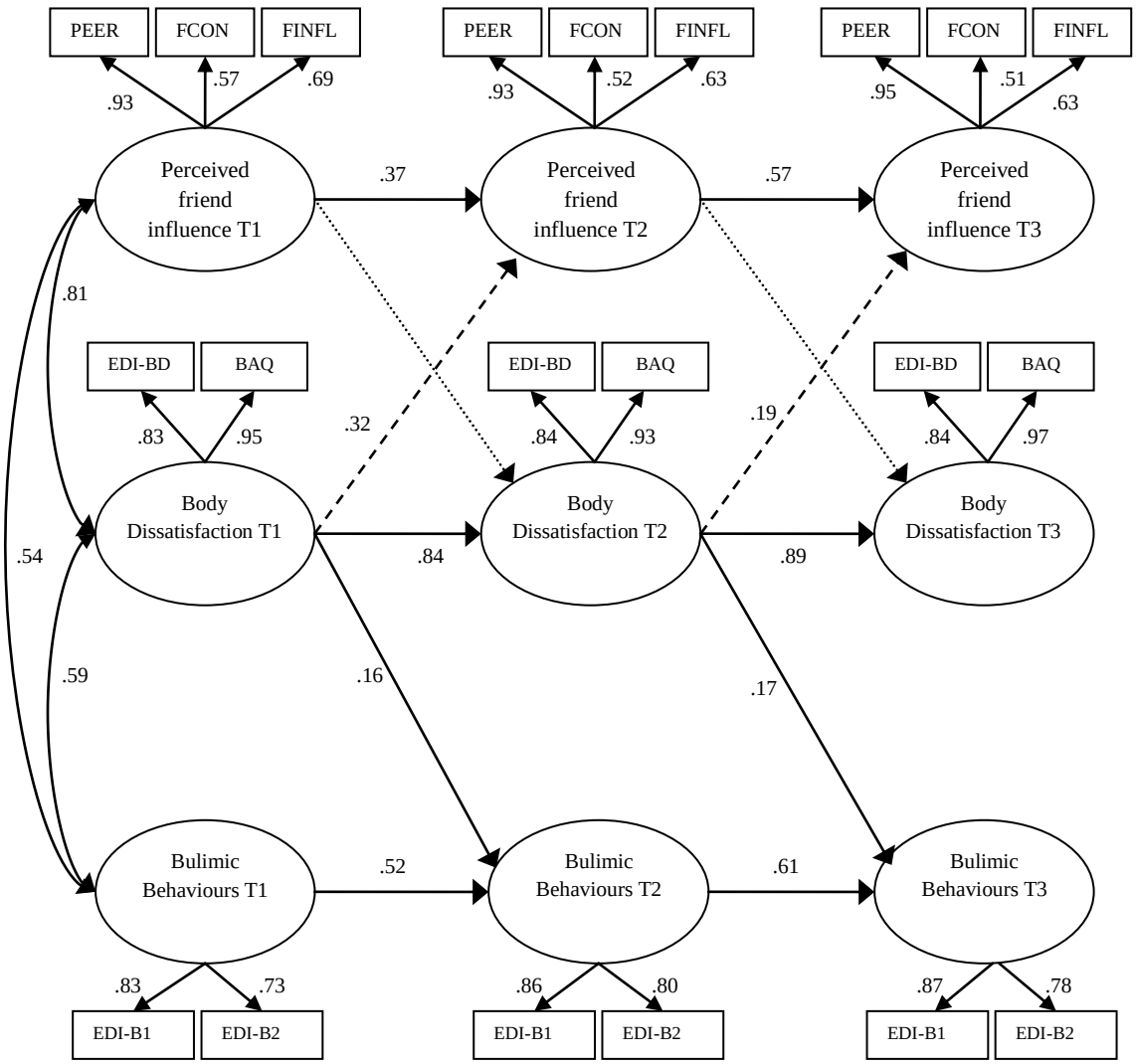

Figure 3. The final Bulimic Behaviours model showing standardised regression weights for all significant pathways ($p < .05$). Non-significant pathways are represented by dotted lines. Pathways added to mediation model from full model are represented by dashed lines. For reasons of simplification, error terms and their correlations are not shown. PEER = Peer Influence to be Thin and Diet Scale; FCON = Friends' Concern with Thinness and Dieting Scale; FINFL = Friends as a Source of Influence Scale; EDI-BD = Eating Disorder Inventory – Body Dissatisfaction subscale; BAQ = Body Attitudes Questionnaire; EDI-B1 = Eating Disorder Inventory – Bulimia subscale Parcel indicator 1; EDI-B2 = Eating Disorder Inventory – Bulimia subscale Parcel indicator 2.

The specific hypothesised mediational relationships (i.e., Perceived Friend Influence → Body Dissatisfaction → Dieting/Bulimic Behaviours) were examined within the final DT and BB models. Firstly, the relationships between the initial and outcome variables were tested (Baron & Kenny, 1986). However, results showed non-significant total effects between both Friend Influence and Dieting ($\beta = .0045$, $p = .198$) and Friend Influence and Bulimic Behaviours ($\beta = -.0004$, $p = .467$), indicating no reliable relationship between these variables over time. Furthermore, Friend Influence was not a significant predictor of Body Dissatisfaction over time in either model (all *p*s > .05), with the exception of Time 2 Friend Influence to Time 3 Body Dissatisfaction in the DT model ($\beta = -.10$, $p = .043$). Thus it was concluded that the hypothesised longitudinal mediational relationships were not present in the current sample[1].

Testing the Models in Healthy Weight versus Overweight Participants

Multi-group structural equation modelling was used to examine whether model pathways differed in strength for healthy and overweight adolescents. The two weight categories were derived from Time 1 BMI percentiles, with both overweight and obese participants included in the "overweight" category ($n = 287$). First, all pathways and correlations between variables and error terms in the final DT and BB models were constrained to be equal across both BMI groups. This constrained model was then compared to the final DT and BB models in which all parameters were estimated separately for the BMI groups. Results showed that there was a significant chi-square difference for the constrained versus unconstrained DT model, $\chi^2_{diff} = (42) = 66.23$, $p = .015$, indicating that some pathways differed according to BMI status. An examination of the separate parameter estimates for the healthy and overweight groups revealed that three pathways differed between the groups; 1)

[1] In order to investigate whether the lack of significant relationships between key variables in the current sample was spurious, the hypothesised relationships were also tested cross-sectionally. These analyses demonstrated that the variables were significantly related to each other as hypothesised within each time point, indicating that the current data do not differ substantively from previous studies which have obtained significant cross-sectional findings. These additional analyses further underscore the importance of examining risk factors longitudinally, as significant cross-sectional results may be misleading.

T1 Body Dissatisfaction significantly predicted T2 Friend Influence for healthy weight (β = .14, $p < .001$), but not overweight (β = .08, p = .356), participants; 2) T2 Body Dissatisfaction significantly predicted T3 Friend Influence for overweight (β = .19, p = .002), but not healthy weight (β = .06, p = .18), participants; and 3) T2 Friend Influence predicted T3 Body Dissatisfaction for overweight (β = -.40, p = .019), but not healthy weight (β = -.06, p = .667), participants. Interestingly, this last relationship was negative, suggesting that for overweight girls, more perceived friend influence was associated with less body dissatisfaction one year later. Conversely, the final BB model fit the healthy and overweight groups equally well, χ^2_{diff} = (42) = 57.97, p = .051 (constrained model: CFI = .988, TLI = .986, RMSEA = .025), indicating that these relationships did not differ across groups.

Discussion

Past research and aetiological theories indicate that friends and peers are influential in the development and maintenance of body image concerns and disordered eating during adolescence. The present study examined whether perceived friend influence prospectively predicted the use of dieting or bulimic behaviours, and whether this relationship was mediated by changes in body dissatisfaction, in a sample of young adolescent girls. The study further investigated whether these interrelationships differed depending on girls' BMI.

Contrary to the first hypothesis, the results of the study indicated that perceived friend influence was not significantly associated with girls' use of dieting or bulimic behaviours over time. Moreover, the results indicated that, by and large, perceived friend influence did not predict changes in body dissatisfaction over time. Thus the second hypothesis was also not supported. Based on these results, differences between healthy and overweight girls in relation to the specific hypothesised relationships could not be examined. These findings were unexpected and are not in line with previous studies that have found both direct and indirect pathways from perceptions of friend influence to eating pathology (Hutchinson et al., 2010; Lam et al., 2009; Stice, 2001). However, a few past studies that have utilised prospective

research designs have also found a lack of longitudinal relationships between friend factors and weight related attitudes and behaviours, despite the presence of significant cross-sectional relationships within the same data (e.g., Clark & Tiggemann, 2008; Jones, 2004).

One possible explanation for the absence of direct and indirect relationships between perceived friend influence and disordered eating in the current study may be that the data collection time points were spaced too far apart. That is, friend influence may operate more overtly over a shorter time frame. However, other studies have found that perceived influence from friends predicted adolescent girls' body dissatisfaction and disordered eating over periods of up to seven years (e.g., Field et al., 2008; Paxton et al., 2006). Another explanation is that the mechanisms through which friend influence operates are different from those assessed by the study measures. For instance, the amount of friend influence an adolescent girl perceives may not be as influential as the actual attitudes and behaviours evident within her immediate peer environment. In this sense, group norms may implicitly guide an individual's body image attitudes and eating behaviours, rather than through a conscious process of socialisation. Alternatively, it may be that the relationships between perceived friend influence, body dissatisfaction and disordered eating may not hold over time when previous levels of each variable are taken into account. Further longitudinal studies that investigate different aspects of the peer context are required to elucidate ways in which risk factors for eating pathology interrelate over time.

Interestingly, the data analysis revealed some unexpected relationships between key variables. Specifically, body dissatisfaction was found to predict ratings of perceived friend influence, such that higher body dissatisfaction led to greater perceptions of friend influence one year later. Although this finding arose from data-driven modifications to the hypothesised mediation models, the consistency of the positive relationship between body dissatisfaction and perceived friend influence across time points and differing models suggests a reliable association between the variables.

Taken at face value, there are a number of possible explanations for this finding. Firstly, this relationship may be a result of cognitive processes, with girls who think and feel more negatively about their bodies having an attentional bias for weight and shape related cues in their social environment. This may mean that they are more likely to notice direct and indirect peer pressures and may be more likely to compare themselves to their friends on domains that are salient to them, that is, body shape and weight. Body dissatisfaction and body comparison have been found to be related in previous studies (e.g., Schutz, Paxton, & Wertheim, 2002), however, the direction of this relationship over time is unclear due to the use of cross-sectional designs. Alternatively, girls with higher levels of body dissatisfaction may misinterpret events in the peer environment as reflective of pressure to look or behave in a particular way. This would indicate that for girls with more negative body image, there is a difference between perceived and actual friend influence. Secondly, girls with higher levels of body dissatisfaction may directly contribute to a peer environment in which body image and eating patterns are important, and are therefore more likely to talk about, model, and reward weight loss attempts. This may create a strong friendship group norm that reinforces the thin ideal propagated by wider societal factors. Thirdly, girls with higher body dissatisfaction may actually receive higher levels of friend influence due to other, related reasons. For instance, girls with higher body dissatisfaction may also have higher BMIs, and are thereby more likely to receive negative feedback about their bodies. However, this potential explanation was not supported by the current study's findings. Rather, body dissatisfaction was predictive of perceived friend influence for both healthy and overweight girls.

The findings in the current study were remarkably similar for both healthy and overweight girls, which was inconsistent with the hypothesis that overweight girls would be more susceptible to the effect of friend influence on body dissatisfaction and disordered eating. However, there was some indication that the unexpected pathway from body dissatisfaction to later perceived friend influence was apparent slightly earlier (across grades 7

to 8) for healthy weight girls, and slightly later for overweight girls (across grades 8 to 9), suggesting future studies should examine this issue further.

The findings of this study, namely that perceived friend influence did not predict body dissatisfaction or disordered eating, while body dissatisfaction predicted ratings of perceived friend influence, have important implications for current theoretical understanding of the development of negative body image and eating pathology. Aetiological models that incorporate sociocultural factors posit that pressure to be thin from family, peers and the media fosters body dissatisfaction, which in turn, leads to dieting and bulimic behaviours. However, findings in the present study suggest that the relationships between these variables may be more complex than the linear trajectory suggested by theoretical models. Specifically, the current results indicate that elevated body dissatisfaction precedes increased perceived pressure from friends. Given that this finding was not anticipated, it is imperative that future studies investigate a priori predictions about the effect of body dissatisfaction on perceptions of friend influence to determine the reliability of this association.

This study had a number of noteworthy strengths. Firstly, we utilised a longitudinal research design, collecting data across three yearly time points. Secondly, the sample was large and reflective of the diverse socioeconomic and cultural background and current BMI distribution in the wider Australian population. Thirdly, this is the first longitudinal study to examine the effects of BMI on the relationships between friend influence, body dissatisfaction and disordered eating. Fourthly, potential biases due to missing data were addressed using multiple imputation, which has been shown to outperform other, more commonly used missing data techniques (Newman, 2003). Lastly, rigorous statistical procedures recommended for longitudinal data analysis were used to examine the hypothesised relationships in a comprehensive and stringent manner, ensuring that robust conclusions could be drawn (Cole & Maxwell, 2003). Additionally, previous levels of each of the key variables were controlled so as not to potentially overestimate the influence of risk factors on the

development of eating pathology, and testing dual models allowed for the potentially differential effect of friend influence on different outcome variables to be examined.

Several limitations of the present study should also be mentioned. Firstly, the data collection points may have been spaced too far apart to detect changes in body dissatisfaction or eating behaviours relative to friend influence. Future studies could implement a multi-wave design with shorter intervals. Secondly, although the friend influence measures appeared to have adequate reliability in the current study, they have not undergone thorough psychometric testing. Furthermore, the latent variable "perceived friend influence" was used to examine the role of friend in influencing individuals' body image and eating behaviours and assessed via self-report. Thus it cannot be concluded that friends are not influential in adolescents' experiences of their bodies or use of weight loss behaviours, only that the current sample did not perceive friends as influencing their individual body image concerns and eating patterns. As noted previously, friend influence encompasses a wide range of aspects from the social environment, and is likely to include perceived and actual, as well as direct and indirect influences. It could be that friends are influential in a different or more subtle way than conceptualised here. Corroborative reports from friends may help in differentiating perceived from friends' actual attitudes and behaviours. Further, new analyses that allow for the reciprocal nature of friend influence and the relative contribution of selection versus socialisation processes to be examined should be utilised in future studies (e.g., Snijders, 2005). Finally, friends were conceptualised as a risk factor for body dissatisfaction and disordered eating in the current study. Future research should examine whether friends may also be protective against the development negative body image and unhealthy weight loss behaviours.

In summary, the findings of this study indicate that perceived friend influence was not predictive of changes in body dissatisfaction, dieting or bulimic behaviours over time. Unexpectedly, girls with greater body dissatisfaction had higher ratings of perceived friend

influence one year later, suggesting that friends may play a more prominent role for adolescents who already have some degree of body image concern, rather than contributing directly to the development of body dissatisfaction as proposed by past research and aetiological theories. Continued prospective investigation of the role of friends and other peers is necessary in order to facilitate the development of effective prevention and intervention programs for adolescents most at-risk of developing unhealthy eating attitudes and behaviours.

