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Attachment and Eating: A Meta-Analytic Review of the Relevance of Attachment for Unhealthy and Healthy Eating Behaviors in the General Population

by

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Abstract

Attachment relationships play an important role in people's wellbeing and affliction with physical and mental illnesses, including eating disorders. Seven reviews from the clinical field have consistently shown that higher attachment insecurity—failure to form trusting and reliable relationships with others—systematically characterized individuals with eating disorders. Nevertheless, to date, it is unclear whether (and if so how) these findings apply to the population at large. Consequently, the objective of the present meta-analysis is to quantify the relationship between attachment and unhealthy and healthy eating in the general population. Data from 70 studies and 19,470 participants were converted into *r* effect sizes and analysed. Results showed that higher attachment insecurity (r = .266), anxiety (r = .271), avoidance (r = .119), and fearfulness (r = .184) was significantly associated with more unhealthy eating behaviors, ps = .000; conversely, higher attachment security correlated with lower unhealthy eating behaviors (r = -.184, p = .000). This relationship did not vary across type of unhealthy eating behavior (i.e., binge eating, bulimic symptoms, dieting, emotional eating, and unhealthy food consumption). The little exploratory evidence concerning healthy eating and attachment was inconclusive with one exception—healthy eating was associated with lower attachment avoidance (r = -.211, p = .000). Our results extend previous meta-analytic findings to show that lack of trusting and reliable relationships does not only set apart eating disordered individuals from controls, but also characterize unhealthy eating behaviors in the general population. More evidence is needed to determine how attachment and healthy eating are linked and assess potential mechanisms influencing the attachment–eating relationship.

Attachment and Eating: A Meta-Analytic Review of the Relevance of Attachment for Unhealthy and Healthy Eating Behaviors in the General Population

The role of attachment relationships for people's wellbeing and their susceptibility to both physical (e.g., hypertension, obesity, cancer) and mental (e.g., depression, anxiety, and addiction) ailments has received great attention during the past decades (Diener et al., 2016; Maunder & Hunter, 2001; Mikulincer & Shaver, 2012; Puig, Englund, Simpson, & Collins, 2013). The theory of attachment provides a framework for understanding how we see ourselves vis-à-vis others in relationships—do we feel worthy of love, do we feel we can trust others?—and how these patterns of thought influence our *expectations* of others' availability and dependability when we require support (Mikulincer, Florian, & Weller, 1993).

Poor interpersonal relationships have been identified as a core factor for the onset and maintenance of eating disorders (Broberg, Hjalmers, & Nevonen, 2001). For instance, seven reviews unanimously found a higher likelihood of insecure and pathological attachments, i.e., less trusting and dependable relationships, in individuals with eating disorders (e.g., O'Shaughnessy & Dallos, 2009). Moreover, research has shown that eating disorders and overweight/obesity may not be estranged phenomena (Neumark-Sztainer, 2003; Sánchez-Carracedo, Neumark-Sztainer, & López-Guimerà, 2012). In fact, many times these conditions are interrelated and co-evolve (da Luz et al., 2017). For example, individuals with a history of eating disorders, i.e., binge eating and bulimia nervosa, are more likely to have obesity than people who have never had such ailments (Kessler et al., 2013). Similarly, children at risk for obesity rely on eating to manage emotions before becoming obese or overweight (Nguyen-Rodriguez, Chou, Unger, & Spruijt-Metz, 2008). In a recent review, insecure attachment relationships were positively linked to higher body mass indexes in children and adults (Diener et al., 2016). Consequently, we believe that examining the

relationship between attachment orientations and eating behaviors could shed light on a common psychological risk factor for both, eating disorders and obesity.

Understanding common factors affecting eating disorders and obesity is important because both conditions are associated with negative health consequences and grim prognoses. For example, between 25% and 50% of individuals with eating disorders continue to meet diagnostic criteria 5 to 10 years after initial treatment (Keel & Brown, 2010; Smink, van Hoeken, & Hoek, 2013), while roughly 20% will have an eating disorder all their lives (Steinhausen, 2009). Obesity and overweight, on the other hand, cost the United Stated 150 billion dollars annually in healthcare costs (Kim & Basu, 2016), and have been associated with stroke, type II diabetes, depression, and cancer (Hruby & Hu, 2015). Moreover, children with overweight and obesity are likely to remain obese into adulthood and develop diabetes and cardiovascular diseases at a younger age (Sahoo et al., 2015).

Nevertheless, focusing only the attachment relationships of pathological eaters has few implications for the general population. As such, it is unclear whether attachment insecurity is linked with eating behaviors in the population at large and if so to what extent. Consequently, the primary aim of the present article is to change the focus from a clinical to a general population perspective where primary prevention for eating disorders and overweight/obesity is still possible. Specifically, we examine and quantify for the first time the extent to which attachment orientations and eating are related in individuals of the general population, including children, adolescents, and adults, using meta-analysis. Our goal is to expand conclusions from previous clinical reviews and assess the extent to which attachment insecurity could influence the adoption of unhealthy eating behaviors (including binge eating, bulimic symptoms, dieting, emotional eating, and unhealthy food consumption) and that of healthy eating behaviors (vegetable consumption, intuitive eating,

healthy eating index) in the population at large. To provide further insights on the attachment and eating associations as well as new paths for future research, we also explore moderators of the attachment–unhealthy eating behavior relationship as an additional contribution of the present research.

Attachment Conceptualization

Attachment can be conceptualized as internal working models of self and others in relationships developed from repeated interactions with attachment figures. Based on caregivers' reliability and supportiveness, children acquire beliefs about their self-worth, which then act as baselines for the formation of other attachments (siblings, teachers, peers, and partners) and serve to organize expectation about future relationships (will others be there when I need them?), and guide cognitions, affect, as well as dealing with distress (Mikulincer et al., 1993).

Bowlby (1973) highlighted the existence of two biologically rooted and evolutionarily adaptive systems crucial to survival: attachment and exploration. Both systems develop in infancy and complement each other (Bowlby, 1973). The attachment behavioral system is automatically activated by perceived or actual threats to felt security from danger, stress, or illness (Bowlby, 1973; Mikulincer & Shaver, 2007d). When triggered, this system promotes physical or symbolic proximity-seeking to supportive others (attachment figures) with the goal of attaining protection and security. In other words, when feeling distressed, regardless of individual differences in attachment orientation, the attachment behavioral system tells people to think about and/or get close to someone who can provide support, comfort, and help. Once emotional balance has been restored, the attachment system becomes idle, and the exploratory

system becomes activated, encouraging learning, curiosity, mastery, and engaging with others (Aspelmeier & Kerns, 2003; Mikulincer, Gillath, & Shaver, 2002) .

Attachment styles were first documented in children using observational studies. By elaborating an experimental procedure called the Strange Situation where children were temporarily separated and then reunited with caregivers, Ainsworth and colleagues (1978) were able to examine mother-child interactions upon reunion and assess exploratory behaviors. As a result, they identified three distinctive attachment patterns. When faced with distress, securely attached children display attachment behaviors such as crying, proximity seeking, or clinging to ask for soothing from their caregivers (Ainsworth et al., 1978; Bartholomew & Horowitz, 1991). Emotionally available and responsive caregivers act as a *safe haven* for the child, providing comfort, assistance, and support in times of distress (Mikulincer et al., 2002). When unthreatened, however, secure children are able to use their caregivers as a *secure base* or a springboard to independent exploration to acquire knowledge and master their environment. Parental availability and reliability allow for the development of a secure attachment script, where the self is viewed as valued and loved, and attachment figures as available in times of need (Mikulincer & Shaver, 2007c).

Nevertheless, some caregivers are not consistently dependable. In response to caregivers who are unreliable or distracted in their caring and comforting patterns, children come to develop an anxious attachment style (Ainsworth et al., 1978; Bartholomew & Horowitz, 1991). When distressed, these children overplay negative feelings and over-seek help (Gillath, Giesbrecht, & Shaver, 2009). When reunited with their caregivers, instead of being relieved and soothed, anxious children show conflicted attachment behaviors, wanting to cling one moment and to resist comforting the next (Ainsworth et al., 1978). The exploratory behaviors of anxious

attachment children are limited because they are constantly on the lookout for their caregivers' whereabouts which stops them from focusing fully on exploration and learning (Ainsworth et al., 1978).

Attachment avoidance develops in response to caregivers who are detached, emotionally cold, and emotionally unavailable on a consistent basis (Mikulincer, Shaver, & Pereg, 2003). These caregivers provide better care if children underplay their emotions (Gillath et al., 2009). Avoidant children thus show little distress when separated from their caregivers and engage in an abundance of exploratory behaviors when left alone; when reunited with their caregivers, however, these children continue exploration and tend to actively avoid their caregivers (Ainsworth et al., 1978; Bartholomew & Horowitz, 1991). Unlike their secure counterparts, when avoidant children engage with toys and other objects, it is not to mater or learn about their environment but rather to dampen or forget about their negative feelings (Ainsworth et al., 1978; Bartholomew & Horowitz, 1991).

A fourth attachment category named attachment fearfulness has been documented at a later date by Main and Solomon (1990). Initially, these children could not be classified in any of the available attachment categories because they lacked a clear strategy for obtaining proximity and increasing feelings of security. Rather, they showed a breakdown in the organized attachment strategies described above—upon reunion with their caregivers, they show a mixture of rapid and incoherent sequences of proximity-seeking behaviors, as well as avoidance, resistance and fearfulness towards caregivers (Hesse, 2008). Consequently, fearful children oscillate between the emotion escalations and helplessness witnessed in anxious children and the detached and aloof behaviors of avoidant children (Hesse, 2008; Lyons-Ruth & Spielman, 2004; Mikulincer & Shaver, 2007c). Similarly, the caregivers of fearfully attached children display a

combination of atypical parenting behaviors such as withdrawal (directing the child away with toys), fearful behaviors (hesitation/uncertainty/fright), role confusion (pleading with the child), contradictory communication signals, and intrusiveness/negativity (mocking, teasing, derogating; Zeanah, Berlin, & Boris, 2011). In the general population, about 15% of children are classified as fearful, while 65% are classified as securely attached, 20% as avoidant, and 10% as anxious (Zeanah et al., 2011).

Attachment styles are not only characteristic of the child-caregiver relationship. Hazan and Shaver (1987) showed that adults in close relationships displayed similar attachment patterns to those found in children. The authors elaborated three stereotypical exemplars better known as descriptors or vignettes for each adult attachment style (exception fearful attachment which was added later as well). Securely attached relationships in adulthood are marked by increased levels of intimacy, closeness, and trust, and expectations of availability of others in times of need (Hazan & Shaver, 1987; Mikulincer et al., 1993). Secure people have internalized a view of the self as worthy and of others as dependable (Mikulincer & Shaver, 2007a). On the other hand, an anxious attachment style is shaped by emotional instability, worrying about being abandoned by significant others, jealousy in relationships, and a tendency to appraise all situations as threatening (Hazan & Shaver, 1987; Mikulincer et al., 1993). Anxious adults carry an idealized view of others but a negative view of the self (Mikulincer & Shaver, 2007a). People with avoidant attachment styles relate difficulty depending on significant others and fear of intimacy in relationships (Hazan & Shaver, 1987; Mikulincer et al., 1993). They are characterized by a marked increase in self-reliance and inflated positive self-views, a necessity in the absence of being able to count on others who are viewed in a more negative light (Mikulincer & Shaver, 2007a). A the core of a fearful attachment lies two opposite forces: a desire of intimacy with

significant others matched by perceived difficulty in depending on and trusting them, due to a negative image of the self and of others (Collins & Read, 1990). Thus, fearful adults share attributes with both anxious and avoidant attached people (Aspelmeier & Kerns, 2003).

All in all, there is a moderate association between attachment security in childhood and adulthood throughout the first 19 years of life, $r = .27$ and $\rho = .39$ (Fraley, 2002). Note that, to date, no findings document attachment continuity in older adults. While, longitudinal findings are mixed with regard to the degree or the way in which early attachment histories shape adult attachments, they do converge on one aspect—attachment stability is affected by negative life events (Aikins, Howes, & Hamilton, 2009; Fraley, 2002; McConnell & Moss, 2011). In other words, attachment continuity between infancy and adulthood is greater among people who have lived in the same homes and communities throughout their childhood, who did not experience parental divorce, and who were provided opportunities associated with a middle-class upbringing (Aikins et al., 2009; McConnell & Moss, 2011)(estimated association $\rho = .48$). On the other hand, change from attachment security in infancy to insecurity over time is predicted by the loss of a parent or family member, abuse, parental divorce, living in poverty, and depression (see Fraley, 2002; McConnell & Moss, 2011 for reviews)(estimated association $\rho = .27$). Importantly, positive life events that are long lasting (an increment in social class, for example) can benefit attachment, with people experiencing such changes migrating from an insecure to a secure attachment style.

Because attachment research has its roots in observational methods, much of the measures available in the past were based on stereotypical exemplars of each of the four attachment categories (or styles) explained above. However, an important step was achieved by Brennan and colleagues (1998) who showed that, at the core of each attachment measurement,

were two dimensions: attachment anxiety and avoidance. In other words, attachment dimensions were akin to the axes in a Cartesian plane and the attachment categories (or styles) were its quadrants (see **Figure 1**). Higher scores on the attachment anxiety dimension designated a desire to merge with and increase proximity to close others, a focus on negative emotions, a tendency to worry, and the use of emotion-focused/hyperactivating strategies (Birnbaum, Orr, Mikulincer, & Florian, 1997; Mikulincer & Florian, 1995; Mikulincer & Orbach, 1995; Simpson, Rholes, & Nelligan, 1992). On the other hand, higher scores on the attachment avoidance dimension indicated a minimized dependency on others and an over-emphasized dependency on the self, a use of deactivation attachment strategies whereby stress and help seeking are suppressed at least in the short-run, and emotion-laden stimuli avoided (Fuendeling, 1998; Mikulincer & Orbach, 1995; Simpson et al., 1992). These dimensions will be further discussed in the *Emotion regulation* view below. As such, people with a secure attachment are characterized by a combination of low scores on the attachment anxiety and avoidance axes. These scores indicate a lower tendency to worry about attachment figures presence in times of need and a greater ability to depend on others. Conversely, higher scores on the anxious and avoidance dimensions typify fearful people, who fear being abandoned but paradoxically prefer not to depend on attachment figures. Importantly, the same dimensional structure has been shown to apply to children (Fraley & Spieker, 2003).