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CHAPTER THREE

Adolescent girls' friendship networks, body dissatisfaction and disordered eating: Examining selection and socialisation processes

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Abstract

Previous research has shown that adolescent girls tend to resemble their friends in their level of body dissatisfaction and disordered eating. However, no studies to date have attempted to disentangle the underlying peer selection and socialisation processes that may explain this homophily. The current study used longitudinal stochastic actor-based modelling to simultaneously examine these two processes in a large community sample of adolescent girls (N = 1,197) from 9 Australian girls' high schools. Friendship nominations and measures of body dissatisfaction, dieting and bulimic behaviours were collected across 3 annual waves. Results indicated that selection rather than socialisation effects contributed to similarity within friendship groups when both processes were examined simultaneously. Specifically, girls tended to select friends who were similar to themselves in terms of body dissatisfaction and bulimic behaviours, but dissimilar in terms of dieting. Network and individual attribute variables also emerged as significant in explaining changes in adolescents' friendships and behaviours. As well as having important clinical implications, the findings point to the importance of controlling for friendship selection when examining the role of peers in adolescent body image and eating problems.

Over the last two decades, research has consistently found that body image concerns and disordered eating behaviours are commonplace among female adolescents (e.g., Bearman, Presnell, Martinez, & Stice, 2006; Clark & Tiggemann, 2008; Tiggemann & Pennington, 1990). Reported prevalence rates of body dissatisfaction vary widely in community samples, but are frequently higher than 50%, with a significant number of healthy weight girls perceiving themselves to be overweight (for a review, see Littleton & Ollendick, 2003). In a recent survey of over 50,000 Australian youth, body image was rated as being their greatest personal concern, above family conflict, coping with stress and study problems (Mission Australia, 2010). Epidemiological research has shown that while some adolescents engage in healthy weight control behaviours, such as exercise and healthy eating, the use of more harmful methods, such as fasting and purging, are also common (Center for Disease Control, 2008). These findings are concerning, as both body dissatisfaction and disordered eating are associated with many adverse physical health outcomes and predict the onset of serious psychopathology, including eating disorders and depression (Johnson & Wardle, 2005; Marmorstein, von Ranson, Iacono, & Malone, 2008; Stice, 2002; Stice & Shaw, 2002).

Consequently, a substantial body of literature has focused on identifying risk factors for the development of body image concerns and eating pathology which may be amenable to change through prevention or early intervention programs. Individual risk factors, which include both biological (e.g., body mass index) and psychological (e.g., negative affect and self-esteem) factors, have garnered consistent empirical support from the literature as being important and are included in major theoretical models of the development of eating pathology (e.g., Ricciardelli & McCabe, 2001; Stice, 2001, 2002). Sociocultural factors have also been implicated, both theoretically and empirically, and include pressure and influence from the media, family and peers (Ricciardelli, McCabe, Holt, & Finemore, 2003; Stice & Agras, 1998; Thompson, Heinberg, Altabe, & Tanteleff-Dunn, 1999). It is thought that the media propagates a ‘thin ideal’ of beauty, which is reinforced in the individual’s immediate

environment by family and peers, thereby fostering body dissatisfaction and uptake of unhealthy weight loss behaviours (Dunkley, Wertheim, & Paxton, 2001).

Peers are considered to be a particularly important source of influence in the development of body image and eating disturbances during adolescence. Peer relationships are a crucial aspect of adolescent life that contribute to the development of adolescents' sense of self during a period of rapid physical, cognitive and emotional change (Lieberman, Gauvin, Bukowski, & White, 2001). While friendships provide many benefits, such as increased self-esteem, emotional and practical support, and a sense of belonging, both friends and other peers are also influential in adolescents' adoption of risky and harmful attitudes and behaviours, including substance use (Curren, Stice, & Chassin, 1997) and delinquency (Dishion, Spracklen, Andrews, & Patterson, 1996). Adolescence is a pertinent time to investigate the role of peers in the uptake of health risk behaviours, as research has shown that this age group is particularly susceptible to peer influence and more likely to conform than both younger and older individuals (Steinberg & Monahan, 2007).

Previous studies support the notion that peers are important in the study of body image and eating problems in adolescence (e.g., Eisenberg & Neumark-Sztainer, 2010; Hutchinson & Rapee, 2007; Jones, 2004; Jones, Vigfusdottir, & Lee, 2004; Lieberman, et al., 2001; Paxton, Schutz, Wertheim, & Muir, 1999). Of particular interest is the recurring finding that adolescent girls tend to resemble their friends on dimensions of body dissatisfaction and disordered eating behaviours (e.g., Hutchinson & Rapee, 2007; Paxton, et al., 1999; Pike, 1995; Woelders, Larsen, Scholte, Cillessen, & Engels, 2010). This similarity between friends is referred to as "homophily" and has been explained in terms of two, non-mutually exclusive processes: selection and socialisation (Kandel, 1978a). Selection describes the tendency for friendships to develop between individuals with pre-existing similarities, while socialisation refers to the process by which friends become more similar to each other over time. The latter is generally what is meant by the term "peer influence", and is thought to occur via a number

of different mechanisms, such as modelling, reinforcement, and direct pressure to conform (Brown, Bakken, Ameringer, & Mahon, 2008). Obtaining a clear understanding of how these two processes work together to create peer homophily is essential for informing both theoretical knowledge and clinical approaches relating to adolescent health risk behaviours.

Despite the growing evidence that peers resemble each other on eating related factors, no previous research has attempted to tease apart the relative contributions of selection and socialisation processes that may contribute to this similarity. Furthermore, studies that have examined peer influence in relation to these factors suffer from a number of important limitations. First, much research has been conducted cross-sectionally, which precludes conclusions about direction of effects or how variables interact over time. Second, the majority of longitudinal studies have relied on adolescents' perceptions of their friends' attitudes and behaviours. Although perceptions may be important in influencing individual adolescents' own attitudes and behaviours, they are also susceptible to the "false consensus effect", that is, the tendency for people to perceive others as more similar to themselves than they actually are (Ross, Greene, & House, 1977). Differentiating between the influence of perceived and actual peer attitudes and behaviours would help determine whether intervention is best directed towards amending adolescents' (mis)perceptions, fostering healthier body image and eating patterns at the peer-level more generally, or a combination of both (Rancourt & Prinstein, 2010).

A third widespread limitation of past studies is the reliance on only baseline measures of adolescents' friendship nominations or perceptions of friends' attitudes and behaviours in order to predict future individual change (e.g., Eisenberg & Neumark-Sztainer, 2010; Woelders, et al., 2010). This methodology assumes that the friendships that adolescents nominate at the first data collection wave do not change over time. However, friendship is not a stable construct; it is a dynamic process in which new ties may form, while existing ties are strengthened or dissolve (Snijders, van de Bunt, & Steglich, 2010). In fact, studies have

shown that a significant proportion of friends that are nominated by adolescents at one time point are not re-nominated at the next time point, particularly over longer periods such as a school year (e.g., Bowker, 2004; Hogue & Steinberg, 1995). Lastly, and perhaps most seriously, past longitudinal studies which purport to examine the role of peer influence on body image and eating problems tend to focus solely on socialisation processes while ignoring potential selection effects (e.g., Jones, 2004; Paxton, Eisenberg, & Neumark-Sztainer, 2006; Stice, 1998). Without adequately accounting for peer selection, results pertaining to socialisation effects are likely to be biased and lead to inaccurate conclusions.

Thus, in order to make clear assertions about friendship group homophily of body image and eating problems, research should be longitudinal, consider actual or peer-reported data, obtain measures of both individual behaviour and friendship nominations at multiple time points, and control for both selection and socialisation processes. However, only three studies to date appear to have met these criteria, and each has focused exclusively on college students (Crandall, 1988; Meyer & Waller, 2001; Zalta & Keel, 2006). In an earlier study, Crandall (1988) found that young women's level of binge eating became more similar to that of both their college sorority and group of close friends over nine months. As sorority and friendship group membership remained stable over the study period, Crandall concluded that these results were indicative of socialisation rather than selection processes. However, as sororities are typically formed through a process of self-selection, it is possible that the students had unobserved pre-existing similarities that may have biased the results. More recently, Zalta and Keel (2006) also found that bulimic tendencies were subject to socialisation processes, but only within groups of college students who had selected one another based on similar traits that are themselves risk factors for eating pathology (e.g., self-esteem, perfectionism and impulsivity). These findings suggest that both selection and socialisation contribute to bulimic homophily in self-selected friendship groups; however, the relative contribution of each process remains unclear.

In addition to bulimic symptoms, Meyer and Waller (2001) examined social convergence of body dissatisfaction and drive for thinness in newly formed groups of female students living in university housing. Because students were previously unknown to one another and were allocated to accommodation, selection effects were controlled. The results showed that within accommodation groups, women's drive for thinness converged over time, while body dissatisfaction initially converged, but then returned to the baseline distribution by the end of the study. In contrast, bulimic symptoms diverged over time, a finding that conflicts with the previous studies. This inconsistency may be due to the fact the peer groups were not self-selected, as well as reflecting differences in the degree to which some weight-related attitudes and behaviours are more socially sanctioned than others (Meyer & Waller, 2001). That is, while body dissatisfaction and dieting tend to be viewed as 'normative' in Western cultures, engaging in bulimic behaviours remains a secretive and shameful experience (Petterson, Rosenvinge, & Ytterhus, 2008). Consequently, bulimic symptoms may be less apparent (and therefore less prone to socialisation) in groups of unselected peers, compared to more intimate, selected peer relationships. These hypotheses have not yet been tested in an adolescent sample.

Taken together, the findings from these previous studies highlight the importance of examining both selection and socialisation processes when investigating similarity of body satisfaction and eating behaviour among friends. Differences in socialisation effects found between self-selected and unselected peer groups in college samples suggest that socialisation is more likely to occur in self-selected groups (Crandall, 1988; Meyer & Waller, 2001; Zalta & Keel, 2006). As adolescent friendship groups are typically formed through self-selection (Urberg, Degirmencioglu, & Tolson, 1998), it is likely that girls' weight related attitudes and behaviours will become more similar over time through socialisation. It is less clear whether these particular attitudes and behaviours are important in the initial peer selection processes. It is feasible that girls who have an existing preoccupation with weight and shape are more

attracted (and conversely appear more attractive) to other girls with similar concerns, and are therefore more likely to become friends. Recent research by Rayner and colleagues (2012) provides some preliminary evidence that supports this idea; peer influence did not prospectively predict adolescent girls' body dissatisfaction, but rather higher body dissatisfaction predicted greater perceptions of peer influence a year later.

Recent developments in statistical methods for analysing social networks represent a promising avenue for examining the role of peers in body image and eating behaviours. Stochastic actor-based modelling allows researchers to delineate selection and socialisation processes by simultaneously modelling changes in the peer network structure and changes in individual variables (Snijders, Steglich, & Schweinberger, 2007). To achieve this, participants nominate friendship ties in addition to completing more traditional measures of attitudes and behaviours across a series of data collection waves. Friendship nominations form the basis of the peer network, while participants' attitudes and behaviours are conceptualised as individual attributes. Changes in network structure that depend on individual attributes are indicative of selection processes, while changes in individual attributes that are dependent on network dynamics are suggestive of socialisation processes (Snijders, et al., 2010).

In addition to being able to overcome the limitations of previous peer influence studies described above, stochastic actor-based modelling has some other advantages over alternative statistical methods. For instance, structural aspects of the peer network (such as transitivity, that is, becoming friends with friends of friends) that have been shown to play a role in friend selection can be controlled for, which produces more accurate estimates of selection effects and, in turn, socialisation effects (Steglich, Snijders, & Pearson, 2010). Another benefit is that there is less need for arbitrary modifications to the peer network, such as the creation of artificial boundaries between friendship groups, as the model allows for interdependencies between participants. This enables researchers to model networks that more closely reflect

reality, rather than imposing constraints on friendship ties based on statistical requirements, such as independence. This is particularly important when examining adolescent networks, as group boundaries tend to be ill-defined and adolescents are often members of multiple groups (Kindermann & Gest, 2009). Stochastic actor-based modelling has been used to examine the co-evolution of adolescent peer networks and drug and alcohol use (e.g., Mercken, Snijders, Steglich, Vartiainen, & de Vries, 2010), delinquency (e.g., Snijders & Baerveldt, 2003), and internalizing problems (e.g., Mercer & Derosier, 2010). To the authors' knowledge, no previous studies have used this method to investigate selection and socialisation processes in relation to adolescent body image and eating disturbances.

The aim of the present study was to clarify the role of the peer environment in the development and maintenance of body image and eating problems by examining the underlying processes that may contribute to homophily within adolescent girls' friendship groups. Specifically, the study used stochastic actor-based modelling in order to investigate the relative contribution of peer selection and socialisation processes to similarity in body dissatisfaction and use of dieting and bulimic behaviours over time. Body mass index (BMI), self-esteem and negative affect were included in the analyses as covariates, as these factors are known to contribute to the development of adolescent body image and eating pathology and have also been shown to moderate the influence of sociocultural pressures to be thin on these outcomes (e.g., Ricciardelli & McCabe, 2001). Furthermore, evidence suggests that body weight plays a role in friend selection among female teenagers (Valente, Fujimoto, Chou, & Spruijt-Metz, 2009). Because adolescents also tend to select friends who are the same age and sex as themselves (Kandel, 1978b), age was included as another covariate, while sex was automatically controlled by using a female sample.

Based on the research reviewed above and current theories of peer influence, body image and disordered eating, it was hypothesised that, (1) adolescent girls would choose friends who had similar levels of body dissatisfaction, dieting, and bulimic behaviours to

themselves (selection), and (2) adolescent girls' body dissatisfaction, dieting and bulimic behaviours would become more similar to that of their friends over time (socialisation). Importantly, it was anticipated that these hypotheses would be supported when examining selection and socialisation processes simultaneously, while also controlling for the influence of BMI, self-esteem, negative affect and age.

Method

Participants

Participants were female students recruited from 10 state, private and Catholic girls' high schools in New South Wales, Australia. From the total pool of 1,403 Grade 7 students, 1,094 (78%) participated at Time 1 (*M* age = 12.3, *SD* = .52). Time 2 and 3 assessments were completed 12 and 24 months after baseline respectively. A feature of social networks is that the network composition is constantly evolving, with individuals joining or leaving the network at different moments in time. In the current study, a total of 43 students left school networks and 48 newcomers joined between Times 1 and 2, while 78 students left and 18 joined school networks between Times 2 and 3. To increase the completeness of each school network, participants who were new to the study after Time 1 or who left before the end of the study were included in the analyses, following the procedure set out by Huisman and Snijders (2003). Leaving the school accounted for 10.2% of the attrition from the baseline sample, while 1.5% of participants were absent and 10.3% declined to participate further at later time points. One state school was excluded from the analyses as the participation rates were lower than those recommended for minimum participation in sociometric studies (< 60%; Cillessen, 2009). Participation rates for the other nine schools ranged from 63% to 100% (*M* = 82.49; *SD* = 12.55) at Time 1, 65% to 99% (*M* = 84.46; *SD* = 13.43) at Time 2, and 67% to 97% (*M* = 86.06; *SD* = 13.75) at Time 3.

Thus, the final sample consisted of 1,197 girls who provided questionnaire and friendship network data for at least one time point. Most were born in Australia (81.7%),

followed by Asia (12.7%), United Kingdom (1.0%), and New Zealand (0.8%; 3.8% specified other locations and 1.3% did not specify any location). The majority of participants lived with both biological parents (82.4%) or in a single parent household (10.4%). Adolescents in the sample were typical of the general adolescent population in the local school communities from which they were drawn and the broader Sydney metropolitan area in terms of race and ethnicity, but had a slightly higher parental socio-economic status (ABS, 2006). An examination of parental occupation indicated that the sample was primarily from middle to upper-middle class socio-economic backgrounds, with 76% of parents having completed further study after high school.

Measures

Demographics. Participants were asked to indicate their age, country of birth, language spoken at home, relationship to adults living at home, and parents' country of birth, education level and occupation.

Body dissatisfaction. Body dissatisfaction was assessed using the 9-item Body Dissatisfaction subscale from the Eating Disorder Inventory (EDI-BD; Garner, Olmstead, & Polivy, 1983). Participants rated their responses on a scale ranging from 1 (*always*) to 6 (*never*). Subscale scores were calculated using untransformed responses (with the most asymptomatic response scoring 1 and the most symptomatic scoring 6), as this method results in improved scale reliability and validity in non-clinical samples (Schoemaker, van Strien, & van der Staak, 1994). The EDI-BD has demonstrated good internal consistency and construct validity with female adolescents (Machado, Gonçalves, Martins, & Soares, 2001; Schoemaker, et al., 1994). In the current sample, Cronbach's α was .93 at Time 1 and .94 at Times 2 and 3.

Bulimic behaviours. The 7-item Bulimia subscale from the Eating Disorder Inventory (EDI- B; Garner, et al., 1983) was used to measure participants' tendency think about and engage in binge eating and purging. Again, participants' total scores were initially calculated

using untransformed responses as recommended for non-clinical samples (Schoemaker, et al., 1994). Previous studies have shown that the EDI-B is a reliable and valid scale for use with adolescent girls (Machado, et al., 2001; Schoemaker, et al., 1994). Internal reliability in the present study was α = .71, α = .78 and α = .77 at Times 1 to 3 respectively.

Dieting. Dieting was assessed by the 10-item Restraint subscale of the Dutch Eating Behaviour Questionnaire (DEBQ-R; van Strien, Frijters, Bergers, & Defares, 1986). Participants rated their responses on a 5-point scale ranging from 1 (*not at all*) to 5 (*all the time*). Scores were obtained by dividing the total sum of the item scores by the number of items answered. The DEBQ-R has been shown to have excellent internal and test-retest reliability and good convergent and discriminant validity in child and adolescent samples (Banasiak, Wertheim, Koerner, & Voudouris, 2001; Halvarsson & Sjödèn, 1998). Cronbach's α for this scale was .93 at Time 1, .94 at Time 2 and .95 at Time 3.

Body mass index. Height (meters) and weight (kilograms) were measured using a tape measure and electronic weight scales. These measurements were used to calculate each participant's body mass index (BMI = kg/m^2). Missing BMI values (n = 27.9%) were replaced with the participants' BMI from the previous or subsequent time point where available, as this measurement has been shown to be stable over four year periods during adolescence (Crimmins, et al., 2007). The distribution of BMI values in the sample was consistent with the variation in the general Australian youth population (ABS, 2008).

Self-esteem. The Rosenberg Self-Esteem scale (RSE; Rosenberg, 1965) was used to assess participants' global self-esteem. Participants rated their agreement to items on a 4-point Likert scale ranging from 1 (*strongly agree*) to 4 (*strongly disagree*). The RSE was developed for use with adolescents and has demonstrated good internal consistency and construct validity (Robins, Hendin, & Trzesniewski, 2001). In the current sample, internal consistency was .84, .89 .90 at each time point respectively.

Negative affect. Trait negative affect was measured by the 30-item short form of the Negative Emotionality higher order factor scale from the Multidimensional Personality Questionnaire (MPQ-NE; Tellegen, 1982). The MPQ-NE assesses the tendency to experience negative mood states, with participants responding to whether item statements are descriptive of their personality on a true/false scale. Higher scores are indicative of higher levels of negative affect. This scale is a widely used measure of normal personality and has demonstrated good internal consistency, test-retest reliability and convergent validity (Tellegen, 1982; Tellegen & Waller, 2008). Cronbach's alpha in this sample was .87 at Times 1 and 2 and .88 at Time 3.

Friendship ties. At each time point, participants were given a list of the names of all the students in their grade at their school, each with a corresponding number. They were then asked to write down the numbers of the group of friends that they usually spent time with at school and their best friends. No limit was set on the number of friends participants could select, however, peer network boundaries were determined by school and grade, as studies have shown that the majority of adolescent friendship ties are between same-age and same-sex individuals who attend the same school (e.g., Ennett & Bauman, 1994; Kandel, 1978b). Sex was automatically controlled as the sample was drawn exclusively from single-sex schools. As nominated friends were members of the same network, friends' attitudes and behaviours were able to be directly observed from their own self-reported questionnaire ratings rather than using adolescents' perceptions of peer attributes.

Both best and group-level friends were included in the analyses in order to obtain nominations that represented friendships characterised by relatively strong ties and frequent interaction. Adolescents' best friends were typically members of their friendship group, with 90-91% of best friends also nominated as group members at each wave. Friendship nominations were entered into an adjacency matrix in which 0 and 1 represented the absence or presence of a tie respectively. Self nominations were excluded from the analyses. Separate

network adjacency matrices were created for each school based on participants' friendship nominations at each time point. Participants were also asked to indicate whether they had friends outside of their grade or school.

Procedure

The research was reviewed and approved by the University Human Research Ethics Committee and the New South Wales Department of Education and Training. All grade 7 students at each high school were invited to participate in the study, with active written consent obtained from parents prior to the Time 1 assessment. To encourage students to return their consent forms, a small gift was given to those who returned a signed form regardless of their decision to participate. Questionnaires were administered during class time and took 90 minutes to complete. Participants first completed the friendship nominations and then the self-report measures. A word glossary was also given to participants to improve consistency in the interpretation of questionnaire items. Participants' height and weight were measured privately by a female researcher. A follow-up was arranged to collect data from students who were absent during the initial testing days. The data collection procedure was identical at all three time points.

Overview of Analysis

Statistical analyses were conducted using the Simulation Investigation for Empirical Network Analysis (SIENA) software program (Snijders, Steglich, Schweinberger, & Huisman, 2008). Stochastic actor-based modelling assumes that changes in friendship ties and individual attributes occur continuously between observed time points. The unobserved changes are considered to arise as a result of a sequence of decisions made by individuals in the network and are stochastically modelled using continuous-time Markov chains. These decisions or "micro-steps" occur very gradually, with individuals choosing to either form or break a tie or to change their behaviour by one unit at each moment (individuals may also choose not to change a tie or behaviour). In order to obtain parameter estimates and standard

errors, SIENA simulates the most likely sequence of micro-steps and compares this to observed patterns in the data.

Changes to the network and individual behaviours are signified in SIENA by rate functions, which represent the number of tie and behaviour changes that occur, and objective functions, which represent the types of changes that occur. Objective functions include selection and influence effects as well as a number of other network and behaviour parameters which are described in more detail in the Results section.

In order to assess the co-evolution of friendship ties and behaviours, SIENA treats dependent behaviour variables as ordinal and requires that the total number of scale values is not too large (10 being the recommended upper limit; Snijders, et al., 2010). Thus participants' EDI-BD and EDI-BB scores were divided in such a way as to comply with SIENA's computational requirements and maintain maximum variability within the distribution of each variable (these scale scores divided by six and four respectively). It was not necessary to make any transformations to DEBQ scores given the already small range of possible scores. BMI, self esteem, negative affect and age were included in the analyses as changing individual covariates in order to control for other factors that may be associated with changes in friendship ties and weight-related attitudes and behaviours. RSE and MPQ-NE scores were also divided (by four and six respectively) to reduce the number of scale values to be less than 10.

Missing data were handled by SIENA's imputation procedure (Huisman & Steglich, 2008). Specifically, missing tie and behaviour variables are imputed using the individual's last previous non-missing value from an earlier observation. Where there is no previous non-missing value, the mode value for that observation is imputed for missing behaviour variables, while missing ties are replaced with zero (i.e. absence of a tie). This procedure minimises possible biases in parameter estimates in networks that have small to moderate amounts of missing data (i.e. 20 - 40%; Huisman & Steglich, 2008). In the present sample, the

fraction of missing network data was 10.5%, 11.3%, and 6.9% at each time point respectively, while missingness on individual behaviour variables ranged from 1.1% to 14.3% within each wave.

Social network analyses were conducted separately for each school and then the results were combined in a meta-analysis to produce average parameter estimates and standard errors (Snijders & Baerveldt, 2003). Following the methodology described in previous studies (e.g., Mercken, et al., 2010), Fisher's combination procedure (Hedges & Olkin, 1985) was used to determine the significance of averaged parameter estimates. In this method, the null hypothesis that the parameter estimate is equal to zero is tested using both right-sided (H_0 = the effect is non-positive) and left-sided (H_0 = the effect is non-negative) tests. In order to control for type-I error, an estimate was considered to be statistically significant if its *p*-value was less than 0.025 ($\alpha/2$). Additionally, an estimate of the variability of the effects across the nine schools was calculated using Cochran's method (Snijders & Baerveldt, 2003).

Results

Descriptive Statistics

Network characteristics and means for the dependent variables and covariates at each time point are presented in Table 1. Friendship networks expanded over time, as indicated by increases in the total number of nominated friendship ties and the average number of friends nominated by individual participants (*average degree*) at each wave. The low *density* values, calculated by dividing the number of existing friendship ties by the number of possible ties, revealed that school networks tended to be relatively sparse. The *reciprocity index* refers to the proportion of friendship ties that were reciprocated, and in the current sample was moderately high and increased over time. It is typical for friendship networks to have low density and high reciprocity values (Veenstra & Steglich, 2011). The majority of participants had additional friendships outside of their grade or school (Time 1 = 86%, Time 2 = 85%, Time 3 = 83%). The percentage of participants who did not make any friendship nominations

within their grade was 0.7%, 1.5% and 0.3% at each time point respectively, and only 0.1% of participants did not make or receive any nominations.

Table 1

Descriptive Statistics for Network Structure and Individual Characteristics by Wave

	Time 1		Time 2		Time 3		Scale Range
Network Characteristics							
Total number of individuals in combined networks	1,014		1,027		1,028		
Total number of friendship ties	8,817		9,487		10,524		
Average degree	9.02		9.62		10.84		
Density	.07		.08		.09		
Reciprocity index	.57		.63		.68		
Behavioural Characteristics[a]							
Body dissatisfaction	27.99	(12.37)	29.45	(12.24)	31.67	(12.15)	9 - 36
Dieting	1.90	(0.89)	1.93	(0.91)	2.12	(1.02)	1 - 5
Bulimic symptoms	12.88	(5.14)	13.22	(5.57)	14.09	(5.65)	7 - 42
Age	12.31	(0.53)	13.30	(0.53)	14.30	(0.54)	-
Body mass index	20.29	(3.20)	20.47	(3.28)	20.87	(3.40)	-
Self-esteem	29.98	(4.74)	29.81	(5.21)	29.26	(5.31)	10 - 40
Negative affect	42.32	(6.52)	41.88	(6.52)	41.94	(6.55)	30 - 60

Note. Results for the combined nine school networks are presented.

[a] Untransformed mean scores are reported for the behavioural variables with standard deviations in parentheses.

The average values for body dissatisfaction, dieting, bulimic symptoms and BMI all increased over time, while average self-esteem and negative affect remained relatively stable. Mean DEBQ-R scores in current sample were slightly lower than those found previously in community samples of Australian adolescent girls (e.g., Banasiak, et al., 2001), while EDI-BD and EDI-BB mean scores were comparable to those obtained in other studies (e.g., Richardson & Paxton, 2010; Schutz & Paxton, 2007). In line with the literature, body dissatisfaction, dieting and bulimic behaviours were positively correlated with one another both within and across time points (Table 2). BMI and negative affect also correlated positively with the three dependent variables, while self-esteem demonstrated a negative association with the dependent variables.

Table 2

Correlations Between Individual Variables Over Time

	T1 BD	T1 DT	T1 BB	T1 Age	T1 BMI	T1 NA	T1 SE	T2 BD	T2 DT	T2 BB	T2 Age	T2 BMI	T2 NA	T2 SE	T3 BD	T3 DT	T3 BB	T3 Age	T3 BMI	T3 NA	T3 SE
T1 BD	-																				
T1 DT	.60**	-																			
T1 BB	.43**	.39**	-																		
T1 Age	.09**	.06	.02	-																	
T1 BMI	.50**	.36**	.19**	.08*	-																
T1 NA	.38**	.34**	.42**	.02	.09**	-															
T1 SE	-.50**	-.30**	-.35**	-.04	-.12**	-.45**	-														
T2 BD	.68**	.49**	.33**	.04	.43**	.28**	-.32**	-													
T2 DT	.47**	.63**	.32**	.03	.30**	.25**	-.20**	.62**	-												
T2 BB	.38**	.34**	.53**	.02	.17**	.34**	-.27**	.47**	.48**	-											
T2 Age	.09**	.06	.02	1.00**	.08*	.02	-.04	.05	.03	.03	-										
T2 BMI	.40**	.33**	.13**	.05	.77**	.05	-.07	.34**	.25**	.07*	.05	-									
T2 NA	.30**	.28**	.34**	.00	.06	.64**	-.32**	.39**	.37**	.47**	.00	.07	-								
T2 SE	-.43**	-.31**	-.34**	.00	-.14**	-.41**	.57**	-.56**	-.40**	-.46**	.00	-.05	-.51**	-							
T3 BD	.61**	.43**	.27**	.06	.37**	.26**	-.29**	.76**	.49**	.37**	.06	.26**	.28**	-.46**	-						
T3 DT	.44**	.56**	.28**	.04	.27**	.23**	-.18**	.54**	.70**	.40**	.04	.23**	.28**	-.32**	.64**	-					
T3 BB	.32**	.28**	.44**	.00	.10**	.32**	-.24**	.40**	.43**	.63**	.00	.03	.37**	-.42**	.47**	.49**	-				
T3 Age	.10**	.06	.05	.88**	.09**	.02	-.02	.07*	.05	.05	.88**	-.01	.00	.00	.08*	.06	.05	-			
T3 BMI	.41**	.34**	.18**	.08	.72**	.08	-.08	.42**	.31**	.18**	.08	.72**	.05	-.10*	.38**	.29**	.16**	.05	-		
T3 NA	.26**	.23**	.32**	-.01	.01	.56**	-.27**	.31**	.27**	.39**	-.01	.02	.64**	-.44**	.40**	.34**	.49**	.00	.07	-	
T3 SE	-.36**	-.28**	-.28**	.04	-.07*	-.37**	.45**	-.49**	-.34**	-.40**	.04	-.01	-.40**	.68**	-.60**	-.42**	-.48**	.02	-.11**	-.57**	-

Note. T1 = Time 1; T2 = Time 2; T3 = Time 3; BD = Body Dissatisfaction; DT = Dieting; BB = Bulimic Behaviours; BMI = Body Mass Index; NA = Negative Affect; SE = Self-Esteem.
* p < .05; **p < .01.