How Is Attachment Related to Eating?

The relationship between attachment and eating may be explained by multiple factors detailed by Zachrisson and Skarderud (2010), and Mikulincer's and Shaver (2012) in similar fashion, albeit for two different domains—disordered eating and psychopathology, respectively. Four interrelated mechanisms were proposed: a *general vulnerability view* (insecure vs. secure

people just fare worse on mental and physical health outcomes, eating being one such outcome), *inability to regulate emotions* (insecure vs. secure people use more ineffective coping strategies; unhealthy eating behaviors allow momentary relief/escape from negative emotions), *poor self-representation* (insecure vs. secure people think poorly of themselves; self-doubts make them unlikely to cope well, the remaining negative affect promotes unhealthy eating behaviors), and *interpersonal difficulties* (insecure vs. secure people's reliance on ineffective coping strategies prevents them from acquiring the necessary social skills to thrive in relationships; this creates serious problems with others and builds up stress, which in turn leads to unhealthy eating). While these are mechanisms are discussed independently, both poor self-representations and relationship difficulties are related to maladaptive coping strategies (e.g., Bélanger et al., 2014; Wei, Vogel, Ku, & Zakalik, 2005) and hence affect unhealthy eating behaviors directly and indirectly—through inability to cope, regulate emotions, and stress.

General vulnerability view. Technically not a mechanism, the general vulnerability view maintains that attachment insecurity is a nonspecific factor that worsens both mental and health conditions (Zachrisson & Skarderud, 2010). As seen previously, insecurely attached individuals cannot develop secure and stable mental foundations. This inability is linked with many negative psychological outcomes (e.g., poorer relationships, self-views, self-control, etc.), a reduced resilience in coping with life events, and a predisposition to break down psychologically in times of stress (Bowlby, 1988; Mikulincer & Shaver, 2012). In light of this theorizing, insecure individuals should perform worse on a range of mental and physical health outcomes, including eating; alternatively, securely attached individuals should be better off. Which behaviors will develop into full-fledge illnesses will be dictated by an interaction among the person's genetics, life-history, and developmental factors (Mikulincer & Shaver, 2012). The general vulnerability

view fails to distinguish between or highlight any specific mechanisms (Zachrisson & Skarderud, 2010). Rather, this view points to something problematic within the relationships of insecure (avoidant, anxious, or fearful) people potentially linked with worse health and mental well-being (Zachrisson & Skarderud, 2010). In principle, publications examining associations between attachment orientations and eating which do not explicitly test for a specific mediating mechanism but do find significant associations between insecure attachment orientations and unhealthy eating behaviors, for example, provide support for this view.

Evidence for a general vulnerability view. A literature review by Maunder and Hunter (2001) showed that insecurely attached individuals were worse off than their secure counterparts with regard to treatment adherence, substance use, eating behaviors, and symptom reporting. Similarly, Mikulincer and Shaver (2007b; see book chapter for complete review) showed that attachment avoidance and anxiety in adults were positively related to a wide range of mental disorders including but not limited to depression, anxiety, trauma, and post-traumatic stress disorder, as well as substance abuse; a secure attachment was negatively related to these mental illnesses.

Longitudinal findings by Puig and colleagues (2013) showed that adults classified as anxious (vs. securely) attached at 18 months were six times more likely to report physical illnesses, such as inflammatory related-illnesses (hypertension, high blood sugar, or asthma, etc.), and nonspecific symptoms (fainting spells, migraines, recurring stomach troubles, etc.) at age 32. These associations remained significant even after accounting for stressful life events, negative emotional style, and perceived instrumental and emotional support (Puig et al., 2013). Adults classified as avoidant (vs. secure) at 18 months were three times more likely to report

inflammatory related illnesses; however, no relationship between attachment avoidance and nonspecific-symptoms was found (Puig et al., 2013).

Similarly, in a sample of 5,692 adults, McWilliams and Bailey (2010) found that attachment anxiety was associated with a wide range of health conditions including pain conditions (headaches, chronic pain) and cardio-vascular diseases (stroke, heart attacks, and high blood pressure); on the other hand, attachment avoidance was only associated with pain-related conditions (arthritis, back and neck problems, headaches, and chronic pain). Moreover, compared to avoidant adults, these associations were generally larger for anxiously attached adults (McWilliams & Bailey, 2010). These effects remained positive even after adjustment for gender, marital status, education level, age, and race. No associations between attachment security and health conditions were found after adjustment (McWilliams & Bailey, 2010).

While eating disorders were not assessed in this cohort study, both attachment avoidance and anxiety were associated with higher odds of having a mental disorder, i.e., depression, anxiety, or alcohol/substance abuse, while securely attached adults had significantly lower odds of reporting a lifetime history of these disorders (McWilliams & Bailey, 2010). Importantly, when attachment orientation and mental illnesses were used together to predict physical health conditions, the relationship between attachment avoidance and pain-related conditions completely disappeared; so did the association between attachment anxiety and headaches (McWilliams & Bailey, 2010). However, the relationship between attachment anxiety and chronic pain as well as cardio-vascular diseases remained (McWilliams & Bailey, 2010). In other words, it seems that mental diseases might mediate the relationship between attachment avoidance and physical illnesses, while attachment anxiety seems to plays a unique role in adults' cardio-vascular diseases. Relevant for our inquiry, cardio-vascular diseases are highly

preventable by the adoption healthy lifestyle habits, including better diets (McGill, McMahan, & Gidding, 2008).

In line with above findings, evidence showed that married women who engaged in fewer attachment behaviors—behaviors characterized by accessibility, responsiveness, and engagement—with their spouses were significantly more likely to report low-activity and poor diets simultaneously (S. Y. Davis, Sandberg, Bradford, & Larson, 2016). In a nutshell, evidence shows that attachment anxiety and avoidance are linked with worse physical and mental outcomes compared with attachment security, even in the absence of a specific mediation mechanism. Importantly, some evidence points to a mediating role of mental diseases in the association between attachment and physical outcomes.

Emotion regulation view. Emotion regulation is the mediator that has received the most theoretical and empirical attention in explaining the link between attachment and eating. Individuals use emotion regulation to monitor, evaluate, and modify the course of an emotional response (Nolen-Hoeksema, 2012). People who fail to effectively manage their emotional responses to everyday events are likely to experience longer and more severe periods of distress (Aldao, Nolen-Hoeksema, & Schweizer, 2010). *Adaptive* emotion regulation strategies are based on facing a stressor by changing its meaning (reappraisal), finding a solution (problem solving), seeking emotional support to deal with it, or accepting the stressor when it cannot be changed (Aldao et al., 2010; Nolen-Hoeksema, 2012; Tamres, Janicki, & Helgeson, 2002). A recent meta-analysis has found these strategies to be negatively associated with eating disorders in clinical and general populations of children, adolescence, and adults , small to moderate effects (see Aldao et al., 2010). On the other hand, *maladaptive* emotion regulation strategies either suppress/avoid or accentuate emotional experiences and negative affect (e.g., wishful thinking,

rumination); these strategies were found to be positively associated with eating disorders in clinical and general population participants, including children, adolescents, and adults, moderate to large effects (see Aldao et al., 2010).

The attachment behavioral system provides a useful framework for understanding the normative process of coping and how attachment orientations systematically influence the go-to strategies people use to regulate their emotions (Mikulincer et al., 2003). More specifically, in light of this theory, when a threat activates the attachment system, it automatically prompts children and adults alike to seek physical or symbolic proximity to an attachment figure, regardless of attachment orientation (Mikulincer & Orbach, 1995). Nonetheless, only securely attached people can use support seeking as an adaptive and viable strategy to deal with distress and restore emotional balance (Mikulincer & Shaver, 2012; Mikulincer, Shaver, Sapir-Lavid, & Avihou-Kanza, 2009; Waters & Waters, 2006). Why? Because they have learned that when obstacles arise, accessible and supportive attachment figures (e.g., parents, peers or partners) will be there to help, and that this help will result in emotional comfort or relief (secure script). Empirical evidence supports this theorizing, showing that attachment security is indeed linked with the use of adaptive emotion regulation strategies, including support seeking in children and adults, and positive reappraisal of emotions and maintaining efforts on constructive alternatives in adults (see Brumariu, 2015; Mikulincer & Shaver, 2007g for complete discussion) .

On the other hand, while threats also prompt insecure individuals to seek proximity to attachment figures, they cannot act on this urge—their certitude of others' availability and support has been violated repeatedly (insecure script); as such, others cannot be trusted to be available and/or supportive when in need (Mikulincer et al., 2009; Waters & Waters, 2006). Insecure people of all ages must then resort to other coping strategies than support seeking to

regulate distress; these strategies either hyperactivate or deactivate the attachment system (Mikulincer & Orbach, 1995).

To deal with potential distress, anxiously attached children and adults always keep close tabs on things that could go wrong. Specifically, their attachment system is hyperactive, continuously fed by catastrophic appraisals and pessimistic beliefs about their ability to manage distress (Mikulincer & Orbach, 1995). Anxious adults, for example, are not likely to seek support because they doubt other's availability and fear rejection in the first place (Mikulincer & Orbach, 1995). Concurrently, it makes problem solving irrelevant—they wish to perpetuate problematic situations and helplessness to get attention from attachment figures (Mikulincer & Shaver, 2007g). Empirical evidence has linked anxiously attached people's ambivalent views about support seeking with the use of rumination, self-blame, and wishful thinking strategies to regulate distress and cope with negative emotions in adults (Mikulincer & Florian, 1995; Mikulincer & Shaver, 2007g). Anxious attachment has also been associated with more pessimistic and hopeless appraisals of situations and higher levels of generalized anxiety and overall negative affect (Mikulincer & Orbach, 1995). These strategies map closely on maladaptive emotion regulation strategies that accentuate emotional experiences and negative affect (Aldao et al., 2010). In early adolescents, an anxious attachment was associated with a fall-down of the emotion regulation system in response to sadness or anger (Brenning & Braet, 2013).

On the other hand, in line with emotion regulation strategies aiming to suppress unwanted thoughts and experiences, the deactivating attachment strategies used by avoidant children and adults serve as defense mechanisms designed to inhibit emotional states and avoid feeling emotions (Mikulincer & Orbach, 1995). As such, like securely attached people, avoidant children

and adults downregulate threat-related emotions; however, contrary to their secure counterparts, their ultimate goal is to minimize—not to promote—closeness and interdependence to others (Ainsworth et al., 1978; Mikulincer & Shaver, 2007g). Empirical evidence has shown that avoidant adults and children use maladaptive emotion regulation strategies that suppress emotions, deny stress, or divert attention from emotion-eliciting stimuli (Brumariu, 2015; Mikulincer & Shaver, 2007g). Avoidant adults have also been found to forgo support seeking, and to have more pessimistic situation appraisals and attitudes (Mikulincer & Shaver, 2007g).

The emotion regulation model proposes that, compared to their secure counterparts, insecurely attached people of all ages are more likely to use maladaptive coping strategies to deal with distress. However, due to their maladaptive nature, rather than getting rid of stress, these strategies either hyperactive/accentuate or deactivate/suppress or avoid distress (Aldao et al., 2010; Mikulincer & Orbach, 1995). This means that physiological stress markers and/or negative affect remain. One way to deal with that discomfort is to turn to eating in the hopes of feeling better and finding distraction from adverse emotions (Haedt-Matt & Keel, 2011; Stice, 2002). Eating is an inherently rewarding, motivating, and pleasurable behavior (Blumenthal & Gold, 2010) and becomes quickly a conditioned way to manage discomfort and negative emotions (Haedt-Matt & Keel, 2011). In other words, children and adults rely on eating in the absence of being able to rely on the care and support of close others; eating allows them to escape from and deal with negative affect and physiological stress effects—ultimately it allows them to feel better (Anderson, Gooze, Lemeshow, & Whitaker, 2012; S. Han & Pistole, 2014; Stenhammar et al., 2010; Tasca & Balfour, 2014; Wilkinson, Rowe, & Heath, 2013). This cycle is maintained through negative reinforcement—eating makes negative affect and uneasiness go away, even if so momentarily (Haedt-Matt & Keel, 2011).

Evidence for the emotion regulation as mediating mechanism. Although evidence on whether overeating ultimately decreases negative affect is mixed (Haedt-Matt & Keel, 2011), the link between attachment and unhealthy eating behaviors, and the mediating role of emotion dysregulation has been substantiated by empirical evidence in the general population, including children, early adolescents, young adults and adults (Bost, Wiley, Fiese, Hammons, & McBride, 2014; S. Han & Pistole, 2014; Ty & Francis, 2013; van Durme, Braet, & Goossens, 2015), adult female patients with eating disorders (Tasca et al., 2009), as well as bariatric surgery adult candidates (Shakory et al., 2015; Taube-Schiff et al., 2015). Together, these researchers showed that a higher insecure attachment predicted a wide range of unhealthy eating behaviors, including unhealthy food consumption (Bost et al., 2014), eating disorder pathology (Ty & Francis, 2013; van Durme et al., 2015), binge eating (S. Han & Pistole, 2014; Shakory et al., 2015), and emotional eating (Taube-Schiff et al., 2015), and that these relationships were mediated by emotion regulation difficulties. For example, Han and colleagues (2014) found that college students who reported higher insecure attachment orientations towards romantic partners were more likely to binge eat; this relationship was fully explained by a failure in their emotion regulation system.

Self-representation view. People strive to maintain a positive self-image throughout the life span and a key role in this process is played by interpersonal relationships (Gorrese & Ruggieri, 2013). People likely to suffer from eating disorders derive their self-worth from their weight, figure, and ability to control them as opposed to their performance in various life domains (Fairburn, Cooper, & Shafran, 2003; Malicki, Ostaszewski, & Dudek, 2014). According to the transdiagnostic model, factors contributing to the maintenance of eating disorders include: self-criticism, clinical perfectionism, core low self-esteem, inability to cope with emotions

(explained in the *Emotion regulation view*), and interpersonal difficulties (addressed below separately; Fairburn et al., 2003). Indeed, higher levels of perfectionism and self-criticism were positively related with more eating disturbances in both clinical and non-clinical samples (Bento et al., 2010; Ferreira, Pinto-Gouveia, & Duarte, 2014; Shafran & Mansell, 2001). Moreover, research has pinpointed to self-esteem as a protective factor against the development of eating pathology and body image disturbances later in life (Granillo, Jones-Rodriguez, & Carvajal, 2005; Kelly, Vimalakanthan, & Carter, 2014). On the other hand, adolescents reporting loss of control over eating (vs. those who did not) also reported significantly lower self-esteem (Goossens, Soenens, & Braet, 2009). In addition, evidence was found for a full model where higher levels of perfectionism, lower self-esteem, and lower body satisfaction predicted increases in bulimic symptoms over time (Stice, 2002). On the other hand, compassion—defined as the tendency to respond to one's suffering by adopting an attitude of self-caring and kindness as opposed to judgment and self-criticism—was associated with lower eating disorders symptoms in female college students (see Braun, Park, & Gorin, 2016 for a review; Kelly et al., 2014).

The associations between attachment and cognitive self-representations follow similar patterns to that outlined above. For instance, attachment anxiety, avoidance, and fearfulness was linked with poorer self-esteem, while the reverse was true for securely attached children and adults (see Gorrese & Ruggieri, 2013; Hao & Wilkinson, 2014; Mikulincer & Shaver, 2007a for reviews). Attachment security was associated with greater self-efficacy across life domains in secure adults, and with negative and chaotic self-representations in anxiously attached adults; avoidant adults reported low competency only in social and interpersonal (vs. non-social) life domains—domains they do not deem important (see Mikulincer & Shaver, 2007a for complete review). Lack of attachment security was associated with higher self-criticism (Thompson &

Zuroff, 1999), particularly in anxiously attached adults and, to a lesser extent, in avoidant adults (Mikulincer & Shaver, 2007a). Both, attachment anxiety and avoidance predicted significant higher levels of maladaptive perfectionism (e.g., Ulu & Tezer, 2010).

As such, because of the lack of parental sensitivity and responsiveness, both anxious and avoidant individuals experience more negative emotions brought upon by inherent negative views of the self and/or others, by self-doubts, and by unrealistically high standards (Mikulincer & Shaver, 2012). These negative self-representations are likely to hijack the attempts of insecurely attached people to cope with negative emotions effectively because they are less capable and well-equipped to handle distress (Goossens, Braet, Bosmans, & Decaluwé, 2011). Hence, similarly to the emotion regulation view, to get rid of the remaining negative affect, these individuals may resort to eating to cope and feel better (Goossens et al., 2011).

Evidence for self-representations as a mediating mechanism. Goossens and colleagues (2011) showed that children 8-11 years old who reported loss of control over eating (vs. those who did not) had lower self-esteem and less secure attachment towards their mothers and fathers. Moreover, a lower secure attachment towards the mother fully mediated the self-esteem–loss of control over eating relationship, while lower secure attachment towards the father was only a partial mediator of the relationship (Goossens et al., 2011). In a sample of late adolescents, higher socially prescribed perfectionism and perfectionistic self-promotion partially mediated the relation between parental attachment anxiety and security, respectively, and binge eating, even after controlling for gender, age, adjusted BMI, and family status (Boone, 2013). In addition, higher perfectionistic self-promotion fully mediated the relation between attachment avoidance towards the father and binge eating (Boone, 2013). Moreover, in a sample of adults diagnosed with eating disorders, maladaptive perfectionism fully mediated the relationship between

attachment anxiety and eating disorders symptoms, while attachment avoidance partially mediated the relationship (Antonios Dakanalis et al., 2014). Lastly, women with an anxious attachment had higher levels of eating psychopathology and body dissatisfaction; this relationship was fully mediated by higher social comparison with models and peers (Bamford & Halliwell, 2009). In this case, it seems that anxiously attached women excessively compare to others whom they deemed potentially better to assess their self-worth, which in turns determines their level of disordered eating. On the other hand, while attachment avoidance did predict eating disorder psychopathology, social comparison did not mediate this relationship (Bamford & Halliwell, 2009).

Interpersonal difficulties. Both insecurely attached individuals and people with eating disorders experience difficulty with relationships (Arcelus, Haslam, Farrow, & Meyer, 2013; Mikulincer & Shaver, 2012). Problematic thoughts, feelings, and behaviors interact to create difficulties in fulfilling social roles and in maintaining healthy and rewarding relationships (Hoermann, Zupanick, & Dombeck, 2013). As explained above, insecurely attached individuals could not rely on others for care and comfort, and it resulted in the use of deficient strategies (hyperactivating/stress-perpetuating and deactivating/stress-inhibiting) to regulate emotions. The use of these ineffective coping strategies may also interfere with their ability to acquire the social skills necessary to thrive in and maintain healthy relationships (Mikulincer & Shaver, 2012). For example, how can an avoidant person who suppresses and denies emotions or an anxious person who interprets signals as potentially catastrophic acquire the necessary tools to solve conflicts, compromise, seek support without overwhelming, or simply ask for help? Insecurely attached people's social inefficiencies in turn contribute to interpersonal problems (e.g., conflict) and deficits (e.g., absence of tools to solve conflict in a constructive way), which perpetuates

negative mood and stress, two triggering factors of overeating (Ansell, Grilo, & White, 2012; Stice, 2002).

For instance, across cultures, genders, and ages, insecurely attached people report lower relationship satisfaction, a variable that encompasses love, intimacy, affection, autonomy, growth, and competence amongst others (Mikulincer & Shaver, 2007f). On the other hand, securely attached adults report greater intimacy compared to both anxious and avoidant adults (see Mikulincer & Shaver, 2007f for complete review). Insecurely attached individuals have trouble disclosing in a healthy way in relationships. As such, compared to securely attached adults whose disclosure goals are guided by mutual enjoyment and intimacy, avoidant adults disclose too little and anxious adults disclose indiscriminately (Mikulincer & Shaver, 2007f). Insecurely (vs. securely) attached adults also have trouble managing conflict, being less likely to compromise and experiencing more post-conflict distress (Mikulincer & Shaver, 2007f). They are also more likely to leave conflict unresolved or to escalate it (Mikulincer & Shaver, 2007e). These patterns result in negative emotions that are reflected in their daily interaction reports. For example, avoidant (vs. secure) people report more negative and less positive emotions during daily interactions, and less supportive behaviors; while anxious (vs. secure) people report higher levels of negative emotions and feelings of rejection, as well as more pronounced emotional ups and downs (Mikulincer & Shaver, 2007e).

Similarly, the eating disorder literature underlines the pervasiveness of relationship difficulties in eating disorders patients (Broberg et al., 2001) and suggests that Interpersonal Psychotherapy is an effective treatment for women with eating disorders (Arcelus et al., 2013). While it is challenging to disentangle whether poor relationships lead to the onset of eating disorders or vice-versa (Broberg et al., 2001), the associations between eating pathology and

relationship problems cannot be denied. For instance, individuals with eating disorders were more likely to experience a critical familial environment (see Polivy & Herman, 2002 for complete review). Moreover, lower family communication, parental caring, and parental expectations were associated with a higher risk of developing an eating disorder (Polivy & Herman, 2002). Similarly, women diagnosed with an eating disorder reported lower maternal and paternal care, as well as higher overprotection (see Tetley, Moghaddam, Dawson, & Rennoldson, 2014 for complete review). These associations were also replicated within romantic relationships, with a positive association between sub-clinical eating disorders (such as weight control and dieting symptomatology) and relationship and intimacy difficulties (Arcelus et al., 2013).

Evidence for interpersonal difficulties as a mediating mechanism. To date, no study has empirically tested interpersonal difficulties as a mediating mechanism of the attachment and eating relationship. While some studies do describe this mediation process theoretically (Broberg et al., 2001; Milan & Acker, 2014), future research needs to explicitly test this mediation model.

Previous Reviews of Attachment and Eating

A total of eight reviews, spanning over 20 years, have addressed the links between attachment and eating (see **Appendix 1** for detailed summary of each review). With one exception, all reviews have maintained a clinical focus by examining attachment differences between eating disordered versus individuals from the general population. More importantly, however, they have reached similar conclusions—attachment insecurity was found to be more prevalent within individuals with eating disorders than controls (Caglar-Nazali et al., 2014; Kuipers & Bekker, 2012; O'Kearney, 1996; O'Shaughnessy & Dallos, 2009; Tasca & Balfour,

2014; Ward, Ramsay, & Treasure, 2000; Zachrisson & Skarderud, 2010). This conclusion was reached regardless of whether the review constrained attachment measurement to interviews, sometimes referred to as the gold-standard measure of attachment for clinicians (Kuipers & Bekker, 2012; Zachrisson & Skarderud, 2010), or included both interviews and self-report questionnaires (e.g., Tasca & Balfour, 2014); the effect, recently quantified by Caglar-Nazali and colleagues (2014) in a systematic review, is medium-to-high (r = .41; d = 1.31).

Previous reviews also established that anxious (Kuipers & Bekker, 2012; O'Kearney, 1996; O'Shaughnessy & Dallos, 2009), avoidant, and fearful (Kuipers & Bekker, 2012; O'Shaughnessy & Dallos, 2009) attachment styles were more likely to be found in samples of eating disordered individuals; conversely, eating disordered individuals were less likely to be classified as securely attached compared to their healthy counterparts (Zachrisson & Skarderud, 2010). The lack of attachment security in this population was also illustrated indirectly, with individuals with eating disorders reporting trouble with emotional autonomy (O'Kearney, 1996) or remembering their caregivers as being less supportive, responsible, available, and trustworthy (Ward et al., 2000). Individuals from clinical samples also reported high fear of abandonment (O'Kearney, 1996) and separation anxiety (Caglar-Nazali et al., 2014; O'Shaughnessy & Dallos, 2009; Ward et al., 2000). Similar to the above reviews, Jewell and colleagues (2016) reported a positive association (not yet quantified) between attachment insecurity and eating pathology level in children and adolescents age 8 to 20.

Research Questions

Our goal was to assess attachment–eating behavior relationships in the general population and explore potential relationship moderators. We addressed all questions empirically using

meta-analysis. The first question documents the extent to which attachment orientations play a role in unhealthy eating behaviors of the population at large (i.e., binge eating, bulimic symptoms, dieting, emotional eating, and unhealthy food consumption). In line with conclusions from prior meta-analyses comparing eating disordered individuals with controls, we hypothesize that greater attachment insecurity, including anxious, avoidant, and fearful attachments, will be linked with more unhealthy eating behaviors (H1); conversely, we hypothesize that greater attachment security will be negatively associated with unhealthy eating behaviors (H2). The second question quantifies associations between attachment and healthy eating (i.e., fruit and vegetable consumption, intuitive eating) in the general population. Nevertheless, due to the exploratory nature of this question, little available data, and lack of established evidence, we will directly explore and report findings.

Sample Type. As a follow-up question to our main inquiry, question three examines the extent to which attachment orientations affect similarly unhealthy eating behaviors when studies compare clinical to control groups versus when studies select participants from the population at large. We will be thus be able to quantify the extent to which a lack of attachment insecurity, for example, affects people with eating disorders and people from the general population. Based on our literature review, we expect that effect sizes from comparative studies (people with eating disorders vs. controls) will be higher for attachment insecurity compared to studies using only people from the general population (H3). Furthermore, we also expect that associations between attachment and unhealthy eating behaviors from comparative studies (vs. studies using individuals from the general population only) will be higher for attachment anxiety, avoidance, and fearfulness (H4), and lower for attachment security (H5).

Type of Unhealthy Eating Behavior. Our fourth question explores the extent to which attachment orientations are related to subtype of unhealthy eating behavior, i.e., binge eating, bulimic symptoms, dieting, emotional eating, and unhealthy food consumption, in the general population. This inquiry is motivated by the numerous and inconclusive efforts in the literature to move from more general attachment orientation–eating disorder associations, to linking attachment orientations with specific eating disorder subgroups, such as bulimia vs. anorexia vs. subthreshold eating disorders, for example (Broberg et al., 2001; O'Shaughnessy & Dallos, 2009). By formally testing whether attachment influences a specific unhealthy eating behavior more than another in the general population, we will be able to zoom in and better target that behavior in future studies and interventions. Conversely, a lack of differentiation would imply that attachment orientations affect similarly unhealthy eating behaviors, indicating that a more general view of attachment–unhealthy eating behaviors should be adopted.