Social Network Analyses

Following recent recommendations for developing co-evolving network and behaviour models (Snijders, et al., 2010), relatively simple models containing only network dynamics were estimated first, followed by a more complex multivariate model that included both network and behaviour change parameters for all three dependent variables. Accordingly, parameter estimations obtained from simpler, well-fitting models were used as initial values for the multivariate model in order to facilitate convergence of the algorithm (Snijders, et al., 2010). As models that included both selection and socialisation processes are of primary interest in the current study, parameter estimates from the simpler network-only models are not reported. The degree of convergence is determined by t-ratios, calculated by dividing the average deviations between simulated and observed statistic values by their standard deviation. Absolute values of t-ratios less than .1 are deemed 'excellent', below .2 are 'good' and below .3 are 'moderate' (Snijders, et al., 2008). All reported results are taken from final network-behaviour co-evolution model estimations in which the absolute value of all objective function t-ratios ≤ .1. Table 3 presents the objective function parameter estimates that were included in the final multivariate model (rate functions were estimated in the model but omitted from the table for simplicity).

Network dynamics. In order to control for factors which have been shown to influence friendship selection processes, four basic network parameters were examined: *outdegree*, *reciprocity*, *transitive triplets* and *3-cycles*. All of these network effects were significant, highlighting the importance of including them in the model (see upper section of Table 3). The negative outdegree effect indicates that the overall tendency for adolescents to form friendships with others in the network was low, that is, girls were selective about who they made friends with. This is consistent with the low average density values (Table 1) and signifies that the pattern of friendship ties in the networks was quite sparse. The reciprocity effect was positive, indicating that adolescents tended to form reciprocated friendships.

Transitivity refers to the phenomenon that friendships in social networks are more likely to form between two people when they share a common friend. The ability for SIENA to account for triadic relationships rather than just examining dyadic effects is a key improvement to past methodologies (Veenstra & Steglich, 2011). Two measures of transitivity were included in the model. The positive transitive triplets effect suggests that adolescents tended to form relationships with their friends' friends, while the negative 3-cycles effect indicates that there were few 3-cycles within the network (i.e., for actors *i*, *j* and *h*, unreciprocated ties exist for $i \rightarrow j$, $j \rightarrow h$, and $h \rightarrow i$). Together these transitivity effects show that there was a strong hierarchical tendency in the network. The strength and direction of the four network parameters were in line with those typically found in adolescent networks (Snijders, et al., 2010). Although significant variance estimates signalled that the size of these effects varied across individual school networks, an examination of these values within each network revealed all four effects were consistently significant and in the same direction for each of the nine schools.

Three selection parameters (*ego*, *alter* and *similarity*) were included for body dissatisfaction, dieting and bulimic symptoms and each of the four covariates. Ego effects are an indication of how active an individual is in the network, with higher values indicating a greater tendency to nominate friends. Alter effects are a measure of popularity, with higher values indicating that the individual receives more nominations. Similarity effects are a measure of homophilic selection, that is, to what extent individuals select friends based on pre-existing similarities. Higher values indicate that ties are formed more often between individuals with similar attitudes or behaviours.

Table 3

Parameter and Variance Estimates from the Multivariate Network and Behaviour Co-Evolution Model

Parameter	Estimate	SE	Variance
Network Dynamics			
Outdegree	-2.463***	.09	.23†
Reciprocity	2.327***	.06	.13†
Transitive triplets	0.285***	.03	.09†
3-cycles	-0.296***	.03	.08†
BD alter	-0.002	.02	.03
BD ego	0.008	.01	.02
BD similarity (selection)	0.406***	.15	.37†
DT alter	-0.105***	.03	.05†
DT ego	-0.054*	.03	< .001
DT similarity (selection)	-0.390***	.13	.19
BB alter	0.084***	.04	.10†
BB ego	0.042	.02	< .001
BB similarity (selection)	1.284***	.25	.50†
Age alter	-0.020	.02	< .001
Age ego	-0.054***	.04	.08†
Age similarity (selection)	-0.030	.05	< .001
BMI alter	0.014***	.01	.03†
BMI ego	0.007	.01	.01
BMI similarity (selection)	0.069	.08	.13†
NA alter	-0.009	.01	< .001
NA ego	0.024**	.02	.04
NA similarity (selection)	-0.106**	.07	.14†
SE alter	-0.016	.01	< .001
SE ego	0.010	.01	< .001
SE similarity (selection)	-0.083	.08	.15†

Behaviour Dynamics			
Body Dissatisfaction			
Linear shape	0.044	.07	< .001
Quadratic shape	0.001	.02	< .001
Average similarity (socialisation)	1.405	1.00	< .001
DT adolescent	0.064	.04	< .001
BB adolescent	-0.014	.03	< .001
Age adolescent	0.083	.03	< .001
BMI adolescent	0.024**	.01	.01
NA adolescent	0.017	.02	< .001
SE adolescent	-0.016	.03	.06
Dieting			
Linear shape	-0.451***	.11	< .001
Quadratic shape	-0.102	.09	< .001
Average similarity (socialisation)	0.407	1.29	< .001
BD adolescent	0.162***	.04	< .001
BB adolescent	0.066	.06	< .001
Age adolescent	0.136	.09	.14
BMI adolescent	0.034	.02	< .001
NA adolescent	0.045	.05	< .001
SE adolescent	0.075	.05	< .001
Bulimic Behaviours			
Linear shape	-0.389***	.08	.10
Quadratic shape	-0.034	.03	< .001
Average similarity (socialisation)	1.378	1.08	< .001
BD adolescent	0.093***	.03	< .001
DT adolescent	0.044	.05	< .001
Age adolescent	0.082**	.04	< .001
BMI adolescent	-0.023	.01	< .001
NA adolescent	0.114***	.03	.06
SE adolescent	-0.026	.03	< .001

Note. BB = Bulimic Behaviours; BD = Body Dissatisfaction; DT = Dieting; BMI = Body Mass Index; NA = Negative Affect; SE = Self-Esteem. Variance refers to the estimated between-school standard deviation.
* $p < .025$, ** $p < .01$, *** $p < .001$ (two-sided), † significant differences between school networks (one-sided).

Significant ego effects indicated that younger adolescents with lower levels of dieting and higher levels of negative affect tended to nominate more friends (i.e., they were more active in the network), while significant alter effects suggested that adolescents who had higher BMIs and engaged in more bulimic, but less dieting, behaviours tended to receive more friendship nominations (i.e. they were more attractive as friends). Significant, positive similarity effects indicated that adolescents preferred to select friends who were similar to themselves in terms of body dissatisfaction and bulimic symptoms, while the negative dieting and negative affect similarity effects suggest that adolescents who were similar on these two domains were less likely to select one another as friends.

Although this overall pattern of findings was significant across the nine school networks when examined together, significant variance estimates indicated that there were differences between individual school networks. However, close examination of the parameters within each network revealed that the majority of individual school network effects were consistent with the overall pattern of reported effects, while effects that did differ were not significant. This suggests that the importance of various individual attributes to friendship formation is not necessarily common to all adolescent social networks, but rather individual networks have particular rules that govern friend selection processes.

Behaviour dynamics. Linear and quadratic shape parameters were included in the models to examine whether there were general tendencies toward higher or lower scores on any of the dependent variables (see Table 3). The significant negative linear effects for both dieting and bulimic behaviours indicated that adolescents tended to obtain low scores on these measures, which is typical in a non-clinical sample. Conversely, there was no significant tendency towards higher or lower values for body dissatisfaction, suggesting a wider distribution of scores. None of the quadratic shape parameters were significant, indicating that there was no overall tendency towards central or extreme scores on any of the dependent variables. Estimates for the linear and quadratic shape parameters were consistent across the

different school networks. Both shape effects were included in the model to account for the distribution of each behaviour (Snijders et al., 2010).

Average similarity effects refer to the tendency for adolescents to change their attitudes and behaviours to be more in line with their friends' attitudes and behaviours over time (i.e. socialisation). In order to avoid overestimating these socialisation effects, the influence of the covariates on behaviour change was controlled in the model. None of the average similarity effects for any of the dependent variables were significant (see lower section of Table 3), indicating that there was no overall tendency for adolescents' body dissatisfaction, dieting or bulimic behaviours to become more similar to that of their friends over time. Instead, changes in these variables were better explained by the shape effects and several ego adolescent attributes. Girls with a higher BMI were more likely to demonstrate increases in body dissatisfaction over time, while increases in dieting were associated with higher body dissatisfaction. Additionally, there was a tendency for older girls with higher levels of body dissatisfaction and negative affect to experience increases in bulimic behaviours. The behaviour dynamics estimates were consistent across the nine networks (all variance estimate *p*s > 0.05) indicating that this pattern of results was relatively universal across schools.

Discussion

The current study aimed to elucidate the way in which the peer environment contributes to adolescent girls' body dissatisfaction, dieting and bulimic behaviours by examining the underlying processes that may contribute to friendship group homophily. As anticipated, girls selected friends who were similar to themselves in their level of body dissatisfaction and bulimic behaviours. In contrast, girls tended to choose friends who were significantly different from themselves in terms of dieting behaviour, with girls who dieted a lot tending to befriend girls who did not diet much (and vice versa). These results therefore give partial support to the first hypothesis.

In addition to pre-existing body dissatisfaction and bulimic behaviour similarity, network effects (such as reciprocity and transitivity) were also important in predicting adolescents' friendship selection. In other words, girls were more likely to form reciprocated than one-sided friendships and tended to become friends with their friends' friends. Additionally, girls with higher levels of bulimic behaviours and higher BMIs, but lower levels of dieting received more friendship nominations; while younger adolescents with lower levels of dieting and greater negative affect made more friendship nominations (even after controlling for other covariates). Interestingly, girls tended to choose friends who had dissimilar levels of negative affect to themselves.

Counter to the second hypothesis, none of the socialisation effects were significant when selection effects were also taken into account. That is, adolescents did not become more similar to their friends in their levels of body dissatisfaction, dieting or bulimic tendencies over time. Rather, changes in the dependent variables were predicted by several individual attributes. Specifically, having a greater BMI predicted increases in body dissatisfaction, having higher body dissatisfaction predicted increases in dieting, and being older and having higher body dissatisfaction and negative affect predicted increases in bulimic behaviours. These relationships are consistent with theoretical models of the development of body dissatisfaction and disordered eating (Ricciardelli & McCabe, 2001; Stice, 2001) and previous empirical studies (e.g., Jones, 2004; Stice, 2002).

Therefore, the results of the current study indicate that when examined simultaneously, selection but not socialisation processes were important in explaining similarity of body dissatisfaction and bulimic behaviours within adolescent girls' friendship groups. These findings conflict with those found previously in self-selected groups of college students (Crandall, 1988; Zalta & Keel, 2006). This may be due to developmental differences in the way in which these homophilic processes occur, or may reflect the different statistical methodologies used. The current study took a more conservative approach than past studies

by simultaneously examining selection and socialisation effects for multiple dependent variables, as well as controlling for several additional risk factors. Given that past research with adolescent samples rarely accounts for selection processes, it may be that the contribution of socialisation processes to homphily of body image and eating disturbances in friendship groups has been previously overestimated. In contrast, there was no evidence for either selection or socialisation processes occurring for dieting. In fact, girls tended to befriend those who were dissimilar to themselves in how much they dieted and did not change their dieting to be more in line with their friends' eating behaviour over time. These findings were unexpected and conflict with past studies that have found that adolescent girls tend to resemble their friends in how much they diet (e.g., Paxton, et al., 1999; Woelders, et al., 2010). It is unclear why girls in the current sample would have preferred to form friendships with those who were different to themselves in terms of dieting. One possible explanation may be that girls who diet more often also value thinness more highly and are therefore attracted to other girls who conform to the "thin ideal" and do not themselves need to diet. Alternatively, this may be a spurious finding that is best explained by unobserved factors that are associated with dieting, such as certain personality features. It is possible that the low levels of dieting in the current sample may have contributed to the lack of evidence of socialisation of this behaviour.

The current results have important methodological and clinical implications. In order to make accurate assessments about peer influence, future studies should examine multifactorial models that include both selection and socialisation effects, while controlling for other network and individual variables which may play a role in the homophilic processes. Combined with previous literature, the results of the present study also highlight the importance of taking the peer environment into account when preventing and treating adolescent girls' body image concerns and unhealthy weight loss behaviours. Prevention and intervention efforts that fail to address the role of friends and peers in these issues are likely to

be less effective. Girls who receive individual treatment for body image and eating pathology may be more at risk of relapse if they remain embedded in a peer environment in which the importance of body image and weight loss remain at a heightened level. The results also point to the potential usefulness of generalised prevention programs that target all adolescent girls in addition to indicated prevention programs for those who have already developed disordered body image and eating.

This study makes an important and novel contribution to the existing literature through its use of innovative and sophisticated social network analyses to examine the way in which adolescent girls' friendship networks and individual body image and eating disturbances co-evolved over two years. Additionally, factors that have been shown to be consistent predictors of body dissatisfaction and disordered eating were controlled to reduce the possibility of overestimating the impact of peer socialisation. Network effects were also included in the models to provide alternative explanations for adolescents' selection of friends. Future studies could extend on this work by including other potentially important factors such as ethnicity, academic achievement, internalization of the thin ideal, and personality factors such as perfectionism and impulsivity. Other aspects of the social network, such as friendship quality and social status, could also be examined in more detail. A further strength of the current study is that friends' body image attitudes and eating behaviours were obtained via peer-report rather than self-reported perceptions, ensuring that friendship group similarity was not exaggerated by the false consensus effect. While continuous measures of disordered eating do not allow for diagnostic categories to be determined, they are valuable when examining risk for psychopathology as they capture the variability of behaviours that are common in the general population (Center for Disease Control, 2008).

Although the current study addressed many shortcomings of earlier research, there were some limitations which should be acknowledged. This study focused on the way in which adolescent girls' school-based friendship group is implicated in the development and

maintenance of body image and eating issues. However, adolescent peer relations are complex and multifaceted, with different types of relationship (e.g., best friends, cliques, crowds and acquaintances) co-existing in an intertwined and overlapping way (Urberg, Degirmencioglu, Tolson, & Halliday-Scher, 1995). Therefore, depending on which type of friends participants are asked to nominate, different patterns of selection and influence effects may emerge. As this study did not distinguish between the roles of best friends compared to other members of the friendship group, it is unclear whether one may be more important than the other in the current context. Furthermore, while school and grade represent a useful boundary for the analysis of adolescent peer networks, other potentially important friendships may be excluded. Our understanding of peer selection and socialisation processes is likely to benefit from future studies which delineate and compare findings across different types of adolescent peer relationships.

Another limitation of the current study is that it focused exclusively on adolescent girls. While this approach is justified by the fact that females continue to vastly outnumber males in terms of experiencing body dissatisfaction, use of extreme weight loss behaviours and development of eating disorders (Striegel-Moore & Bulik, 2007), recent empirical evidence suggests that peers also affect the way male adolescents feel about their body and their use of body change strategies (Rancourt & Prinstein, 2010; Ricciardelli & McCabe, 2001). Thus future studies should examine whether weight and shape related attitudes and behaviours play a role in the selection and socialisation of friends among male adolescents. Future work could also investigate whether these analyses produce similar results in a sample of adolescents drawn from co-educational schools. Although friendships in early to mid-adolescence are predominantly formed between same-sex individuals, the presence of males in friendship groups and in the broader school network may attenuate or exacerbate selection and socialisation processes.

The current findings pose some interesting questions that require further research. For instance, are body dissatisfaction and disordered eating salient markers for adolescent friend selection in themselves, or are these results actually attributable to other factors that are associated with these variables (such as certain personality factors)? Is peer socialisation more likely to occur at different levels of peer relationships, or within a particular subset of girls who are more vulnerable to peer influences than others? Further, what factors explain differences in the strength and significance of effects across different school networks?

Unfortunately, body image concerns and unhealthy weight control behaviours continue to be commonplace among adolescent girls. Given the importance of the peer environment in adolescent development (in relation to both general development and the uptake of specific health risk behaviours), investigating the role of friendships and other peer relations is an essential task in obtaining a clear understanding of how these issues develop and are maintained. The current study makes an important contribution to the existing literature by teasing out the selection and socialisation processes that contribute to friendship group similarity of body image and eating concerns. Overall, the results indicated that peer selection contributed to homophily of body dissatisfaction and bulimic tendencies, while socialisation did not account for friendship group similarity over and above selection effects. These findings represent important building blocks in facilitating the formation of more effective prevention and intervention strategies.

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CHAPTER FOUR

The influence of peer norms on the effects of thin-ideal media images in adolescent girls

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Abstract

Although sociocultural risk factors for the development of body image concerns have previously received extensive attention, the way in which these factors may interact with one another to attenuate or amplify risk has been largely ignored. Accordingly, the current study investigated whether peer norms influenced the way in which adolescent girls responded to thin-ideal media images. In an online experiment, 205 adolescent girls were randomly assigned to one of three conditions: peer rejection of the thin-ideal, peer endorsement of the thin-ideal, or a control group (no peer information). Participants viewed six thin-ideal images along with the normative peer information. State body dissatisfaction and negative mood were measured immediately before and after viewing images. Results showed that, overall, peer norms did not influence girls' responses to the images. However, there was some evidence that age affected adolescents' susceptibility to peer norms, with younger adolescents (13-15 years) demonstrating lower post-exposure body dissatisfaction than older adolescents (16-18 years) in the peer rejection condition. The findings support the idea that there are developmental differences in the strength of peer influences on adolescent body image.

Body image concerns and disordered eating are common in adolescent girls in Westernised societies and are predictive of a host of adverse consequences, including depression, anxiety, eating disorders and obesity (Johnson & Wardle, 2005; Stice, 2002; Stice & Shaw, 2002). It is therefore imperative that risk factors that are amenable to change through prevention and intervention strategies are identified. Dominant aetiological models purport that sociocultural factors are central to the development and maintenance of body image and eating problems (e.g., Stice & Agras, 1998; Thompson, Heinberg, Altabe, & Tanteleff-Dunn, 1999). These models propose that social forces, including the media, peers and family, propagate and reinforce an unrealistic thin-ideal of female beauty. Perceived discrepancies between the ideal and one's own appearance produce feelings of body dissatisfaction, which motivate individuals to attempt to modify their body size and shape to be closer to the ideal. Body change strategies vary from healthy eating and exercise, to more extreme or unhealthy behaviours, such as fasting, purging, laxative abuse and cosmetic surgery. Sociocultural models have received extensive support from empirical studies (e.g., Cafri, Yamamiya, Brannick, & Thompson, 2005; Jones, 2004; Shomaker & Furman, 2009; Stice, 2001, 2002).

The role of peers in the development of body disatisfaction and disordered eating has been the focus of numerous investigations in recent times. Although there has been an over-reliance on cross-sectional research designs, several longitudinal studies have lent further credence to the notion that peer influences (both perceived and actual) are important contributers to how adolescent girls feel about their body and their use of unhealthy weightloss strategies (e.g., Blodgett Salafia & Gondoli, 2011; Jones, 2004; McCabe & Ricciardelli, 2005; Rayner, Schniering, Rapee, Taylor, & Hutchinson, in press). While empirical examinations of the peer environment represent an important step forward in understanding the development of body image and eating concerns, studies which examine the way in which peers and other sociocultural influences may interact are lacking. Rather, research has tended to examine peer factors as operating in parallel to other factors (Park,

Yun, McSweeney, & Gunther, 2007). In reality, the way in which these factors contribute to adolescent girls' body image and eating behaviours are likely to be intertwined. The confluence of peers and the media is likely to be particularly important during adolescence as exposure to both socialising agents increase during this developmental stage (Clark & Tiggemann, 2006; Larson & Richards, 1991).

Of all the sociocultural influences proposed to contribute to body dissatisfaction and unhealthy attitudes towards eating, the media have received the most attention in the literature (Ferguson, Winegard, & Winegard, 2011). Experimental studies have found that exposure to images of women who conform to the thin-ideal produces adverse changes in state body dissatisfaction and mood in adolescent girls (e.g., Bell, Lawton, & Dittmar, 2007; Clay, Vignoles, & Dittmar, 2005; Durkin & Paxton, 2002). Although this effect is small (approximately d = -.30), meta-analytic studies have shown that it is robust and stronger for adolescent girls than adult women (Grabe, Ward, & Hyde, 2008; Groesz, Levine, & Murnen, 2002). Further, for vulnerable teenage girls, exposure to thin-ideal media images longitudinally predicts increased body dissatisfaction, drive for thinness, negative affect and disordered eating up to two years later (Hargreaves & Tiggemann, 2003; Stice, Spangler, & Agras, 2001). Vulnerability to the negative impact of thin-ideal media appears to be moderated by several individual characteristics, including pre-existing body dissatisfaction and thin-ideal internalisation (Brown & Dittmar, 2005; Durkin & Paxton, 2002; Groesz et al., 2002; Heinberg & Thompson, 1995), body mass index (Shaw, 1995), investment in body image (Hargreaves & Tiggemann, 2004), body comparison tendency (Durkin & Paxton, 2002), and self-esteem (David & Johnson, 1998; Jones & Buckingham, 2005).

While studies of the impact of media on body image and mood show a heavy reliance on experimental designs, the dearth of experimental studies represents a notable gap in the peer influence literature. Moreover, no experimental studies to-date have examined the influence of peers using an adolescent sample. Experimental designs are valuable because

specific variables of interest can be manipulated in order to establish causality. Furthermore, they have the advantage of controlling for the possibility that those who are more dissatisfied with their bodies are more likely to seek out thin-ideal media.

Investigating the confluence of the peer environment and thin-ideal media is important, as prior research has shown that individuals do not interpret media images in a vacuum but are influenced by their perceptions of how others interpret media images (Gunther & Storey, 2003). In an intriguing qualitative study, Milkie (1999) found that although adolescent girls viewed thin-ideal images as unrealistic and unattainable, they believed that other teenage girls were unduly influenced by the images because they accepted them uncritically. The extent to which others were perceived to idealise media images increased with social distance, such that close friends were not thought to be overly swayed by the thin-ideal, while other girls at school and at a national level were believed to value such an appearance. Of primary concern, was that even when adolescent girls did not believe media images to be realistic, they still desired to look like the depicted models due to the perceived impact of the images on others. This process, by which individuals perceive others as being more influenced by media than themselves, yet change their own attitudes or behaviours as a result of this perception, is known as the influence of presumed influence (Gunther & Storey, 2003) and has also been observed in adult women (Choi, Leshner, & Choi, 2008; Park, 2005).

The implications of these studies are two-fold. First, it is important to consider different "levels" of peer relationships. Previous research has tended to focus on peer influence at the immediate friendship level (e.g., dyads or cliques). However, it may be that societal or more macro-levels of the peer enviroment are also important in contributing to girls' body related attitudes. Secondly, adolescents' perceptions of peers' attitudes towards media images may serve as an indirect form of influence that promotes body dissatisfaction and ultimately, unhealthy weight control behaviours (Levine & Murnen, 2009). Accordingly, if adolescents

perceived their peers as being critical of media images and rejecting the thin-ideal as desirable and attainable, this may reduce risk for body image concerns (Milkie, 1999).

The idea that the adverse effects of exposure to thin-ideal media may be attenuated by challenging perceptions of peer norms was recently tested in a sample of female college students (Strahan, Spencer, & Zanna, 2007). It was found that women who were told that their peers did not endorse the thin-ideal demonstrated less restrained eating following exposure to thin-ideal commercials compared to women who saw the commercials but did not receive any peer information. Furthermore, those who were told that their peers were critical of the thin models ate the same amount as those in the non-appearance commercial condition, suggesting that the adverse effect of thin-ideal media was completely attenuated by the peer information. Given the importance of peer norms in guiding attitudes and behaviour during adolescence, it is important to test whether these effects also occur in an adolescent sample. Additionally, it would be valuable to investigate whether overt peer endorsement of the thin-ideal may actually intensify the impact of thin-ideal images on state functioning.

It is also important to consider individual variables that may make adolescent girls more or less susceptible to peer norms. Studies investigating factors that moderate adolescents' tendency to be influenced by their peers are sparse, however, there are at least two factors that have obtained some empirical support. First, conformity to peer influence and the importance placed on being part of a peer group is greater during early to mid-adolescence compared to pre- and late adolescence, suggesting that younger adolescents will be more sensitive to peer judgments in order to detect threats to their group membership (Gavin & Furman, 1989; Steinberg & Monahan, 2007). Significant developmental differences exist between early-mid and mid-late adolescence, including pubertal development, orientation towards peers, development of romantic relationships, identity formation and autonomy (for reviews see: Smetana, Campione-Barr, & Metzger, 2006; Steinberg & Morris, 2001). Further, having friends that diet has been shown to prospectively predict increases in girls' body

dissatisfaction across early to mid-adolescence, but not during mid to late adolescence, suggesting that the impact of peer influences varies across different developmental stages (Paxton, Eisenberg, & Neumark-Sztainer, 2006). Second, adolescents with lower self-esteem are more likely to conform to peers (Bukowski, Velasquez, & Brendgen, 2008). Self-esteem has been conceptualised as an "interpersonal monitor" that provides people with a sense of how much they are being included or excluded by others (Leary, Tambor, Terdal, & Downs, 1995). Accordingly, people with low self-esteem will feel less socially connected and consequently be motivated to change aspects of themselves in order to increase their sense of social inclusion (Bukowski et al., 2008). Therefore, adolescents who are younger or have low self-esteem may be most likely to look to their peers to determine their own attitudes and behaviours. However, this hypothesis has not been tested with body image as an outcome variable.

In summary, past research has shown that peers are important in the development and maintenance of body image concerns and eating problems in adolescent girls. However, much of this research has focused on peers as operating in parallel with other sociocultural risk factors and has ignored their potential interaction. Further, past studies have tended to conceptualise peers as being close friends, rather than considering the influence of the broader peer environment. Although there is some evidence that challenging perceptions of peer norms may attenuate the effect of other sociocultral influences (i.e. thin-ideal media images) in adult women, this is yet to be tested in an adolescent sample.

Thus, the first aim of the current study was to investigate whether peer norms regarding thin-ideal images influence the effect that these images have on adolescent girls' state body dissatisfaction and mood. The study utilised an experimental research design, extending the methodology used by Strahan et al. (2007). It was firstly hypothesised that adolescent girls who believed that their peers rejected the thin-ideal would experience a smaller increase in state body dissatisfaction and negative mood following exposure to thin-ideal images

compared to girls who were not given any normative peer information (control condition). Secondly, it was hypothesised that adolescent girls who believed that their peers endorsed the thin-ideal would experience a greater increase in body dissatisfaction and negative mood following exposure to thin-ideal images compared to those in the control condition. The second study aim was to examine whether the influence of peer norms on the negative effects of thin image exposure would differ as a function of age or self-esteem. It was hypothesised that differences in post-exposure body dissatisfaction and mood between the experimental and control conditions would be most pronounced for younger adolescents and those with lower self-esteem.

Method

Participants

Participants were recruited via advertisements posted in local school newsletters, on youth websites, and on online social media networks. To be eligible to take part in the study, participants had to be female, between the ages of 13-18 years and living in Australia. All participants were given the opportunity to enter a prize draw to win one of 10 personal music devices. Four hundred and thirteen individuals started the questionnaires; however, only 214 completed the experiment. Eight male respondents were excluded and one participant did not re-consent to their data being used in the analyses following debriefing, resulting in a final sample of 205 female adolescents.

Participants' ages ranged from 13 to 18 years, with a mean age of 14.7 years (*SD* = 1.31). Respondents were distributed unevenly across school grades, with the highest number of participants in grades 8 (23.9%), 9 (22.4%) and 10 (21.5%), and fewer numbers in grades 11 (14.6%), 12 (9.8%) and 7 (7.3%). The largest percentage of participants attended public schools (49.3%), followed by private (30.7%) and Catholic schools (16.1%), while a small percentage received distance education (2.4%) or were home schooled (1.0%). The majority of participants were born in Australia (90.7%), while 2.5% were born in the United Kingdom,

2.5% in Europe, 2.5% in Asia, 1.0% in New Zealand and 1.0% in South Africa. Most parents were also born in Australia (mothers: 63.9%, fathers: 69.8%), while 23.8% were born in Asia, 15.2% in the United Kingdom, 8.1% in Europe, 7.1% in Africa, 4.8% in New Zealand, 3.3% in the Middle East, and 2.4% in the USA. The main language spoken at home was English for 93.2% of participants. Families tended to be highly educated, with 40% of parents having a university degree, 26% having some education after high school and 32% being high school graduates. The distribution of participants' body weight status was reflective of that of adolescents in the general Australian population (3.4% underweight, 73.7% healthy weight, 16.1% overweight and 5.4% obese; Australian Bureau of Statistics, 2008).

Materials

Thin-ideal images. In a pilot study, 30 images depicting thin and attractive young women were selected by the first author from an online image database (Dreamstime.com). All images displayed women in 3/4 to full body shots and wearing figure-revealing clothing. Pictures of adult women were chosen as research has shown that both adolescents and adults respond more to these images than images of adolescent models (Shaw, 1995). A sample of 13 female postgraduate psychology students (age M = 30 years, SD = 5.41) and two female adolescents (aged 13 and 16) were asked to rate each image on a 10-point scale on four domains: (1) attractiveness, (2) thinness, (3) appeal to adolescent girls and (4) resemblance to images typically seen in magazines aimed at adolescent girls. The images were presented in a randomised order to avoid biases in responding. The six images that obtained the highest ratings on both attractiveness ($M \geq 8.2$) and thinness ($M \geq 7.7$) were selected for inclusion in the main study. All of the selected images were also rated highly on their appeal to teenage girls ($M \geq 7.7$) and typicality of images seen in female teen magazines ($M \geq 7.4$).