Attachment Figures. Our fifth question explores the moderating role of attachment figures—close others, romantic partners, parents, and peers—on the attachment orientation and unhealthy eating behaviors relationship (see Ravitz, Maunder, Hunter, Sthankiya, & Lancee, 2010 differing relational foci). As explained earlier, people form attachments with parents, friends, partners, siblings, teachers, neighbors, to name just a few. However, the extent to which different attachment figures impact unhealthy eating behaviors has never been quantified using meta-analysis. At this stage, a clear qualitative pattern could not be extracted from the six studies available due to authors measuring different attachment figures and attachment orientations. For this reason, we proceed to report results directly. Documenting whether specific attachment figures (parental vs. romantic attachment, for example) play a greater role in determining

unhealthy eating behaviors could also lead to targeting specific dyadic relationships to change unhealthy eating behaviors (Ravitz et al., 2010).

Attachment Dimension vs. Style. Our sixth question assesses the moderating role of attachment dimension (vs. style)—do associations between attachment and unhealthy eating remain similar when attachment is measured as a dimension or a category/style (see Ravitz et al., 2010 categorical versus dimensional measurement)? As discussed earlier, attachment measurement scales allow for the conceptualization of attachment anxiety and avoidance as dimensions or as categories/styles (Ravitz et al., 2010; see Figure 1). Thus, it begs the question whether measuring attachment *dimensions* as opposed to *styles* could result in distinct attachment–unhealthy eating associations, as dimensions regroup more than one attachment style. To date only three studies provided both dimension and category measurements with mixed results and so we proceed to report results directly. Disentangling the effects of categorical versus dimensional measurement on the attachment-unhealthy eating behavior relations could result in more enlightened attachment measurement choices and indirectly provide a clue as to which strategies—hyperactivating or deactivating—influence unhealthy eating behaviors.

Method

The present meta-analytic review of quantitative studies followed the guidelines specified by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist (Moher, Liberati, Tetzlaff, Altman, & The Prisma Group, 2009).

Information Sources

A systematic review of studies involving attachment and eating behaviors was conducted in August 2015. Studies were identified by searching PubMed and PsychInfo databases simultaneously using the OVID online search engine, and the Science Direct database, from the first available publication to August 2015. We limited searches to English and human participants and included dissertations results provided by default from the PubMed and PsychInfo search engines. We supplemented aforementioned search results by Google Scholar searches, Web of Science inquiries, and reference scanning of relevant peer reviewed articles.

Eligibility Criteria

To be included in our meta-analysis a study had to 1) measure attachment using Bowlby (1969/1999) or Ainsworth (1978) conceptualization of the construct, 2) include at least one measure of unhealthy or healthy eating behavior, 3) include only individuals sampled from the general population or a comparison group sampled from the general population, 4) use a quantitative design, and 5) measure attachment towards a physical person. Articles were excluded from the review if they 1) included only clinical samples, 2) used an attachment that did not follow in Bowlby's (1969/1999) or Ainsworth's (1978) conceptualization of the construct, e.g., study measured quality of interpersonal relationships (e.g., Pierce, Sarason, Sarason, Solky-Butzel, & Nagle, 1997), fundamental parenting styles (e.g., Parental Bonding Inventory; Parker, Tupling, & Brown, 1979), or abandonment (e.g., Patton, 1992), 3) focused solely on eating or weight attitudes and concerns as opposed to eating behaviors (e.g., Sharpe et al., 1998), 4) aggregated eating or weight concerns with eating behaviors into one measure and study was too old to contact the authors, 5) focused solely on anorexia and anorexic behaviors, 6) dissertation was the same as published paper (published paper was kept), 7) study was a review (reviews were discussed above).

Publications were limited to Bowlby (1969/1999) and Ainsworth (1978) conceptualization of attachment to insure construct validity across studies. For this reason, all attachment measures included in the present review assessed the degree to which a person could depend, trust, and/or be close to an attachment figure. While disturbed eating and weight *attitudes and concerns* have been identified as precursors of disturbed eating *behaviors* (van Durme et al., 2015), we deliberately chose to focus this review solely on eating *behaviors* allowing us to acquire an in-depth understanding of and quantify the attachment–eating relationship in the population at large for the first time. Therefore, we decided to exclude purely restrictive eating behaviors associated with chronic underweight, such as oral control and anorexic symptoms, to reach more informative conclusions about an already complex set of questions concerning unhealthy and healthy eating behaviors. All authors using aggregated measures, e.g., overall disordered eating score calculated by summing anorexic and bulimic symptoms, were contacted to obtain the specific correlation of interest, e.g., attachment and bulimic symptoms. For example. Articles published more than 12 years ago, with aggregated and/or missing values were considered difficult to retrieve and were dropped from further analysis.

Search

Attachment + eat$ was used as a keyword search.

Study Selection

The first author independently screened the titles and abstracts of all identified citations and excluded irrelevant and unrelated references to the topic at hand. Full paper eligibility was also assessed in a non-blinded, standardized manner by the first author (A.F.) twice from

beginning to end, once in August 2013 and once in August 2015. In addition, in December 2016 research assistant A.B received a one-hour training session on established inclusion and exclusion criteria and a subset of studies to confirm study categorization. All disagreements between raters were resolved through discussion. **Figure 2** shows the flow diagram of the search process.

Data Collection Process

Data was manually extracted from each publication and input into an Excel file. An electronic data conversion sheet was then developed, which was pilot-tested on ten randomly-selected studies, and refined accordingly. Data collection was conducted for the first time in August 2013, re-conducted and refined in August of 2015, and updated in December 2016.

Data Items

Information extracted from each study included: 1) authors and date of publication, 2) number of participants in each study and recruitment place, 3) age range of participants, 4) sex of participants, 5) characteristics of attachment questionnaires (questionnaire name, attachment figure, attachment style/dimension measured), 6) eating behavior characteristics (questionnaire name and specific eating behavior measure), 7) any study findings.

As documented by Ravitz and colleagues (2010), studies used different nomenclatures or terms for overlapping attachment concepts. As such, studies reporting on secure attachment, secure base (N. L. Davis, 2001), confidence in relationships (Feeney, Noller, & Hanrahan, 1994), and felt security/trust (Schutz & Paxton, 2007) were coded as *secure attachment*. Attachment avoidance, dismissiveness, discomfort with closeness and relationship as secondary scales, as well as inability to depend on and be close with others, were coded as *avoidant attachment*.

Attachment anxiety and preoccupation, as well preoccupation with relationships and need for approval, were coded as *attachment anxiety*. Studies referring to attachment fearfulness or disorganization were coded as *fearful attachment*. Lastly, studies referring directly to attachment insecurity or lack of attachment security were coded as *attachment insecurity*. Attachment was coded as a dimension or a style based on the psychometric characteristics of the questionnaire and information provided in the publication's methodology.

We coded an eating behavior as being *unhealthy* if it focused on consuming low nutrient/high calorie items or eating more—in some cases much more—than was needed/healthy (Merriam Webster, dictionary), regardless of whether these behaviors were part of everyday eating habits or happened irregularly, e.g., binge eating episodes (Fairburn et al., 2003). Based on each article's methodology and eating questionnaires' subscales, we identified a total of 10 different unhealthy eating behaviors, namely 1) binge eating behaviors, 2) loss of control over eating, 3) disinhibited eating, 4) bulimic behaviors, 5) emotional eating, 6) dieting behaviors, 7) restriction food rules, 8) encouragement to overeat food rules, 9) low eating self-efficacy, and 10) unhealthy food consumption.[1] An eating behavior was coded as *healthy* if it was linked with a healthy lifestyle and contributed to long-term health (Falk, Sobal, Bisogni, Connors, & Devine, 2001). These behaviors included fruit and vegetable consumption, as well as intuitive eating (eating in response to satiety cues; see Iannantuono & Tylka, 2012). Unhealthy eating behaviors were associated with overweight or obesity (Hudson, Lalonde, Berry, & et al., 2006; Goossens, Braet, Van Durme, Decaluwe, & Bosmans, 2012; Kaltiala-Heino, Rissanen, Rimpela, & Rantanen, 1999; Kessler et al., 2013; Koenders & van Strien, 2011; Puhl & Schwartz, 2003), while the reverse was true for healthy eating behaviors (Anderson et al, 2016).

Risk of Bias in Individual Studies

To minimize bias within individual studies, we included all information and data points provided by the authors about attachment measures and eating. We also included dissertations to minimize file drawer bias. Non-significant associations between attachment and eating that were not explicitly reported were assumed to be zero (see Tamres et al., 2002 for similar method) if the authors could not be contacted.

Summary Measures

The product-moment correlation coefficient (*r*) was used to estimate effect size. We completed all analyses using Microsoft Excel, a web-based effect size calculator (Wilson, n.d.), and the Comprehensive Meta-Analysis, Version 3 (CMA; Borenstein, Hedges, Higgins, & Rothstein, 2009).

Synthesis of Results

The product-moment correlation coefficient (*r*) used to estimate effect sizes was calculated from correlations, means and standard deviations, frequencies, and a combination of statistical tests available within individual publications. Following the independence assumption whereby a study can only contribute to one effect size within a meta-analysis (Lipsey & Wilson, 2001), multiple effect sizes within the same study were combined into a single effect size by transforming all *r*s into Fisher's *z* coefficients, averaging the coefficients, and converting the resulting *z* coefficient into an *r* (Rosenthal, 1991; for similar procedures see Tamres et al., 2002). This was the case for studies where authors reported results on more than one eating related variable (e.g., binge eating and emotional eating), measured attachment towards multiple attachment figures (e.g., parents and romantic partners), or reported the attachment and eating relationship separately for males and females. In light of the gathered evidence, averaging effect

sizes rather than randomly selecting one representative effect size was preferred as being most inclusive of all data points.

Cochran's *Q* chi-square statistic was used to measure effect size robustness (homogeneity). *Q* has been shown to have low power as a comprehensive heterogeneity test when the number of studies is small (Gavaghan, Moore, & McQuay, 2000) or conversely when it is large (Higgins, Thompson, Deeks, & Altman, 2003). To remediate this weakness, the I^2 statistic was also reported, which describes the percentage of variation across studies due to heterogeneity rather than chance (sampling error) independent of the number of studies (Higgins & Thompson, 2002; Higgins et al., 2003). Significant *Q* and I^2 statistics are reported in our results tables. Higgins, Thompson, Deeks, and Altman (2003) suggested that an I^2 of 25% might be considered low, 50% considered moderate, and 75% considered high.

Risk of Bias across Studies

Publication bias was assessed for all significant relationships using Orwin's fail-safe *N*. Based on effect sizes of significant relationships, its value was set at .05 to correspond to trivial, no effect associations (Cohen, 1988). Orwin's fail safe *N* thus indicated the number of publications with effect sizes of .05 required to invalidate reported results by making them non-significant. Publication bias was also assessed for the attachment and unhealthy eating relationships using funnel plots; we were unable to assess publication bias for the attachment–healthy eating relationship due to paucity of data.

Additional Analyses

Weighted analyses of variance (ANOVA) were run to examine categorical moderator variables (i.e., type of unhealthy eating, attachment figure, dimension vs. style attachment

measure, and comparative vs. general population studies only) and detect group differences using a fully randomized model which provided the best fit. In this case, calculating categorical models resulted in a between-class goodness-of-fit *Q* statistic, equivalent to a main effect in an analysis of variance indicating whether the categorical moderator fully explained variance in the data (Cortina, 2003). When publications included associations for more than one effect size, we randomly selected one observation per publication and proceeded to run the moderation analysis (Lipsey & Wilson, 2001). If only one single publication was available to represent a moderator category, the article was excluded from the analysis and the assessment was re-run; the goal was to provide the most informative conclusions on the role played by moderators. In other words, when inquiring about the moderating role of attachment figure on the attachment anxiety–unhealthy eating relationship, for example, if only one study provided data for *peer* anxious attachment, the peer anxious attachment data point was dropped and the analysis re-run with parents, romantic partners, and close others as attachment figures. Due to the weaknesses of the *Q* statistic (Gavaghan et al., 2000), moderation analysis was performed even in the absence of a significant *Q*.

Results

Study Selection

Our initial attachment and eating search produced 771 records, with 675 remaining after duplicates were removed and three additional records were added from other sources. After incomplete and irrelevant references were excluded, a total of 207 full-text articles were assessed for eligibility. Applying the above inclusion/exclusion criteria yielded a total of 70 publications

to be included in the final meta-analysis—47 journal articles, 22 dissertations, and one peer-reviewed conference abstract. See **Figure 1** for step-by-step study selection process.

Study Characteristics

Table 1 provides a summary of each of the studies included in the present meta-analysis. Publications consisted of 67 cross-sectional studies, two longitudinal, and one study combining a cross-sectional and longitudinal design. The majority (k = 58) of studies was conducted in 2000 or later. All in all, a total of 56 studies were used to estimate the attachment and eating relationship in individuals from the general population and 14 additional studies to corroborate and further quantify attachment differences between individuals diagnosed with an eating disorder and controls.

< *Insert **Table 1** about here* >

Across studies, the total number of participants was 19,470 (n = 13,833 females, n = 5,644 males). Out of 70 studies, 51 included female-only samples, 17 included male and female samples, and two included male-only samples. The average age of participants was 21.97 years (SD = 3.54), and the majority of participants were university and college students (k = 48 studies). Other participants included community adults (k = 11 studies), high school and grade school children (k = 8 studies), as well as participants recruited from larger cohort studies (k = 3 studies). Eating disordered samples were recruited from patient and outpatient clinics (k = 7), from the greater community (k = 2), and from universities/colleges/high school (k = 5).

Attachment orientation was measured as an enduring trait (Ravitz et al., 2010) in all but one study which also primed attachment style (Wilkinson et al., 2013). As such, the majority of publications relied on questionnaires to assess this construct (k = 66). The remaining of the

studies used attachment interviews, $k = 3$ (Barone & Guiducci, 2009; C. R. Davis et al., 2014; Lockwood, 2004) and a prime, $k = 1$ (Wilkinson et al., 2013). Although various questionnaires were used to assess attachment orientation, approximately one third of the studies relied on the Experience in Close Relationships questionnaire (Fraley, Waller, & Brennan, 2000; Wei, Russell, Mallinckrodt, & Vogel, 2007). Roughly half of the studies relied on either the Binge Eating Scale (Gormally, Black, Daston, & Rardin, 1982), EAT-26 (Garner, Olmsted, Bohr, & Garfinkel, 1982), or EDI/EDI-2 (Garner, 1991; Garner, Olmstead, & Polivy, 1983) to measure eating behaviors. Effects sizes were calculated from correlations ($k = 52$), means and standard deviations ($k = 9$), frequencies ($k = 3$), and a mix of coefficients ($k = 6$).

Risk of Bias within Studies

Studies included in the present meta-analysis relied on validated measures to assess attachment and eating, thus limiting possible bias. The studies relied extensively on university and college students and were skewed towards female-only samples. These potential limitations are elaborated upon in the discussion section.

Results for Individual Studies

Random effect-size models of correlation coefficients (r) were calculated for unhealthy eating and healthy eating behaviors, respectively, and collapsed across each attachment orientation.

Synthesis of Results

Attachment Orientation and Unhealthy Eating Associations. Studies demonstrated significant small and small-to-moderate associations between unhealthy eating behaviors and

attachment orientation, *p*s = .000. Specifically, higher attachment insecurity (*k* = 11; *r* = .266; *95% CI* [.128, .393], I^2 = 0.00), anxiety (*k* = 33; *r* = .271; *95% CI* [.228, .314], I^2 = 0.00), fearfulness (*k* = 27; *r* = .184; *95% CI* [.112, .253], I^2 = 0.00), and avoidance (*k* = 25; *r* = .120; *95% CI* [.071, .169], I^2 = 10.54), respectively, was linked with more unhealthy eating behaviors; conversely, higher attachment security was associated with lower unhealthy eating behaviors, (*k* = 27, *r* = -.176, *95% CI* [-.216, -.136], *p* = .000, I^2 = 9.61). Importantly, all results were homogeneous, showing normal *Q* and low I^2 statistic values across associations. As such, all of the variation observed for attachment insecurity, anxiety, fearfulness, and security was due to sampling error (chance) rather than heterogeneity (real differences in effect sizes), and only 10.54% of the total variation observed for attachment avoidance can be attributed to heterogeneity rather than sampling error (for complete statistics, please consult **Table 2)**.

Attachment Orientation and Healthy Eating Associations. A robust negative association was established between attachment avoidance and healthy eating—higher avoidant orientation was associated with less healthy eating (*k* = 2, *r* = -.211, *95% CI* [-.296, -.122], *p* = .000, I^2 = 0.00). Attachment security was not correlated with healthy eating, *p* > .05. No other associations could be tested due to paucity of data (see **Table 2**).

<*Insert **Table 2** about here*>

Risk of bias across studies

All in all, there was no difference between the strength of associations reported within peer-reviewed articles and dissertations for unhealthy eating behaviors and attachment insecurity, avoidance, or fearful relationships, *p* > .05. However, anxious attachment and unhealthy eating relationships reported within peer-reviewed publications were significantly

stronger than those reported within dissertations ($Q_{anxiety}$ = 4.61, p < .05; $k_{article}$ = 21; $r_{article}$ = .302; *95% CI* [.254, .355]; k_{thesis} = 12; r_{thesis} = .212; *95% CI* [.142, .280]). Conversely, attachment security and unhealthy eating associations published within peer-reviewed articles were weaker compared to those from dissertations ($Q_{security}$ = 4.89, p < .05; $k_{article}$ = 16; $r_{article}$ = -.144; *95% CI* [-.190, -.097]; k_{thesis} = 11; r_{thesis} = -.230; *95% CI* [-.289, -.169]). These results suggest that participants recruited for dissertation purposes were *healthier* (higher security, lower anxiety) and indicate a small file-drawer bias remedied in this case by including both peer-reviewed articles and dissertations in our meta-analysis.

Moreover, all results presented were homogeneous, with little to no heterogeneity as indicated by I^2 scores ranging between 0% and 20% across all relationships examined. In addition, based on Orwin's fail safe *N*, the number of studies required to invalidate attachment and unhealthy eating relationships is of 158 for attachment anxiety, 80 for attachment insecurity, 63 for attachment security, 42 for attachment avoidance, and 20 for attachment fearfulness. In other words, roughly 1.5–7 times more studies would be required to invalidate these relationships (**Table 2**).

Funnel plots (standard error by effect size) were created for each attachment-unhealthy eating relationship. Plots were first inspected visually to see whether they had a funnel shape with larger studies appearing at the top and smaller studies at the bottom. The presence of a funnel shape suggests that, as the sample size increases, studies converge more and more around the true mean, indicating that publication bias is not likely to have exerted an influence on results (Rothstein, 2008). As shown in **Figure 3**, our plots had funnel shapes, indicating that publication bias was not likely to have affected our findings. In addition, by making dissertations an inherent part of our inquiry, we have directly addressed publication bias as explained above.

<Insert Figure 2 and 3 about here>

Additional analyses

Sample Type Moderation Effects. In the present meta-analysis, our main goal was to examine the relationship between attachment orientation and unhealthy eating behavior in individuals from the general population (question one). Our third question examines the extent to which comparative studies (studies comparing people with clinical levels of bulimia nervosa and binge eating disorders vs. controls; see **Table 4**) and those using only individuals from the general population (see **Table 2**) show similar strengths in their attachment–unhealthy eating behavior relationships. Does attachment play a greater role in determining unhealthy eating behaviors in eating disordered populations than in the general population? Please note that when coding comparative studies, the clinical sample was assumed to be the treatment condition and individuals recruited from the general population, the control. Consequently, a significant positive association between attachment and unhealthy eating in **Table 4** means that the clinical group scored higher than the control group; the reverse is true for a negative sign.

*<Insert **Table 4** about here>*

Moderating analyses for sample type showed stronger relationships between attachment anxiety ($Q(1, k = 38) = 4.13$, $p < .05$) and avoidance ($Q(1, k = 30) = 4.07$, $p < .05$) with unhealthy eating behaviors in comparative studies as opposed to studies using participants from the general population. In other words, eating disordered individuals show significantly higher levels of attachment anxiety and avoidance compared to their general population counterparts. Conversely, there were no significant differences between attachment insecurity ($Q(1, k = 20) = 1.23$, $p > .05$) or security ($Q(1, k = 31) = 4.07$, $p < .05$) relationships in studies using comparative

versus participants from the general population. These results suggest that indeed, people diagnosed with clinical levels of bulimia and binge eating disorders have higher levels of attachment anxiety and avoidance than what is found in the general population, thus confirming H4. On the other hand, attachment insecurity and security contribute equally to unhealthy eating behaviors in both, people with clinical levels of disordered eating and those recruited from the general population. By showing similar effect sizes in both types of studies, these findings disconfirm both H3 and H5. However, despite these non-significant effects, it is important to note that the attachment–unhealthy eating effect sizes obtained from comparative studies (**Table 4**) were always larger than those obtained from general population samples (**Table 2**). Please note that we could not determine differences for attachment fearfulness due to paucity of data in comparative studies.

Type of Unhealthy Eating Behavior Moderation Effect. Following our general findings on attachment and unhealthy eating associations, an essential question remained—were all types of unhealthy eating behaviors equally influenced by attachment orientation or did this relationship vary depending on the type of unhealthy eating behaviors studied (question four)? For more robust estimations, before proceeding to the formal moderator analysis, we grouped binge eating behaviors, loss of control over eating, and disinhibited eating under the binge eating construct as these variables represent overeating behaviors that feel outside a person's control (Bryant, King, & Blundell, 2008; Fairburn, 2001; Fairburn et al., 2003; Goossens et al., 2011; Stunkard & Messick, 1985). Furthermore, dieting behaviors and restriction food rules were grouped together under dieting behaviors as both variables reflect failed attempts to restrict food intake (Lowe, Doshi, Katterman, & Feig, 2013; Puhl & Schwartz, 2003). Unhealthy food consumption, encouragement to overeat food rules, and low eating self-efficacy were also grouped together

under unhealthy food consumption as these variables highlight normal eating behaviors that have the potential to override satiety cues in everyday food consumption (Glynn & Ruderman, 1986; Prichard, Hodder, Hutchinson, & Wilson, 2012; Puhl & Schwartz, 2003).

Our results show that there was no difference between binge eating, bulimic and dieting behaviors, unhealthy food consumption, and emotional eating for attachment anxiety ($Q(5, k = 30) = 8.52$, $p > .05$), avoidance ($Q(3, k = 21) = 1.61$, $p > .05$), security ($Q(2, k = 25) = 0.03$, $p > .05$), or fearfulness ($Q(1, k = 7) = 1.81$, $p > .05$), $p > .05$. Because of the independence assumption whereby one study cannot contribute to estimate more than one effect size within a meta-analysis (Lipsey & Wilson, 2001), we were unable to provide a robust estimate of insecure attachment by specific unhealthy eating behavior subtype. To compensate for this limitation and to further illustrate our findings, **Table 3** provides complete independent estimates of attachment orientation per type of unhealthy eating behavior. Together, findings illustrate that our general conclusions regarding small and small-to-moderate significant relationships between attachment and unhealthy eating behaviors are replicated across type of unhealthy eating behavior.

*<Insert **Table 3** about here>*

Attachment Figure Moderation Effects. In question five, we assessed whether all attachment figures (parental, peer, close other, and romantic partners) were created equal with regard to their capacity to influence unhealthy eating behaviors or whether the attachment–unhealthy eating relationship was moderated by the type of attachment figure towards which it was measured. We tested these assumptions quantitatively. Our results showed that attachment figure moderated the attachment avoidance–unhealthy eating relationship ($Q(2, k = 24) = 13.78$, $p = .001$), in that only avoidant relationships with parents ($z = 3.42$, $k = 5$, $r = .152$, *95% CI*

[.065, .237], $p < .01$) and romantic partners ($z = 6.54$, $k = 16$, $r = .157$, *95% CI* [.111, .203], $p < .001$) were related to unhealthy eating, but not relationships with close others ($z = -1.29$, $k = 3$, $r = -.077$, *95% CI* [-.191, .040], $p > .05$). No other associations were significant, meaning that type of attachment figure did not moderate the attachment orientation–unhealthy eating relationship for attachment insecurity ($Q(3, k = 11) = 3.29$, $p > .05$), anxiety ($Q(2, k = 32) = 0.83$, $p > .05$), security ($Q(3, k = 27) = 4.70$, $p > .05$), and fearfulness ($Q(2, k = 7) = 0.06$, $p > .05$). We conclude that while avoidant attachments towards parents and romantic partners are more determinant of unhealthy eating behaviors than relationships with close others, insecure, anxious, secure, and fearful attachments towards parents, peer, close others, and romantic partners affect unhealthy eating behaviors in similar ways. Please note that due to the paucity of data (only one study available), attachment avoidance, anxiety, and fearfulness towards peers, as well as attachment fearfulness towards romantic partners could not be included in our analyses.

Attachment Dimension (vs. Style) Moderation Effects. As seen previously, people with high scores on the attachment anxiety dimension can be categorized as having either anxious (high anxiety/low avoidance) or fearful (high anxiety/high avoidance) attachment styles. Similarly, people with high scores on the attachment avoidance dimension may belong to the avoidant (high avoidance/low anxiety) or to the fearful (high avoidance/high anxiety) attachment category (see **Figure 1**). In addition, some studies averaged avoidant and attachment dimension scores into an insecure dimension while others averaged attachment avoidance, anxiety, and fearfulness styles into an insecure attachment style.

In our sixth and final question, we examined whether attachment dimensions and styles led to similar levels of unhealthy eating behaviors or whether these associations varied depending of whether attachment was measured as dimension or style. Our results indicate that

the attachment–unhealthy eating relationship was not affected by whether attachment insecurity ($Q(1, k = 11) = 0.27$, $p > .05$), anxiety ($Q(1, k = 33) = 0.27$, $p > .05$), and avoidance ($Q(1, k = 25) = 3.18$, $p > .05$) were measured as dimensions or categories. Interestingly, while the strength of the associations remained highly similar for attachment insecurity (*dimension*: $z = 2.32$, $k = 4$, $r = .264$, *95% CI* [.042, .462], $p < .05$; *style*: $z = 3.01$, $k = 7$, $r = .266$, *95% CI* [.095, .422], $p < .01$) and anxiety (*dimension*: $z = 8.90$, $k = 18$, $r = .281$, *95% CI* [.221, .338], $p < .001$; *style*: $z = 7.32$, $k = 15$, $r = .259$, *95% CI* [.192, .324], $p < .001$), the effect size of the avoidance–unhealthy eating association was small when it was measured as a dimension ($z = 5.02$, $k = 16$, $r = .151$, *95% CI* [.093, .209], $p < .001$) and trivial ($z = 1.33$, $k = 9$, $r = .058$, *95% CI* [-.027, .142], $p > .05$) when measured as a style. Unfortunately, the latter finding did not reach statistical significance ($p = .074$). In sum, our findings show no dimension versus category difference between attachment insecurity and anxiety. Moreover, in light of available evidence, we cannot conclude that the inclusion of a fearful attachment category within the attachment avoidant dimension drives the associations between attachment and unhealthy eating; future studied are needed to assess this specific moderation effect.

Discussion

The present article investigated attachment–eating associations in individuals of the general population and mapped the reminder of the attachment–eating associations in comparative studies (clinical eating disordered vs. control groups) by examining a total of 70 articles and 19,470 participants. Our main goal was to quantify the importance of attachment relationships for eating in the general population. To gain a deeper understanding of this relationship, we also explored four potential moderating factors, namely sample type, type of unhealthy eating behavior, attachment figure, and attachment measure.