Measures

State body dissatisfaction and mood. Seven visual analogue scales (VAS) were used to measure state body dissatisfaction and mood immediately before and after the experimental

manipulation. Participants were asked to indicate how they felt “right now” by clicking and dragging a marker across seven 100-point horizontal lines. Following previous experimental thin-ideal media studies (e.g., Heinberg & Thompson, 1995; Tiggemann & McGill, 2004), five VAS items assessed mood: “happy”, “confident”, “worried”, “depressed (unhappy)” and “angry” and two items assessed body dissatisfaction: “dissatisfied (unhappy) with your body weight and shape” and “dissatisfied (unhappy) with your overall appearance”. The endpoints of each VAS were labelled “Not at all” and “Very much” and the lines were unmarked so that participants could not easily recall their pre-exposure responses.

VAS are commonly used in thin-ideal image exposure experiments (e.g., Heinberg & Thompson, 1995) and are well-suited for use in this type of research as they are easily understood, quick to complete and sensitive to state changes over short time frames (McCormack, Horne, & Sheather, 1988). Body dissatisfaction and mood VAS have been shown to be reliable and have demonstrated good convergent validity with longer measures (Birkeland et al., 2005; Durkin & Paxton, 2002; Heinberg & Thompson, 1995).

Significant intercorrelations were found between the five mood VAS items (all rs > .25, ps < 0.001), which were averaged to obtain an overall score for negative mood (with “happy” and “confident” reverse scored). The two body dissatisfaction VAS items were also highly correlated ($r = .70$, $p < 0.001$) and were combined to form a single body dissatisfaction score. The internal reliabilities of the overall negative mood ($\alpha = .80$) and body dissatisfaction variables ($\alpha = .88$) were satisfactory and comparable to those obtained in previous research (e.g., Harper & Tiggemann, 2008). As the VAS were administered online, ratings were precise and did not require an assessment of inter-rater reliability.

Self-Esteem. Global self-esteem was assessed by the Rosenberg Self-Esteem scale (RSE; Rosenberg, 1965). Reponses were rated on a 4-point Likert scale ranging from 1 (*strongly agree*) to 4 (*strongly disagree*). The RSE has demonstrated good internal reliability

and convergent validity with adolescent samples (Robins, Hendin, & Trzesniewski, 2001; Wylie, 1989). In the current sample, internal consistency of the RSE was .91.

Thin-ideal internalisation. The 9-item Internalisation-General subscale from the Sociocultural Attitudes Towards Appearance Questionnaire – 3 (SATAQ-3; Thompson, van den Berg, Roehrig, Guarda, & Heinberg, 2004) was used to assess the extent to which participants idealise and compare their appearance to models and media stars[2]. Participants rated their responses to statements such as "I would like my body to look like the models who appear in magazines" on a 5-point Likert scale ranging from *definitely disagree* (1) to *definitely agree* (5). This subscale has demonstrated excellent internal reliability and convergent validity in college samples (Thompson et al., 2004) and has also shown to be reliable in adolescent samples (Heinicke, Paxton, McLean, & Wertheim, 2007; Petrie, Greenleaf, & Martin, 2010). In the current sample, Cronbach's alpha was .94.

Body Image Investment. The 20-item Appearance Schemas Inventory – Revised (ASI-R; Cash, Melnyk, & Hrabosky, 2004) was used to measure the extent to which participants were invested in their physical appearance. The ASI-R consists of two subscales: (1) self-evaluative salience (12 items), which assesses how important appearance is in determining an individual's sense of self and self worth, and (2) motivational salience (8 items), which assesses the importance placed on being attractive and appearance management. Self-evaluative salience is considered to be more maladaptive than motivational salience. The ASI-R has demonstrated good convergent and predictive validity (e.g., Cash et al., 2004; Melnyk, Cash, & Janda, 2004), as well as internal and test-retest reliability (Cash & Grasso, 2005) in samples that include older adolescents. Cronbach's alpha for the scale in the present sample was .92.

[2] Given that the SATAQ-3 includes items that assess degree of social comparison (e.g., "I compare my body to the bodies of people who appear in magazines") and that this scale has previously been found to be highly correlated with separate measures of social comparison (Hargreaves & Tiggemann, 2004), a separate measure of social comparisons was not included in this study.

Depression. Depressive symptoms were assessed using the Centre for Epidemiologic Studies Depression Scale for Children (CES-DC; Weissman, Orvaschel, & Padian, 1980). Participants were asked to rate their responses to 20 statements about their cognitive, behavioural and emotional functioning over the past week on a 4-point scale (0 = “not at all”, 1 = “a little”, 2 = “some”, 3 = “a lot”). Positively worded items were reverse scored. The CDES-C has demonstrated good psychometric properties for adolescents (Faulstich, Carey, Ruggiero, Enyart, & Gresham, 1986). In the current sample, Cronbach’s $\alpha = .94$.

Body Mass Index. Participants’ self-reported height (m) and weight (kg) were used to calculate their body mass index (BMI = kg/m^2). Previous research has shown that BMI based on self-reported height and weight is a valid indicator of actual BMI (e.g., Field et al., 2001).

Procedure and Exposure Conditions

The study was advertised and presented as an investigation into the link between adolescent girls’ personality and attitudes towards advertising images. This cover story was used in order to reduce potential demand characteristics and ensure that participants interpreted the normative peer information as genuine. The experiment was conducted online using the survey software Qualtrics. Following the advertised URL, participants logged into the online study portal and were presented with the information and consent form. They first completed demographic (including height and weight), self-esteem, thin-ideal internalisation, body image investment, and depression questionnaires, followed by the pre-exposure state body dissatisfaction and mood VAS.

Participants were then randomly allocated to one of the three experimental conditions (1) peer rejection of the thin-ideal, (2) peer endorsement of the thin-ideal, 3) no normative peer information (control). Before viewing the images, all participants were told: “You will now be shown six images. We are interested to see how eye-catching and successful you think each image would be if it were used in an advertisement. Because it is important that advertising images are also memorable (i.e. you remember them), you will also be asked a

few questions after you have seen all of the images to see what you remember." Following Strahan et al. (2007), participants in the two experimental conditions were further informed that as people often look at advertising images mindlessly, the researchers also wanted to see whether knowing how other people responded to the images would affect how much people remembered about them. These participants were told that the images had recently been shown to other teenage girls around Australia and that they would be shown a summary of the other girls' responses before being asked for their own opinions. In order to increase the salience and relevance of the peer reference group, the instructions were set up such that the group of other girls were the same age as the responding adolescent.

The participants were shown each of the six thin-ideal images one at a time, in a randomised order to control for potential order effects. In the two experimental conditions, a bar chart was displayed next to each image, showing the level of "other" girls' agreement with four statements (see Figure 1). In the peer rejection condition, participants saw a graph in which most other girls believed that, "This model is too thin" and "It is unrealistic to think that most girls could get a body like this in real life". In the peer endorsement condition, the graph indicated that most other girls believed that, "This model has an attractive body" and "Most girls could get a body like this in real life if they tried hard enough". Two additional items were included in the graph to help support the cover story with peers' opinions held constant across the experimental conditions ("This image would suit an advertisement for make-up" and "This image would suit an advertisement for an mp3 player"). Participants in the control condition saw only the thin-ideal images without any additional peer information.

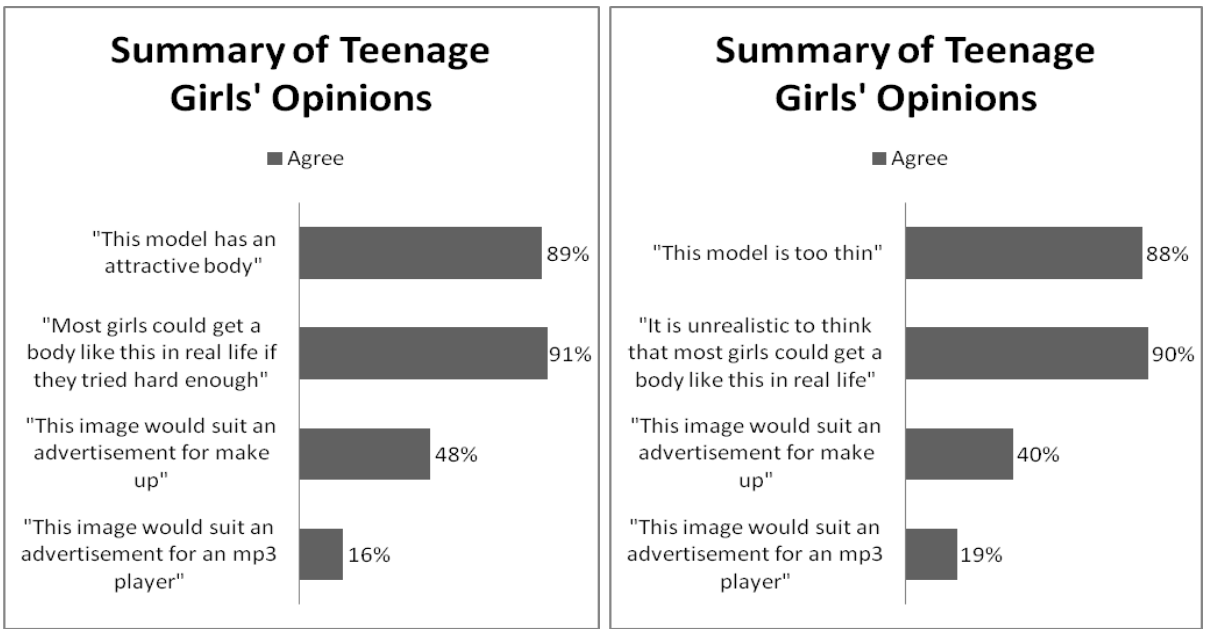

Figure 1. Examples of normative peer information from the peer endorsement (left) and peer rejection (right) of the thin-ideal experimental conditions.

In order to support the cover story and ensure adequate time was spent processing the images, all participants were asked to respond to four items about the style and general appeal of each image (Tiggemann & McGill, 2004). These items were: (1) The style of this image appeals to me, (2) This image would catch my attention if I was flipping through a magazine, (3) This image is creative, and (4) I would buy a magazine if this image was on the front cover. Participants rated their responses on a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5). These data were not included in the analyses.

Following exposure to the images and normative peer information, participants re-completed the body dissatisfaction and mood VAS. A manipulation check was conducted for those allocated to the experimental conditions, with participants asked to indicate whether their peers' opinions had been mostly positive (they thought the models looked good), negative (they thought the models did not look good) or neutral (they neither liked nor disliked the images). All participants were then asked what they thought the aim of the study was, before being debriefed in writing and asked to re-consent to their data being used. None

of the participants guessed the true aims of the study. Finally, participants were given the opportunity to enter a prize draw to win one of 10 personal music devices. Ethics approval for the study was obtained from the University Human Research Ethics Committee.

Results

Descriptive statistics and correlations between the predictor and dependent variables are presented in Table 1. All of the covariates significantly correlated with post-exposure levels of body dissatisfaction and negative mood, except BMI, which was significantly associated with body dissatisfaction only. In support of the randomisation process, there were no significant differences between the three experimental groups on any of the predictor variables (all *p*s > .05).

Table 1

Means, Standard Deviations and Correlations of the Study Variables

	1	2	3	4	5	6	7	8	9
1. Body mass index	-								
2. Self-esteem	-.19**	-							
3. Thin-ideal internalisation	.07	-.42**	-						
4. Body image investment	.01	-.48**	.72**	-					
5. Depressive symptoms	.17*	-.75**	.44**	.44**	-				
6. Pre-exposure mood	.10	-.69**	.42**	.43**	.83**	-			
7. Pre-exposure BD	.27**	-.64**	.66**	.65**	.53**	.51**	-		
8. Post-exposure mood	.12	-.72**	.44**	.45**	.81**	.88**	.55**	-	
9. Post-exposure BD	.28**	-.59**	.65**	.63**	.50**	.49**	.91**	.59**	-
M	21.45	25.28	31.57	3.84	28.30	42.08	54.80	43.30	57.18
SD	3.94	6.56	9.60	0.68	15.11	22.45	35.36	23.46	36.85
Possible range	-	10 - 40	9 - 45	1 - 5	0 - 60	0 - 100	0 - 100	0 - 100	0 - 100

Note. BD = body dissatisfaction.

* $p < .05$

** $p < .01$

Manipulation check

Results indicated that the experimental manipulation was largely successfully in the peer endorsement of the thin-ideal condition, with 91% of participants rating peer opinions about the images as being positive (7.5% rated peer feedback as neutral and 1.5% rated feedback as being negative). However, the peer rejection condition was less successful; with only 62% of participants correctly identifying that the normative peer information had been negative (25% rated the peer information as neutral while 13% rated it as positive). The association between experimental group and whether or not participants correctly identified the valance of peer norms was statistically significant, $\chi^2(1) = 18.08$, $p < .001$. In order to determine whether effectiveness of the manipulation biased the results, a dichotomous variable representing manipulation success (correct versus incorrect) was created and included in preliminary tests of all models. Results indicated that manipulation success did not significantly contribute to explaining variance in any of the models (all *p*s >.05). Furthermore, a multivariate analysis of variance (MANOVA) indicated that there were no significant differences between adolescents for whom the manipulation was successful and those for whom it was not successful on any of the predictor variables, $F(8,192) = 1.24$, $p = .28$, partial $\eta^2 = .05$. Therefore, reported results are derived from models that did not include the manipulation success variable and included all participants.

Experimental effects on body dissatisfaction and negative mood

Data were analysed in two univariate analyses of covariance (ANCOVA) using the general linear model. Type of normative peer information (no peer information, peer endorsement, peer rejection) was entered as the between-subjects factor, with post-exposure body dissatisfaction and mood as dependent variables. Pre-exposure body dissatisfaction and mood were included as covariates to control for pre-existing levels of each variable. Thin-ideal internalisation, body image investment, self esteem, depression and BMI were also

included as covariates in order to account for individual variables which have been shown to moderate the adverse effects of media images.

After adjusting for pre-exposure levels of body dissatisfaction and the other covariates, there was no significant main effect of experimental condition on post-exposure body dissatisfaction, $F(2,190) = 1.16$, $p = .32$, partial $\eta^2 = .01$. The interaction between condition and body dissatisfaction was also non-significant, $F(2,190) = 2.56$, $p = .08$, partial $\eta^2 = .03$. Apart from pre-existing body dissatisfaction, the only covariate that significantly predicted post-exposure body dissatisfaction was body mass index, $F(1,190) = 3.91$, $p < .05$, partial $\eta^2 = .02$. Adjusted mean scores and standard errors for the full factorial body dissatisfaction model, including only significant covariates, are presented in Table 2.