We found robust small and small-to-moderate associations between attachment orientations and unhealthy eating behaviors in individuals of the general population. Specifically, we found that when people had higher attachment insecurity (small-to-moderate effect), anxiety (small-to-moderate effect), avoidance (small effect), and fearfulness (small effect), they were also more likely to display unhealthy eating behaviors. Our meta-analytic findings thus support our first hypothesis (H1) as well as conclusions from previous clinical reviews whereby eating disordered individuals were more likely to show higher levels of insecure (Kuipers & Bekker, 2012; O'Kearney, 1996; O'Shaughnessy & Dallos, 2009; Tasca & Balfour, 2014), anxious (Kuipers & Bekker, 2012; O'Kearney, 1996; O'Shaughnessy & Dallos, 2009), avoidant, and fearful attachments (Kuipers & Bekker, 2012; O'Shaughnessy & Dallos, 2009) than controls recruited from the general population.

In line with our second hypothesis (H2), we also found a significant reversed effect for attachment security—people with higher attachment security showed fewer unhealthy eating behaviors (small effect). This finding is also in agreement with a previous review reporting that eating disordered individuals were less likely to be categorized as securely attached compared to controls (O'Kearney, 1996). In sum, we can state with confidence that attachment orientations play a reasonable role in the unhealthy eating behaviors witnessed in the general population, whereby insecure attachments (including anxious, avoidant, and fearful) are associated with more unhealthy eating behaviors and secure attachments with fewer. We also underline the importance of relationships for *all* individuals from the general population with regard to unhealthy eating, thus extending conclusions from previous clinical reviews to the general population.

We also attempted to quantify the attachment–healthy eating relationship. Unfortunately, to date, only four studies examined associations between attachment orientation and healthy eating (Bost et al., 2014; C. R. Davis et al., 2014; Iannantuono & Tylka, 2012; Prichard et al., 2012). Because of the paucity of data, we could not compute any associations between attachment insecurity, anxiety, and fearfulness, respectively, and healthy eating. However, we did find that more avoidant people were also less likely to adopt healthy eating behaviors. Specifically, higher attachment avoidance was associated with lower diet quality (C. R. Davis et al., 2014) and lower intuitive eating scores (Iannantuono & Tylka, 2012). On the other hand, a secure attachment was not related to healthier eating behaviors, as measured by vegetable consumption frequency (Prichard et al., 2012) and dietary quality (C. R. Davis et al., 2014). It is important to note that, based on so few studies, the present conclusions are tentative at best. Future research on attachment orientation and eating should also routinely incorporate measures of healthy food choices (eating 5-10 portions of fruits and vegetables per day) and behaviors (eating breakfast, eating together) to draw more robust conclusions about the strength of these associations and their influence on adopting healthier lifestyles.

An important contribution of the present paper is the investigation of potential moderators of the attachment–unhealthy eating relationship as they allow for the elaboration of better-defined research questions and more targeted interventions by taking into account precise eating and attachment facets. Question three assessed whether attachment–unhealthy eating behavior associations from studies comparing eating disordered to control groups differed from studies sampling participants from the general population. Because of our all-inclusive search criteria, we identified both—studies that assessed incremental associations between attachment and unhealthy eating behaviors in the general population (see **Table 2**) and those that assessed

attachment differences between eating disordered (binge eating and bulimia nervosa) versus control groups (see **Table 4**). As such, we were able to replicate findings from Caglar-Nazali and colleagues (2014) who showed moderate-to-high insecurity effects for eating disordered versus controls (see **Table 4**). Secondly, we were able to complement their findings and further quantify attachment differences between eating disordered individuals and controls; specifically, we found small-to-moderate differences for attachment avoidance and security, and moderate-to-high for attachment anxiety (see **Table 4**). We could not assess differences for attachment fearfulness, more studies being required.

Moderating analyses with sample type showed that, in line with our fourth hypothesis (H4), attachment anxiety and avoidance were stronger predictors of unhealthy eating behaviors in comparative studies than in general population studies. Although effect sizes for attachment security and insecurity were bigger for comparative studies (vs. general population studies), these differences did not reach significance, thus disconfirming H3 and H5. In other words, as expected from previous reviews, it seems that individuals who have been diagnosed with an eating disorder have significantly higher levels of attachment avoidance and anxiety. Conversely (and unexpectedly), we found that attachment security, or lack thereof in the case of attachment insecurity, affects similarly clinical and individuals from the general population. In other words, it seems that promoting security (and minimizing overall attachment insecurity), might lead to equally lower unhealthy eating behaviors for both, people afflicted with eating disorders and those from the general population. However, comparative studies show that people who suffer from eating disorders indeed have higher levels of attachment anxiety and avoidance, not only when compared to controls but when compared to the general population as well. As such, although attachment orientations and unhealthy eating are significantly related in the general

population, associations between unhealthy eating and attachment orientations are stronger in comparative (vs. general population) studies; this is particularly the case for anxious and avoidant orientations. The latter findings might be a function of the severity of unhealthy eating behaviors in the disordered eating population.

Question four showed that the attachment orientation–unhealthy eating did not vary by eating behavior subtype. In other words, all attachment orientations were equally predictive of binge eating, bulimic symptoms, dieting behaviors, unhealthy food consumption, and emotional eating behaviors. Insecure attachments were positively linked with each subtype of unhealthy eating behavior and secure attachment negatively. These associations were robust and similar in strength (small and small-to-moderate) to the overall attachment–unhealthy eating associations reported earlier. It is important to underline that because the study of attachment differences and eating originated in clinical settings, much of the variables examined thus far in the general population stemmed from this line of work. Consequently, eating variables reflecting disordered eating (e.g., binge eating and bulimic symptoms) have received the lion's share of attention in contrast to those reflecting unhealthy eating in individuals from the general population (e.g., high caloric food consumption and emotional eating). Future studies need to extend our understanding of eating in the general population by including measures reflecting the average person's food consumption. Such measures could include full-length Food Frequency Questionnaires (which routinely include detailed food item consumption, such as pizza, cereals, and fruits), spending on various food categories and frequency of eating out, as well as confidence in cooking skills, preference for healthy foods, and broader adoption of healthy eating habits (not watching TV while eating, eating breakfast, trying new healthy foods, learning new recipes, etc…).

Question five showed that, with the exception of attachment avoidance, attachment figure did not moderate the attachment–unhealthy eating relationship. In other words, all attachment figures, whether parental, peer, close others or romantic, were created equal with no dyad being more important than another in influencing the attachment and unhealthy eating behavior associations. However, in the case of attachment avoidance, only attachment towards parents and romantic partners but not attachment towards close others predicted unhealthy eating behaviors. A reason why relationships with close others was not significant could be the paucity of studies measuring this variable (k = 3). An alternative explanation could be the lack of specificity when referring to close others in questionnaires—close others might be interpreted as an all-inclusive term referring to parents, partners, friends, and/or acquaintances, thus yielding lower effect sizes compared to when participants are prompted to think about specific relationships such as romantic partners or parents. These explanations, however, remain only tentative until more evidence is gathered about attachment avoidance towards close others. Studies should also consistently inquire about multiple attachment figures—including peer attachment avoidance and anxiety, as well as fearful attachment towards romantic partners—to assess whether attachment figures are equal predictors of unhealthy eating behaviors, especially when examining new everyday eating behaviors and habits. Moreover, our findings hint towards the ability of parental attachment histories to influence present adult unhealthy eating behaviors as much as present romantic attachments. This is an interesting finding that emphasizes the strength of all attachment relationships to influence unhealthy eating behaviors rather than the effect of a specific dyad.

In question six, we examined whether measuring attachment as a dimension versus style could affect the attachment–unhealthy eating relationship. This question also allowed us to

inquire indirectly which emotional regulation and coping mechanism(s) were potentially responsible for unhealthy eating behaviors— the stress-perpetuating hyperactivation strategies, stress-inhibiting deactivating attachment strategies, or both. Our findings, however, showed no difference in unhealthy eating behaviors when measuring attachment insecurity, anxiety, and avoidance as dimensions (x and y axes of the Cartesian plane which tap into more than one attachment style) or styles (quadrants of the Cartesian plane; see **Figure 2**). In light of the present evidence, we conclude that all maladaptive coping strategies, whether hyperactivating, deactivating or both, are similarly associated to unhealthy eating behaviors.

Nevertheless, we also wanted to underline that while no moderation effect was significant, when measuring attachment insecurity and anxiety as dimensions or styles), their respective relationship with unhealthy eating behaviors remained highly similar (small-to-moderate effects). In fact, for attachment insecurity there was virtually no difference between dimensions and styles (p = .98), while the effect size difference for attachment anxiety was of .020 (p = .67). The association between attachment avoidance and unhealthy eating, however, yielded a small effect when measured as a dimension (i.e., when tapping into avoidance and fearfulness styles) and a trivial/non-significant effect when measured as a style (i.e., when tapping into attachment avoidance only). Taken together, these results suggest the path to unhealthy eating behaviors in individuals from the general population might be more accurately captured by the hyperactivation/stress-perpetuating as opposed to deactivation/stress-inhibiting attachment strategies, although more future research is needed to ascertain these conclusions (Mikulincer & Orbach, 1995; Mikulincer & Shaver, 2007g).

The notion that attachment hyperactivation could be linked with more unhealthy eating behaviors in the general population was also reflected in our main set of analyses. For instance,

while all associations between attachment and unhealthy eating were significant, the strongest associations were found for attachment anxiety and insecurity, and the weakest for attachment avoidance. Unfortunately, due to the independence assumption required for meta-analysis whereby one study equals one observation, we cannot quantify these differences. However, in addition to measuring attachment and specific emotion regulation strategies, future studies should record the frequency of perceived daily threats as well as the type and degree of negative emotions reported by anxious and avoidant people and relate them to their food consumption. This could be achieved using experience-sampling procedures, for example.

In general, our findings suggest that building secure attachment styles may simultaneously contribute to reducing unhealthy eating behaviors. Moreover, in line with research showing unhealthy eating–obesity and attachment–obesity associations (Diener et al., 2016; Lee et al., 2011; Swinburn et al., 2011), our findings also suggest that secure attachment styles may contribute to heathier weights in children and adults through healthier eating. Consequently, teaching parents and future parents to be sensitive and responsive to their children cues (including children's feeding cues) may be an effective primary prevention intervention, setting the baseline for a secure attachment style and concurrently for less unhealthy eating—ultimately for potentially healthier lifetime trajectories. On this matter, Satter provides a set of instructional material that teaches parents how to pay attention to children's feeding cues (Ellyn Satter Institute). Nevertheless, much in line with attachment theory, she also proposes that parents should be engaging and sensitive when feeding their children and, most importantly, they should respect the child's autonomy when it comes to feeding at *all* ages (Satter, 1990, 1995). This should start as early as the child is born when feeding interactions are the main focus of the parent-child relationship. She proposes that achieving a secure attachment style is tightly linked

with a positive eating dynamic and thus "any influence that leads a parent to be underresponsive to a child's feeding cues or over-controlling of the feeding process puts the feeding dynamics at risk and is likely to impair the child's ability to eat well" (Birch, 1999; Satter, 1995, p. 183).

When healthy eating habits cannot be acquired in infancy, security and sensitivity promoting interventions may help improve attachment relationships and, by the same token, diminish ongoing unhealthy eating behaviors (Bakermans-Kranenburg, van Ijzendoorn, & Juffer, 2003). As such, interventions that enhance the ability of parents to reflect on their own attachment experiences, promote parental sensitivity behaviors to create a secure base for the child, or take the parent-therapist relationship as a secure base from which parents can change, could also help reduce unhealthy eating behaviors (Bradley, 2007). More importantly, these interventions are not only reserved for parents but are also available for caregivers in general (Circle of Security). Also, review findings by Bakermans-Kranenburg and colleagues (2003) showed that attachment interventions did not necessarily require a broad focus, a high amount of sessions with families, or needed to start early in life or before birth to be successful; rather small focused sessions were enough. More encouraging, sensitivity and attachment interventions were more effective in clinical and high-risk groups (Bakermans-Kranenburg et al., 2003).

Conversely, because attachment is at the core of emotion regulation, providing people with tools to minimize distress could also help reducing unhealthy eating behaviors in the absence of other interventions. For instance, findings show that lower mindfulness mediated the association between attachment anxiety and avoidance, and eating pathology (Pepping, O'Donovan, Zimmer-Gembeck, & Hanisch, 2015). Consequently, teaching insecurely attached people how to be mindful could not only provide a positive way of coping with distress (see Khoury et al., 2013 for a review) but also a way to avoid unhealthy eating. Moreover, both

anxious and avoidant people could prioritize eating at home, a place where female adult participants reported feeling calmer and less anxious when consuming meals as opposed to eating outside (Lu, Huet, & Dubé, 2011).

A limitation of the present meta-analysis is that, with the exception of two studies, all articles used a cross-sectional design. Moreover, studies relied on questionnaires for both the assessment of attachment (four exceptions) and eating (one exception). Consequently, prospective studies should incorporate longitudinal designs and laboratory experiments to verify the cause–effect associations between attachment and eating. Moreover, the majority of our studies were heavily biased towards females—51 studies over 70 used female-only samples—and college/university student populations, potentially restraining our conclusions to a younger female population. While this could be the case, it is important to underline that attachment theory is a universal concept (Bowlby, 1969/1999) and, despite the average age across studies being approximately 22, age averages for individual studies ranged from 9 to 51 years old. Nonetheless, future studies should recruit more diverse samples, routinely including males as well as different ethnic groups, levels of education, and socioeconomic statuses in their assessments. More diverse samples could also allow to examine gender and socio-economic moderating effects of attachment and eating associations. Lastly, while we described potential mechanisms at play, few studies actually tested mediating mechanisms. This part is paramount in understanding how attachment and eating are related.

Despite these limitations our findings showed that insecure attachment orientations are positively related with unhealthy eating in the general population while attachment security is negatively associated with unhealthy eating. These associations are robust and extend previous meta-analytic findings to show that, although attachment anxiety and avoidance might constitute

a particular risk for eating disordered individuals, any insecure orientation (including anxious, avoidant, and fearful) is associated with unhealthy eating behaviors in general. More evidence is needed to determine how attachment and healthy eating are linked, assess potential mechanisms at play between attachment and eating. More longitudinal studies are also required to ascertain the causal effects of attachment on eating.

1168 **Figure 1**: Dimensional model of individual differences in adult attachment (Brennan et al., 1998)

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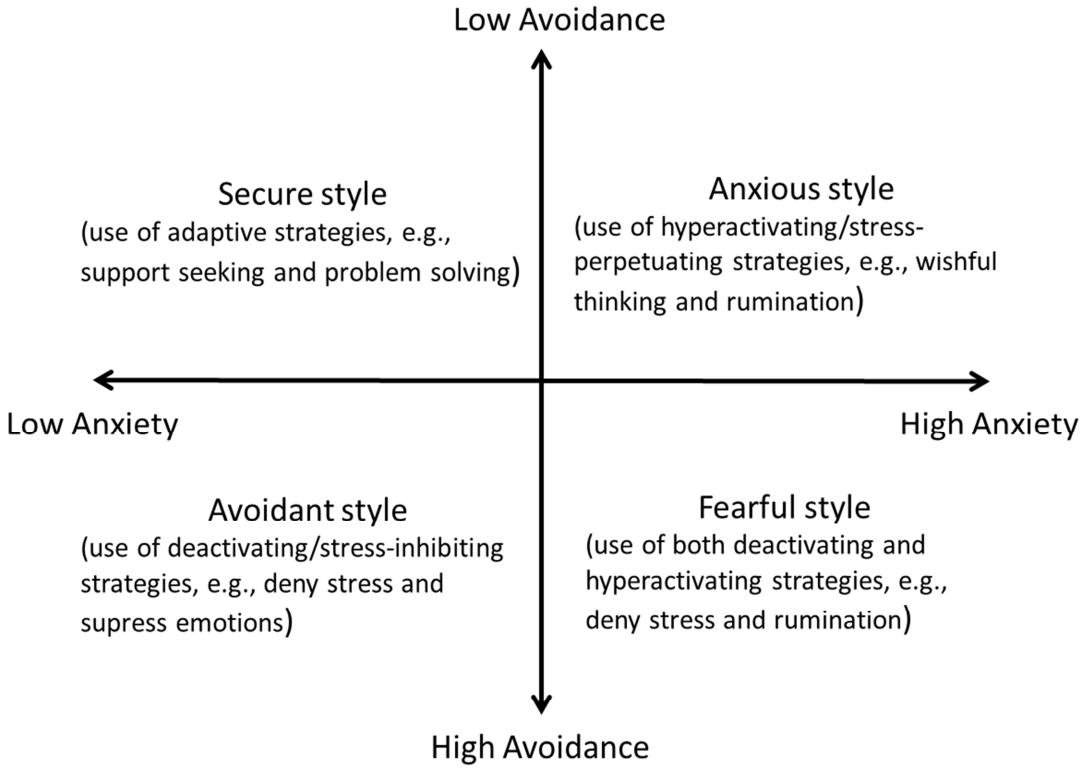

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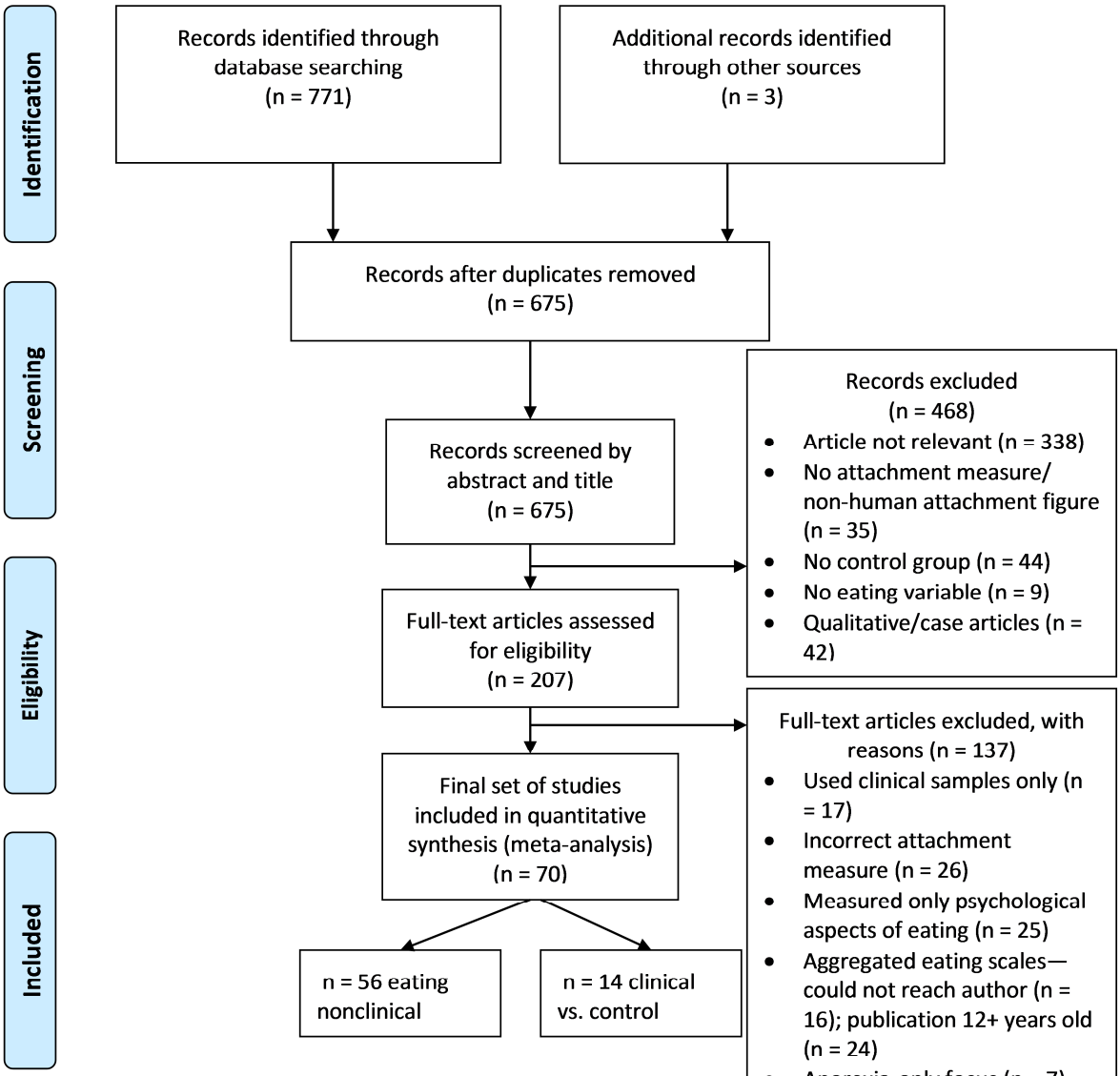
1173 **Figure 2**: Flow diagram of the study selection process



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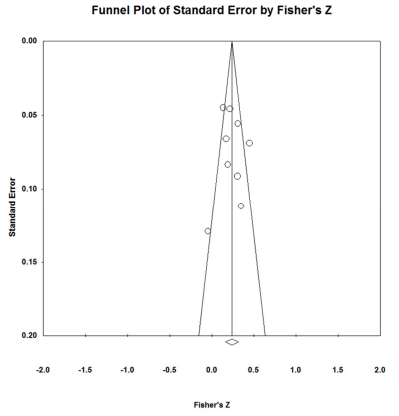
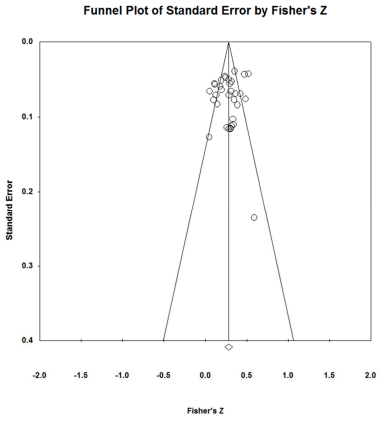
1176 **Figure 3**: Funnel plots of significant attachment-unhealthy eating relationships

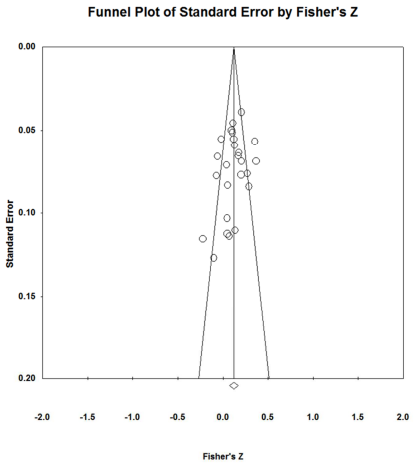
Attachment insecurity and unhealthy eating



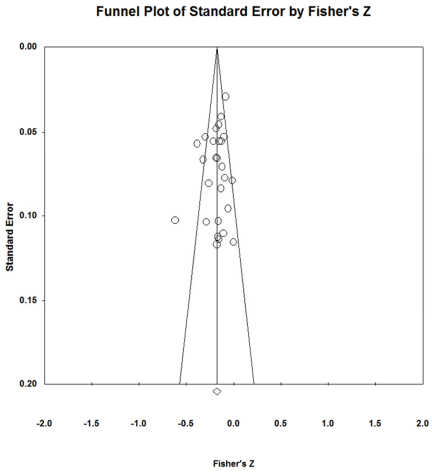
Attachment anxiety and unhealthy eating



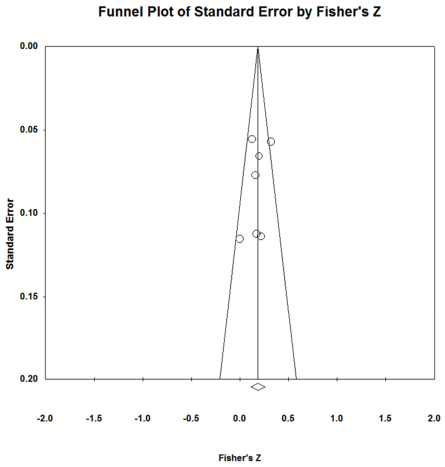
Attachment avoidance and unhealthy eating



Attachment security and unhealthy eating



Attachment fearfulness and unhealthy eating



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1178 **Table 1**: Summary of Studies Examining Attachment Orientation and Eating Behaviors

Authors	N	Age range	Sex	Attach quest	Attach fig	DV quest	DV out	Attach type	*r*
Attachment and eating behaviors in healthy individuals									
(Alexander & Siegel, 2013)	97 (37 men) university students	18-50	M/F	ECR-R	RP	EES	EE	AnxD	.247*
								AvoidD	.099
						BES	BE	AnxD	.462*
								AvoidD	-.013
						BITE	BN	AnxD	.209*
								AvoidD	-.033
						TFEQ	DE	AnxD	.400***
								AvoidD	.061
						Mechanism: Felt hunger mediated the relationship between attachment anxiety and EE-dep and EE-Anx, respectively. No effects for attachment avoidance.			
(Bäck, 2011)	80 high school students (45 men)	18(.62)	M/F	AAP	Mo	Food Rules	EtE	Anx	.250
								Avoid	.070
								Fear	.310**
								Sec	-.260
					Fa	Food Rules	EtE	Anx	.220
								Avoid	-.140
								Fear	.250*
								Sec	-.070
			M/F	AAP	Mo	Food Rules	Restrict	Anx	.310**
								Avoid	.270*
								Fear	.150
								Sec	-.240*
					Fa	Food Rules	Restrict	Anx	.250*

Authors	N	Age range	Sex	Attach quest	Attach fig	DV quest	DV out	Attach type	*r*
								Avoid	.070
								Fear	.140
								Sec	-.030
(Bamford & Halliwell, 2009)	213 university students	18-34	F	ECR-R	all	EDI	BN	AnxD	.349**
								AvoidD	.202**
						Mechanism: Social comparison with both models and peers mediated the relationship between attachment anxiety and eating disorder psychopathology. No effects for attachment avoidance.			
(Boone, 2013)	328 (141 males) high-school pre-adolescents	14-20	M/F	ECR-R	Mo	EDI-2	BES	AnxD	.310***
				ECR-R				AvoidD	.070
				PIML				Sec	-.170**
				ECR-R	Fa			AnxD	.270***
				ECR-R				AvoidD	.170**
				PIML				Sec	-.250***
						Mechanism: Socially prescribed perfectionism (SPP) and perfectionistic self-promotion (PSP) partially mediated the relation between attachment anxiety and secure attachment towards father and mother and binge eating. PSP fully mediated the relation between attachment avoidance towards the father and binge eating.			
						Controlled for gender, age, adjusted BMI, and family status.			
(Bost et al., 2014)	497 parents (50 fathers) of children recruited from child care centers	32.45 (6.68)	M/F	RSQ	CR	ECLS-B	FV-Ch	Insec	-.060
						ECLS-B	UFC-Ch	Insec	.160**
						CFPQ	PressEat	Insec	.110*
						CFPQ	ModelEat	Insec	-.040
						FRQ	MealRout	Insec	-.120**
						Mechanism: Ineffective emotion regulation			