Similarly, there was no significant main effect of experimental condition on post-exposure mood when controlling for initial mood and the other covariates, $F(2,190) = .78$, $p = .46$, partial $\eta^2 = .01$, nor was the interaction between condition and mood significant, $F(2,190) = .56$, $p = .57$, partial $\eta^2 = .01$. Depression and self-esteem were the only significant predictors of post-mood scores after adjusting for pre-exposure mood, $F(1,190) = 6.20$, $p < .05$, partial $\eta^2 = .03$ and $F(1,190) = 4.79$, $p < .05$, partial $\eta^2 = .03$, respectively. The adjusted mean scores and standard errors for the full factorial negative mood model including only significant covariates are presented in Table 2.

Table 2

Estimated Marginal Means and Standard Errors for Post-Exposure Body Dissatisfaction and Negative Mood

Experimental Condition	Post-Exposure Body Dissatisfaction	Post-Exposure Negative Mood
Control (N=67)	57.42 (1.94)	43.56 (1.26)
Peer Rejection (N=71)	55.47 (1.91)	42.80 (1.24)
Peer Endorsement (N=67)	57.97 (1.95)	43.02 (1.27)

Note. Estimated marginal means reported from full factorial models which include only those covariates that significantly predicted the dependent variable (Body dissatisfaction model covariates: pre-exposure body dissatisfaction and body mass index; Negative mood model covariates: pre-exposure negative mood, self-esteem and depression).

Susceptibility to peer norms

The hypothesised effects of age and self-esteem on responsiveness to peer norms were tested using additional ANCOVAs. Again, pre-exposure levels of the dependent variables were entered into the models as covariates. BMI was retained as a covariate in the body dissatisfaction models, while depression and self-esteem were included in the mood models. All other covariates were excluded due to earlier non-significance.

Age. Participants were divided into two age groups, early-mid adolescence (13-15 years) and mid-late adolescence (16-18 years). This cut-off is in line past research that has examined similar developmental differences (e.g., Paxton et al., 2006) and reflects the division between junior and senior high school grades. In the model predicting post-exposure body dissatisfaction, the main effect for age group was not significant, $F(1,198) = .78$, $p = .38$, partial $\eta^2 < .01$, however, the interaction between age group and experimental group was significant, $F(2,198) = 4.54$, $p = .01$, partial $\eta^2 = .04$ (see Figure 2). Post hoc group

comparisons revealed that in the peer rejection of the thin-ideal condition, younger adolescents demonstrated significantly lower post-exposure body dissatisfaction (adj *M*=52.4) compared to older adolescents (adj *M* = 64.4): $t(198) = -2.92$, $p = .004$. However, the difference between younger and older adolescents in the peer endorsement condition was not significant: $t(198) = 1.23$, $p = .22$.

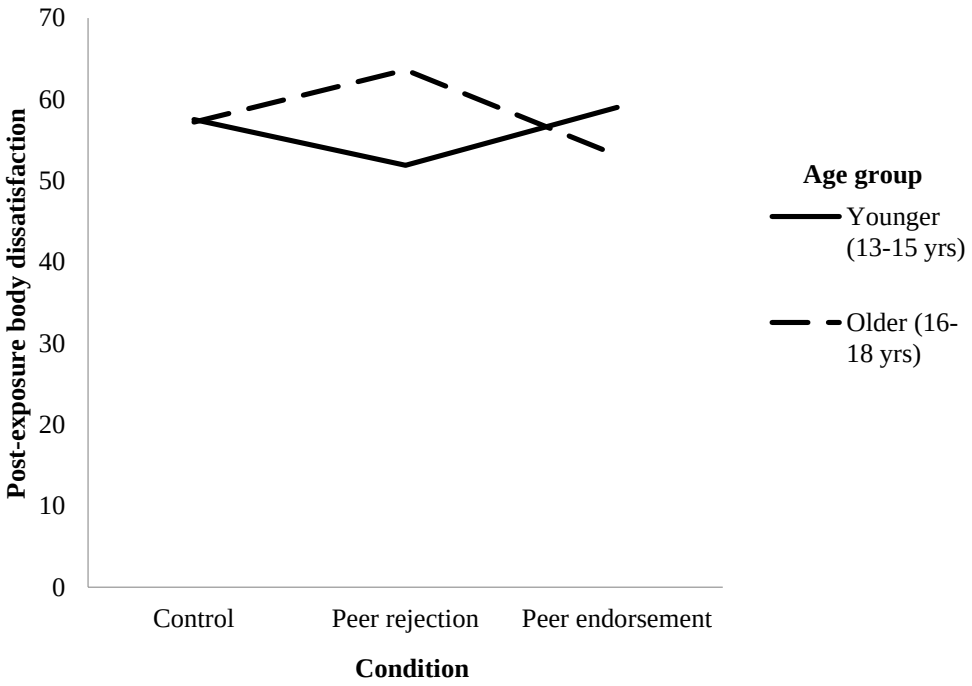

Figure 2. Interaction between experimental condition and age group for post-exposure body dissatisfaction (estimated marginal means presented).

Differences in post-exposure body dissatisfaction scores between the peer rejection and peer endorsement conditions approached significance within each age group [younger: $t(198) = 2.23$, $p = .03$; older: $t(198) = 2.04$, $p = .04$], with younger adolescents showing a trend towards lower levels of body dissatisfaction when told their peers rejected the thin-ideal, and higher levels when told their peers endorsed the thin-ideal, while older adolescents demonstrated a trend towards higher levels of body dissatisfaction in the peer rejection condition and lower levels in the peer endorsement condition. However, the differences

between the experimental groups within each age group were not significant using the post hoc adjusted alpha level ($\alpha = .008$). Furthermore, for both age groups there was no significant difference on post-exposure body dissatisfaction scores between the control group and either of the peer norm groups (*p*s > .05).

In the negative mood model, the main effect for age group was also not significant, $F(1,198) = .03$, $p = .86$, partial $\eta^2 < .001$, nor was the interaction between age group and experimental condition, $F(2,198) = .19$, $p = .83$, partial $\eta^2 = .002$.

Self-esteem. When body dissatisfaction was entered as the dependent variable, the main effect for self-esteem, $F(1,194) = .57$, $p = .45$, partial $\eta^2 = .003$, and the interaction between self-esteem and experimental condition, $F(2,194) = .33$, $p = .72$, partial $\eta^2 = .003$, were not significant.

Consistent with earlier analyses, the main effect for self-esteem on post-negative mood was significant, $F(1,196) = 6.93$, $p = .009$, partial $\eta^2 = .03$, indicating that overall, girls with lower self-esteem experienced lower mood after viewing the images than those with higher self-esteem (controlling for pre-existing negative mood). However, the interaction between self-esteem and experimental condition was not significant, $F(2,196) = .08$, $p = .92$, partial $\eta^2 = .001$.

Discussion

The purpose of this study was to investigate whether peer norms influenced the negative impact of thin-ideal images on adolescent girls' body dissatisfaction and negative mood. Although past research has shown that the way in which people perceive others to respond to advertising indirectly influences individual attitudes and behaviours (Gunther & Storey, 2003), this is the first study to experimentally examine the effect of peer norms on adolescents' responses to thin-ideal images. This represents a potentially fruitful area of study that may contribute to the development of effective prevention and intervention strategies.

Contrary to the first two hypotheses, the results indicated that overall, information about peer attitudes did not influence the effects of viewing thin-ideal images on state body dissatisfaction or negative mood. Although post-exposure mean scores showed a slight trend towards the hypothesised effects (i.e. mean scores were slightly lower in the peer rejection condition than the other two conditions), the differences were not large enough to be significant when controlling for other factors. In line with previous research (e.g., Heinberg & Thompson, 1995; Jones & Buckingham, 2005; Shaw, 1995), pre-existing levels of body dissatisfaction and mood, body mass index, self-esteem and depression were significant predictors of responses to thin-ideal images. However, thin-ideal internalisation and body image investment were not associated with post-exposure scores in the current sample, which differs from results found in other studies (e.g., Brown & Dittmar, 2005; Hargreaves & Tiggemann, 2004).

In partial support of the third hypothesis, there was evidence that the effect of peer norms on adolescent girls' responses to the images varied as a function of age. Namely, when told that their peers rejected the thin-ideal, younger adolescents demonstrated lower post-exposure body dissatisfaction ratings than older adolescents. This finding is in line with studies that show that younger adolescents are more susceptible to peer influence than older adolescents (Gavin & Furman, 1989; Steinberg & Monahan, 2007). On the other hand, post-exposure body dissatisfaction did not differ significantly according to age group when participants were told that their peers endorsed the thin-ideal. Furthermore, post-exposure negative mood did not differ across age groups in either experimental condition. With regards to self-esteem, lower levels predicted lower post-exposure body dissatisfaction, in line with previous research (David & Johnson, 1998; Jones & Buckingham, 2005). However, self-esteem did not influence participants' responsiveness to peer norms.

The current findings have important implications for both research and clinical interventions. Specifically, the results highlight the need to take developmental differences

into consideration when examining peer influences on adolescent functioning, and suggest that strategies aimed at preventing or reducing adolescent girls from elevated body dissatisfaction should be tailored to specific age groups. Compared to older adolescents, early-mid adolescents may be most likely to benefit from targeting peer influences.

The lack of support for the other study hypotheses may be explained by several possible reasons. Firstly, the operationalisation of peers as "other girls around Australia" may not have been salient enough to influence participants' reactions to the images. In line with the influence of presumed influence model (Gunther & Storey, 2003), it may be that others' opinions only matter in so far as the others are close enough to be able to evaluate adolescents. Thus, perhaps opinions of peers at a more local level (e.g. school or neighbourhood) may be more influential than those who are more socially or geographically distant. Secondly, it is possible that the hypothesised effects were minimised in the current study, given that 38% of participants in the peer rejection condition did not accurately process the normative information presented. That is, the strength of the peer rejection effect may not have been enough to produce significant differences in post-exposure responses compared to the other conditions. It is interesting that the experimental manipulation was more successful for the peer endorsement condition than the peer rejection condition, given that the format of the information was consistent across the conditions. In line with prominent cognitive and schema theories (e.g., Beck, 2008; Young; 2003), one possible explanation for this outcome may be that some adolescent girls have an attentional bias in favour of peer endorsement of the thin-ideal. That is, they expect their peers to value the thin-ideal rather than reject it, and therefore "ignore" or misperceive contradictory peer information to be consistent with their pre-existing beliefs and expectations. Future research could test this hypothesis by presenting peer norms in a more explicit way or varying the extent to which participants are required to actively process this information. It will be important to compare these results to future research in which participants more accurately process peer rejection norms. If adolescent

girls do tend to have an attentional bias for peer endorsement of the thin-ideal, this has important clinical implications in terms of what strategies may be useful in prevention and intervention programs. A third possibility for the lack of significant results is that there are factors not assessed in the present study which increase adolescents' vulnerability to peer influence. Future research could examine the role of factors such as level of social support or self-concept clarity on responsiveness to peer norms (Bukowski et al., 2008).

Nevertheless, the present study had several significant strengths. This was the first experimental study to investigate the interaction of peer and media influences in a sample of adolescent girls. Experimental studies have been criticised for obtaining results that do not generalise to the real world (Stice et al., 2001), however, the procedure used in the current study, in which adolescent girls viewed thin-ideal images and compared their opinions to those of their peers, is actually common in online fashion and beauty media (e.g., Dolly, 2012; TeenVogue, 2012). Thus, the present methodology in some ways mirrors a process that takes place naturalistically for some adolescent girls. Moreover, the increase in usage of online media in recent years is an important consideration, as it is now easier for teenage girls to access the views of (selected) peers who are not in their immediate social environment. It is conceivable that the girls who are most likely to write comments about online thin-ideal images are those who endorse the thin-ideal or are invested in appearance and body image, which may create a reinforcing cycle with girls assuming that it is the norm for their peers to believe that thinness is attractive and desirable.

Another important strength of the study is that the sample included participants with ages spread across the teenage years, allowing direct comparisons of effects at different developmental stages throughout adolescence. Examining the effect of risk factors on various outcome variables at different ages is important in guiding the timing of prevention and intervention programs. Additionally, the current study extends understanding of peer influences on body image concerns by examining peers at a broader level, rather than

focusing on close friendships or grade-mates as has been the tendency in previous research. The peer environment has different layers that may influence adolescents in different ways. For example, close friends may influence through direct advice, modelling or reinforcement, while peers at a national or societal level may be influential through the creation and perpetuation of perceived or actual norms. Each layer needs to be examined in order to develop an accurate understanding of peer influence on body image concerns.

Limitations of the current study must be acknowledged. For instance, it is possible that some self-selection bias occurred due to the recruitment method. However, the cover story was constructed in order to help prevent this bias, and the obtained sample included girls from a range of age groups, school types, ethnicities, and locations. Previous research has shown online methods to be as reliable as using pen and paper measures (Krantz & Dalal, 2000) and have the added advantages of being more cost-effective, accessible to a larger pool of potential participants, and have fewer social demands that may bias results than traditional face-to-face methods (Kraut et al., 2004). However, the online nature of the study meant that it could not be as rigorously controlled as laboratory experiments, and there was no way of ensuring that participants fully attended to the requirements of the study, or that external events did not influence their body dissatisfaction or mood. For example, it is possible that participants completed the study in the presence of others, or were engaged in other activities while participating that affected their ability to attend to the stimuli.

Given the dearth of studies that have examined the confluence of media and peer influences on adolescent girls' body image and related factors, there are many paths available for future research. As mentioned previously, peers could be operationalised in multiple ways, including those who are closer in distance (e.g., in the same school or neighbourhood) compared to those further away (in the same city or country), those of same versus different ethnicity, or same versus opposite sex. There may also be particular aspects of the media that are more or less connected to adolescents' social world; for instance, peers may be more

likely to express opinions about the appearance of celebrities seen in movies or on television than models in print advertisements. Moreover, if peers are shown to be instrumental in attenuating or amplifying the adverse effects of thin-ideal media, it would be valuable to determine what mechanisms are at play so that they can be targeted in intervention programs.

In summary, the results of the present study indicate that, in general, knowledge of peer norms does not influence the way in which adolescent girls respond to thin-ideal images when peers are conceptualised at a national level. However, there were developmental differences in the way in which adolescents respond to peer norms, with younger adolescents demonstrating lower post-exposure body dissatisfaction scores than older adolescents when told their peers rejected the thin-ideal. Investigating the confluence of the peer environment with media remains an important endeavour. The accumulation of pressures from different sociocultural contexts has been shown to be associated with higher levels of body dissatisfaction, weight control behaviours and disordered eating (Levine, Smolak, & Hayden, 1994), but the way in which these contexts interact has been largely ignored. Both the media and peers promote and reinforce norms relating to what is attractive and how to achieve it and each is likely to feed into and guide the other. Until the interplay of risk factors is better understood, body dissatisfaction and disordered eating is likely to remain widespread among adolescent girls.

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Chapter Five

General Discussion

Summary of Key Findings

The body of research in this thesis aimed to extend our understanding of the way in which peers contribute to the development and maintenance of adolescent girls' body dissatisfaction and disordered eating. The first study (presented in Chapter Two) found that adolescent girls' perceptions of friend influence did not predict changes in body dissatisfaction, dieting or bulimic behaviours over time. These results were replicated in separate samples of healthy weight and overweight girls, indicating that the (lack of) associations between these variables did not differ with variations in body mass. These findings contrast with aetiological models (e.g., Ricciardelli, McCabe, Holt, & Finemore, 2003; Stice & Agras, 1998; Thompson, Heinberg, Altabe, & Tanteleff-Dunn, 1999) that propose pressure from peers (along with family and the media) contributes to body image and eating pathology. However, several other longitudinal studies have also found that friend influence did not prospectively predict body image and eating problems in adolescent girls (e.g., Field et al., 2001; Presnell, Bearman, & Stice, 2004). An unexpected finding in Study One was that higher levels of body dissatisfaction predicted greater perceptions of friend influence a year later.

The second study (Chapter Three) built upon the first by examining the relative contributions of selection and socialisation processes to the homophily of body dissatisfaction, dieting and bulimic behaviours within adolescent girls' friendship groups. This study eliminated possible bias resulting from misperceptions of friends' attitudes and behaviours by using peer-report measures. Specifically, Study Two demonstrated that girls chose to become friends with others who were already similar to themselves in terms of body dissatisfaction and bulimic behaviours, but selected friends with dissimilar levels of dieting. Additionally, adolescent girls did not become more similar to their friends in body attitudes or eating behaviours over time, indicating that socialisation did not contribute to similarity between friends once selection processes had been accounted for. Rather than peer influence,

increases in body dissatisfaction and disordered eating were better predicted by several individual factors, such as age, BMI, and negative affect, all of which have been implicated in theoretical models (Ricciardelli et al., 2003; Stice & Agras, 1998) and previous research (e.g., Jones, 2004; Stice, 2002). The findings from Study Two complement a growing body of research which has shown that adolescent girls resemble their friends in terms of body dissatisfaction and bulimic behaviours, but conflict with past findings relating to dieting similarity between friends (Hutchinson & Rapee, 2007; Paxton, Schutz, Wertheim, & Muir, 1999; Woelders, Larsen, Scholte, Cillessen, & Engels, 2010). Additionally, the results from the second study diverge from previous studies conducted with college students, which found that friend and peer socialisation produced changes body image concerns and disordered eating (Crandall, 1988; Zalta & Keel, 2006).

The third and final study in this thesis (Chapter Four) investigated the role of the peer environment from a different angle, by examining whether peer (as opposed to friend) attitudes influenced adolescent girls' responses to thin-ideal images. It is conceivable that unfamiliar peers are more likely to adversely influence the way in which adolescents' feel about their bodies as they are perceived as being more critical than friends (Giordano, 2003). Overall, the results from Study Three showed that peer attitudes did not influence the effects of viewing thin-ideal images on girls' state body dissatisfaction or negative mood. Again, these results contrast with those found in similar studies with college students (Strahan, Spencer, & Zanna, 2007). However, there was evidence that the effect of peer norms varied according to age, with younger adolescents showing lower post-exposure body dissatisfaction ratings than older adolescents when told that their peers rejected the thin-ideal. This finding is in keeping with past examinations of age differences in susceptibility to peer influence (Gavin & Furman, 1989; Steinberg & Monahan, 2007). In contrast, there were no age differences in post-exposure body dissatisfaction when girls were told that their peers endorsed the thin-

ideal and no differences in post-exposure negative mood in either peer rejection or endorsement experimental conditions.

In summary, the results from the three studies suggest that friends and peers are important in contributing to the way in which adolescent girls feel about their bodies and their engagement in weight control behaviours. Specifically, girls were more likely to be drawn to others who shared similar levels of body dissatisfaction and disordered eating rather than being directly influenced by friends. Additionally, the attitudes of less familiar peers affected the way in which girls' responded to thin-ideal media images, but only for younger adolescents.

Theoretical Implications

Taken together, the results from the studies presented in this thesis have important theoretical implications for understanding adolescent girls' body image and eating problems. The research findings suggest that the way in which the peer environment contributes to the development and maintenance of body dissatisfaction and eating pathology may not be as straightforward as previously proposed in theoretical models. Specifically, the current findings suggest that adolescents do not simply react to peer influences by changing their attitudes and behaviours to be in line with that of their friends, but rather they are more active in constructing their own appearance cultures. That is, adolescent girls choose to become friends with girls who share similar levels of body image concerns and bulimic pathology. Given that these results were obtained using both adolescents' perceptions of friend influence and actual, peer-reported attitudes and behaviours, it appears that adolescent girls do not misperceive the importance of appearance to their friends but are able to accurately gauge their friends' preoccupation with weight and shape. This information is then drawn upon to inform girls' friendship choices.

By selecting friends who are similarly interested (or disinterested) in weight and shape, adolescent girls' own, pre-existing weight-related attitudes and behaviours are unlikely to be

challenged. Specific mechanisms of friend influence that have been previously investigated, such as appearance conversations, criticism, modelling of disordered eating and social reinforcement, may therefore be a manifestation of pre-existing problems which contribute to the maintenance, rather than the development, of body image concerns and eating pathology. Thus the way in which friends and peers contribute to adolescents' body dissatisfaction and disordered eating is likely to be far more complex than has been acknowledged theoretically. Existing models may be enhanced by reconsidering proposed unidirectional pathways extending from the peer environment to individual body image and eating problems as being bidirectional. That is, rather than conceptualising influence from friends and peers as necessarily preceding the onset of these issues, a range of interactive processes (including both selection and socialisation) need to be taken into account. Methodologically, the current results emphasise the importance of controlling for selection processes when examining possible influences from friends in order to avoid overestimating the role of socialisation in predicting girls' body dissatisfaction and disordered eating.

The results also indicate that adolescents are not universally influenced by the attitudes of unfamiliar peers, but rather there are developmental differences in susceptibility to peer influence. In line with previous research (e.g., Steinberg & Monahan, 2007), it appears that younger adolescents are more likely to be influenced by peer norms compared to their older counterparts. However, this is not necessarily an undesirable phenomenon, as believing that peers rejected the thin-ideal actually buffered the negative effects of thin-ideal images for younger adolescents. Researchers should therefore be sensitive to possible variations in the way in which risk factors may operate across the different stages of adolescence. Given that pubertal development relative to peers has also been found to contribute to body dissatisfaction and dieting (Harden, Mendle, & Kretsch, 2012; Levine & Smolak, 1992), future studies could include a measure of biological maturity in addition to chronological age to further tease apart the association between developmental stage and elevated risk.

The studies presented here also indicate that conceptualising “peers” as one homogenous group is too broad a construct to accurately encapsulate the differing roles of friends compared to less familiar peers. While similarity of body dissatisfaction and disordered eating between adolescent girls and their friends was better explained by selection than influence processes, adolescents are also part of other, unselected peer groups, such as classes, grades, schools, neighbourhoods and communities. Influence processes may be more likely to operate within these unselected peer groups than in close friendship groups, for instance through communication of peer norms (as in Study Three). The role of friends as opposed to unfamiliar peers cannot be directly compared across the current studies due to methodological differences; however, the results lend general support to the notion that theory and research should distinguish between different types of peer relationships.

More broadly, the studies provide support for both biological and psychological risk factors for body dissatisfaction and disordered eating that have been implicated in theoretical models and previous empirical research, such as body mass, self-esteem, negative affect, and pre-existing levels of body image concern and eating pathology. This highlights the importance of taking a multivariate approach to investigating risk.

Clinical Implications

Several important clinical implications can be drawn from the research contained in this thesis. Firstly, there is a need for prevention and intervention programs targeted at adolescent girls that address the role of friends and peers in the maintenance of body image concerns and unhealthy weight loss behaviours. Programs that focus solely on the individual are unlikely to be effective, given that individual girls who have higher levels of body dissatisfaction and bulimic tendencies are likely to inhabit a social environment which reinforces the importance of these issues. Approaches which involve adolescents with their friends may be better suited to addressing these problems, allowing girls to develop new and healthier ways of thinking

and behaving together. In this way, girls could support and be supported by their friends in making changes.

A second clinical implication of this research is that challenging adolescents' perceptions of their friends' attitudes and behaviours in order to correct "misperceptions" is likely to be unhelpful, ineffectual and invalidating. It may be more effective to acknowledge that for some adolescent girls, weight and shape are important to her and her friends. Interventions could then focus on helping girls to identify the potential costs of subscribing to these attitudes and behaviours and understand that the way in which their immediate friendship group values may not be shared by their larger network of peers. That is, challenging the accuracy of perceived norms in the wider peer environment, rather than perceived norms within a friendship group, is more likely to be a useful avenue for intervention.

Thirdly, there are developmental considerations in the way in which the peer environment should be addressed in intervention efforts. Compared to older adolescents, younger adolescents are more vulnerable to peer influence and thus may be more likely to benefit from intervention programs that include a peer influence component. Interventions that occur during early adolescence are also well situated to prevent the development of the array of negative physical and mental health outcomes associated with body dissatisfaction and disordered eating (Stice, Marti, Shaw, & Jaconis, 2009; Stice & Shaw, 2002). Additionally, the findings that friends are more likely to be important in the maintenance than development of these issues during adolescence suggests that preventative measures may need to begin even earlier. This is further supported by the findings that the best predictors of future body dissatisfaction and disordered eating were initial levels of the same variables. Prevention programs with elementary school students could prevent the development of individual body dissatisfaction and disordered eating, which later contribute to the formation of harmful friendship group appearance subcultures in early adolescence.

Lastly, friends and peers are best considered as one part of the adolescent environment that contributes to the maintenance of body dissatisfaction and disordered eating. They should be addressed within the context of a range of other risk factors, which include family and media influences, negative affect, thin-ideal internalisation, self-esteem, personality traits, body mass, and genetic influences. Consistent with aetiological models, prevention and intervention efforts are most likely to be successful when a holistic, multifaceted approach is taken.

Thesis Strengths

This research demonstrates several noteworthy strengths. Firstly, it examined the role of friends and peers using a combination of prospective and experimental research designs. There is a substantial amount of cross-sectional research indicating that different aspects of peer relationships are associated with individual adolescent girls' body image concerns and weight control behaviours (e.g., Hutchinson & Rapee, 2007; Mackey & La Greca, 2008; Paxton et al., 1999; Shroff & Thompson, 2006). Longitudinal and experimental studies such as those contained in this thesis are now required to draw sound conclusions about the direction and significance of these associations. Each of the three individual studies utilised strong and sophisticated statistical techniques that controlled for initial levels of pathology as well as several other factors which have been theoretically and empirically established as important in contributing to risk. Multivariate models are not only important in ensuring that the contribution of one risk factor is not overestimated, but also because the interaction of risk factors is likely to be more important in predicting outcome than any one risk factor alone (Stice, 2002).

Another strength of the current research is that it is the first to simultaneously examine selection and socialisation processes in explaining the similarity of body image and eating problems within adolescent girls' friendship groups. Although researchers have previously acknowledged that girls may be more likely to form friendships with others who are similar to

themselves (e.g., Paxton et al., 1999), this study is unique in actively examining this phenomenon over time. Accordingly, the importance of friend selection, over and above influence, in contributing to the homophily of body dissatisfaction and bulimic behaviours in adolescent friendship groups is empirically supported by the present data.

Additionally, this research investigated the way in which peers may shape individual body image and eating problems by examining peer factors from several different viewpoints. Specifically, the research considered the effects of both perceived and actual influence, as well as differing levels of peer relationships (friends versus unfamiliar peers). Identifying whether these aspects of the peer environment differentially impact upon adolescents' well being has important theoretical and clinical implications. Although the relative effects of perceived versus actual influence and friends versus unfamiliar peers could not be directly compared across studies due to differing methodological approaches, the research represents an important step forward in exploring the impact of different components of the larger "peer influence" construct referred to in theoretical models.

Limitations and Future Directions

Limitations of the research should also be acknowledged and considered in the design of future studies. Firstly, care should be taken in generalising the results to the wider adolescent population. For instance, given the discrepancy in the effect of peer norms found between early-mid and mid-late adolescents in Study Three, it is possible that similar developmental differences may operate in relation to selection and socialisation processes. For instance, rapid physical changes resulting from the onset of puberty, in conjunction with the social challenges of transitioning from elementary to high school, may mean that appearance-related attitudes and behaviours are more important in contributing to friendship selection in early compared to late adolescence. Research comparing selection and socialisation across different developmental stages is needed to determine whether the current findings are generalisable to girls in senior high school grades or college.

Secondly, the peer influence constructs were limited to female friends and peers and (in the case of the first two studies) participants were recruited from single-sex schools. The influence of male peers on female adolescents is less studied than same-sex peer influences, and may differ in important ways. Furthermore, the very presence of males in the same friendship group or school may amplify or buffer the importance of weight, shape and eating concerns for individual adolescent girls. Although the samples included participants from a range of ethnic backgrounds that mirrored the diversity of the broader Australian population, it cannot be assumed that the current results can be generalised to adolescents from different cultures. Further research with varying samples is needed in order to determine whether these processes differ across gender, culture or school environment.

While the current research offers some important insights into the role of friends and peers in girls' weight-related attitudes and behaviours, it does not provide information about the specific mechanisms and processes that may be involved. For instance, similarity in body dissatisfaction and bulimic tendencies were shown to be important in choosing friends, but it is not clear how these similarities are initially identified. Further, more information is needed in order to understand how the attitudes of unfamiliar peers regarding thin-ideal images are conveyed to individual adolescents in real life. Relatedly, the way in which friend influence was operationalised in the first study may have been too broad to detect more specific or subtle ways in which friends may contribute to later changes in body dissatisfaction or eating pathology. It would be beneficial to replicate this research using a variety of more specific friend and peer interaction variables to more fully understand adolescent girls' lived experiences and identify possible targets for treatment.

Lastly, the current research examined the contribution of friends and peers to adolescent body image and eating concerns as a potential risk factor. Although this is congruent with the way in which theoretical models and other empirical studies have conceptualised the role of peers, it is important not to lose sight of the positive nature of adolescent friendships (Allen &

Antonishak, 2008). The potentially protective nature of peers in terms of providing a supportive and validating environment within which to grow has been largely ignored in the body image and eating pathology literature. From a prevention and intervention point of view, it would be informative to consider how positive attitudes towards one's body and healthy eating behaviours naturalistically spread through peer networks.

Concluding Remarks

In conclusion, this thesis has made a unique and important contribution to understanding the role of friends and peers in adolescent girls' body dissatisfaction and disordered eating. Overall, the findings indicate that friends may be less influential in the onset of these problems than previously thought, but more important in maintaining pre-existing body image concerns and unhealthy weight-control behaviours through the formation of friendship groups that share similar attitudes and behaviours. Furthermore, attitudes held by unfamiliar same-age peers moderate the influence of other sociocultural risk factors in early-mid but not mid-late adolescence, highlighting important developmental differences. Establishing the ways in which friends' and less familiar peers' attitudes and behaviours are associated with adolescent girls' body dissatisfaction and disordered eating is essential in facilitating the development of more effective prevention and intervention strategies. The current research provides some significant insights into these relationships, however, continued prospective and experimental investigations during this developmental period of heightened risk are essential in achieving the important task of reducing widespread levels of body dissatisfaction and disordered eating in adolescent girls.

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