Authors	N	Age range	Sex	Attach quest	Attach fig	DV quest	DV out	Attach type	*r*
						(punishing and minimizing child distress) increased caregivers' child emotion feeding and pressure to eat mediating the relationship between insecure parental attachment and child unhealthy food consumption.			
						Controlled for child age, child gender, caregiver age, caregiver BMI, race, education level, caregiver depression, and anxiety.			
(Brennan & Shaver, 1995)	234 (117 men) university students	15-47	M/F	AQ	RP	EDI	BN	Anx	.280***
				AD	RP	EDI	BN	AnxD	.320***
				AQ	RP	EDI	BN	Avoid	.220***
				AD	RP	EDI	BN	AvoidD	.120
				AQ	RP	EDI	BN	Sec	-.180**
(Campion, 2001)	325 women from a psychology subject pool	18-44	F	AAQ	CR	BULIT-R	BN	InsecD	.342**
				AQ	CR	BULIT-R	BN	Insec	.259*
(Castle, 2009)	653 university students	18-25	F	ECR-R	RP	EAT-26	BN	AnxD	.380***
								AvoidD	.220***
							Diet	AnxD	.300***
								AvoidD	.190***
(Cate, Khademi, Judd, & Miller, 2013)	76 primary school girls	9-12	F	IPPA	Pa	ChEAT	Diet	Sec	-.340**
							BN	Sec	.003
(Antonios Dakanalis et al., 2015)	551 male university students	18-28	M	ASQ	CR	EDI-3	BN	Anx	.480***
(A. Dakanalis, Zanetti, Riva, & Clerici, 2013)	538 female university students	18-28	F	ASQ	CR	EDI-2	BN	Anx	.440***
(N. L. Davis, 2001)	227 college students	17-43	F	ASQ	CR	BULIT-R	BE	Sec	-.360**
				AHQ	Pa	BULIT-R	BE	Sec base	-.260**
(C. R. Davis et al., 2014)	215 adults part of a greater study	35-55	M/F	AAI	Pa	BFFQ	HEI	Sec	.220
								Avoid	-.200

Authors	N	Age range	Sex	Attach quest	Attach fig	DV quest	DV out	Attach type	*r*
								Fear	-.090
						Mechanism: Relationship functioning mediated the association between attachment avoidance quality of diet.			
(DePalma, 2011)DePalma, 2011	65 mothers of children aged 3-5	26-46	F	ECR	RP	CFQ	EtE	AnxD	.101
								AvoidD	.008
							Restrict	AnxD	-.009
								AvoidD	-.204
(Domine, Berchtold, Akre, Michaud, & Suris, 2009)	2667 males from the 2002 Swiss Multicenter Adolescent Survey on Health	16-20	M	IPPA	Pa	WECI	BN/BE	Insec	.835*
(Eckerd, 2004)	312 undergraduate female students 67 for SCID-B	18.73 (1.95)	F	RSQ	CR	SCID-B	BN	Anx	.030
				ECR	RP	SCID-B	BN	AnxD	.200
				RSQ	CR	SCID-B	BN	Avoid	.380**
				ECR	RP	SCID-B	BN	AvoidD	.300*
				IPPA	Pa	SCID-B	BN	Sec	-.380***
				IPPA	PEER	SCID-B	BN	Sec	-.430***
				RSQ	CR	SCID-B	BN	Sec	-.280**
				RSQ	CR	SCID-B	BN	Fear	.310**
(Eggert, Levendosky, & Klump, 2007)	85 twins from the community and university	18-30	F	AAS	RP	MEBS	BE	Anx	.400**
								Avoid	.150
								Sec	-.190
							BN	Anx	.250*
								Avoid	.120
								Sec	-.020
						Mechanism: Neuroticism mediated the relationship between attachment anxiety and binge eating. Extraversion did not mediate this			

Authors	N	Age range	Sex	Attach quest	Attach fig	DV quest	DV out	Attach type	*r*
						relationship.			
(Elgin & Pritchard, 2006)	328 (121 males) university students	17-68	F	RQ	CR	EDI	BN	Anx	.130
								Avoid	-.090
								Fear	.220**
								Sec	-.080
			M	RQ	CR	EDI	BN	Anx	.090
								Avoid	.050
								Fear	.030
								Sec	-.220*
(L. Evans & Wertheim, 1998)	360 undergraduate students and women from the community	22.90 (0.50)	F	AAS	RP	BULIT-R	BN	Anx	.310***
								Avoid	.290***
(Faber & Dubé, 2015)	213 elementary school children (70 boys) from 34 schools	8-12	M/F	AAQ	Pa	HCF	Daily # of HCF	AnxD	.398
								AvoidD	.353
								InsecD	.419
(Gelven, 2003)	232 college students	19.50	F	RQ	PEER	EAT-26	BN	Anx	.040
								Avoid	-.010
								Fear	.190**
								Sec	-.210**
								Insec	.186**
							Diet	Anx	.060
								Avoid	-.110
								Fear	.200**
								Sec	-.130*
								Insec	.153*
(Gilbert, 2007)	288 women who have LC over eating in the past 6 months but	18-71	F	ECR-R	RP	EDE-15	BE	AnxD	.110
								AvoidD	.120*

Authors	N	Age range	Sex	Attach quest	Attach fig	DV quest	DV out	Attach type	*r*
	who are healthy otherwise recruited from the Internet					EOQ	EE	AnxD	.240***
								AvoidD	.140*
(Goldberg, 2001)	145 Jewish Orthodox women from college or universities	18-22	F	PAQ	Mo	EDI	BN	Sec	-.195*
					Fa	EDI	BN	Sec	-.125
(Goossens, Braet, Van Durme, Decaluwe, & Bosmans, 2012)	601 children (313 boys) from seven elementary schools	8-11	M/F	SSc	Mo	ChEDE-Q	BE	Sec	-.145**
					Fa	ChEDE-Q	BE	Sec	-.115*
(Goossens et al., 2011)	482 children (254 boys) from six elementary schools	8-11	M/F	SSc	Fa	EDE-Q	BE	Sec	-.139*
					Mo	EDE-Q	BE	Sec	-.167*
						Mechanism: Secure attachment towards the mother mediated the relationship between self-esteem and loss of control over eating. Secure attachment towards the father only partially mediated the relationship between self-esteem and loss of control over eating.			
(G. Han, 2011)	401 college students (127 males)	17-44	M/F	ECR	RP	EAT-26	BN	AnxD	.287**
								AvoidD	.073
			F	ECR	RP	EAT-26	BN	AnxD	.324**
								AvoidD	.083
			M	ECR	RP	EAT-26	BN	AnxD	.151*
								AvoidD	.020
			M/F	ECR	RP	EAT-26	Diet	AnxD	.270**
								AvoidD	.120*
			F	ECR	RP	EAT-26	Diet	AnxD	.290**
								AvoidD	.107*
			M	ECR	RP	EAT-26	Diet	AnxD	.214**
								AvoidD	.127*
(S. Han & Pistole, 2014)	381 undergraduate and graduate students (155 men)	18-60	M/F	ECR-S	RP	BES	BE	AnxD	.210**
								AvoidD	.130*

Authors	N	Age range	Sex	Attach quest	Attach fig	DV quest	DV out	Attach type	*r*
						Mechanism: Emotion dysregulation mediated the relationship between attachment insecurity and binge eating.			
(S. Han, 2009)	221 undergraduate and graduate women	18-60	F	ECR-S	Fa	BES	BE	AnxD	.160*
								AvoidD	.150*
					Mo	BES	BE	AnxD	.240*
								AvoidD	.160*
					RP	BES	BE	AnxD	.230**
								AvoidD	.170*
	155 undergraduate and graduate men	18-60	M	ECR-S	Fa	BES	BE	AnxD	.220**
								AvoidD	.050
					Mo	BES	BE	AnxD	.300**
								AvoidD	.110
					RP	BES	BE	AnxD	.190*
								AvoidD	.180*
	381 undergraduate and graduate students	18-60	M/F	ECR-S	Fa	BES	BE	AnxD	.150**
								AvoidD	.080
					Mo	BES	BE	AnxD	.210**
								AvoidD	.110
(Hardman, Christiansen, & Wilkinson, 2016)	77 mothers of a preadolescent child (3-12 y.o.)	39.23 (5.68)	F	ECR	RP	PFSQ	Emo feed of child	AnxD	.270*
						TEFQ	UE-mo	AnxD	.110
						CEBQ	EE-child	AnxD	.430**
						Mechanism: Emotional feeding strategies partially mediated the effect of maternal attachment anxiety on child emotional eating.			
						Child emotional eating fully mediated the effect of maternal attachment anxiety on emotional feeding strategies.			
(Hart & Kenny, 1997)	156 undergraduate college	18-22	F	PAQ	Pa	EDI-2	BN	Sec	-.256**

Authors	N	Age range	Sex	Attach quest	Attach fig	DV quest	DV out	Attach type	*r*
	women								
(Hodson, Newcomb, Locke, & Goodyear, 2006)	361 adolescent latina females recruited from the community	17.2 (1.4)	F	HCA	CR	EDD	BN	Sec	-.100
(Hoxca, 2015)	812 Albanian female university students	18-21	F	ECR-RS	Mo	EDI	BN	InsecD	.227**
(Howard, 1997)	97 middle-school girls	11-13	F	PAQ	Pa	EDI-2	BN	Sec	-.161
(Huprich, Stepp, Graham, & Johnson, 2004)	83 female students enrolled in an introductory psychology course	19.2 (2.0)	F	BORRTI	CR	EQR	BE	Insec	.340*
						ESES	Eat eff	Insec	.410*
			M	BORRTI	CR	EQR	BE	Insec	.170
						ESES	Eat eff	Insec	.410*
(Iannantuono & Tylka, 2012)	249 college women	18-28	F	ECR	RP	IES	Intuit eat	AnxD	-.430***
								AvoidD	-.220***
						CEMS	EtE	AnxD	.290***
								AvoidD	.140*
						CEMS	Restrict	AnxD	.090
								AvoidD	.210**
						Mechanism: Body appreciation partially mediated the negative links from anxiety to intuitive eating.			
(Kenny & Hart, 1992)	162 first-year college women	18.47 (1.40)	F	PAQ	Pa	EDI	BN	Sec	-.010
(Koskina & Giovazolias, 2010)	381 female university students	20.75	F	ECR-R	RP	EAT-26	BN	AnxD	.250***
								AvoidD	.130*
								InsecD	.240***
							Diet	AnxD	.270***
								AvoidD	.060
								InsecD	.210***
	100 male university students	21.34	M	ECR-R	RP	EAT-26	BN	AnxD	.190
								AvoidD	.080

Authors	N	Age range	Sex	Attach quest	Attach fig	DV quest	DV out	Attach type	*r*
								InsecD	.160
							Diet	AnxD	.220*
								AvoidD	.170
								InsecD	.240*
						Mechanism: Body dissatisfaction mediated the relationship between attachment anxiety and bulimia in females, but not in males. Body dissatisfaction mediated the relationship between attachment anxiety and dieting in females and males.			
(Kraft, 2009)	98 LinkedIn female subscribers	21-59	F	PAQ	Pa	EAT-26	BN	Sec	-.601**
							Diet	Sec	-.490**
(Lawrence, 2007)	147 university students	18.70	F	ECR-R	RP	BULIT-R	BN	AnxD	.144*
								AvoidD	.051
								InsecD	.190
(Le Grange et al., 2014)	1,175 youths (573 males) drawn from the Australian Temperament Project, a 30-year long cohort study	15-16	M	IPPA	Peer	EDI	BN	Sec	-.045
			F	IPPA	Peer	EDI	BN	Sec	-.120
(Lochner, 1999)	436 university students (both graduate and undergraduate)	26.53 (5.73)	F	AAS	RP	BULIT-R/ EAT-26	BN	Anx	.240*
								Avoid	.180*
(Lockwood, 2004)	82 (38 male) college students	20.94 (5.63)	M/F	SAAI	Pa	Over/BE	BE	Anx	.306**
								Avoid	.050
								Fear	.170
								Sec	-.165
(Pepping et al., 2015)	144 female undergraduate students	17-41	F	ECR-R	RP	EDI-3	BN	AnxD	.370***
								AvoidD	.280***
						Mechanism: Mindfulness partially mediated the relationship between attachment anxiety and			

Authors	N	Age range	Sex	Attach quest	Attach fig	DV quest	DV out	Attach type	*r*
						avoidance, respectively, and eating pathology.			
(Phillips, Gibson, & Slade, 2012)	77 (26 men) university students	18-62	M/F	ECR-R	RP	TFEQ-R18	EE	AnxD	.230*
							UE	AnxD	.360*
(Prichard et al., 2012)	112 first year university students	17-25	F	AAS	Mo	UFC	Freq	Sec	.082
						Veggie	Freq	Sec	-.073
						DEBQ	EE	Sec	-.191
(Reichardt, 2003)	201 university female undergraduate and graduate students	18-49	F	AAS	RP	EAT-26	BN	Anx	.180**
								Avoid	.175**
							Diet	Anx	.080
								Avoid	.065
(Schutz & Paxton, 2007)	327 grade 10 girls	15.9	F	IPPA	PEER	EDI	BN	Sec	-.175
		(0.51)					Diet	Sec	-.077
(Sive-Ramirez, 2001)	63 undergraduate females	18-20	F	IPPA	Fa	EDI-2	BN	Insec	-.120
					Mo	EDI-2	BN	Insec	.030
(Spadafore, 2008)	78 African American undergraduate and graduate female students	N/A	F	RQ	CR	EDI-3 SC	BE	Anx	.296
								Avoid	-.218
								Sec	.000
								Fear	.000
(Suldo & Sandberg, 2000)	169 college females	18-72	F	RQ	CR	EDI	BN	Anx	.310***
								Avoid	-.070
								Fear	.160*
								Sec	-.090
(Trichilo, 1998)	96 women (community and university)	18-25	F	PAQ	Fa	EDI	BN	Sec	-.123
					Mo	EDI	BN	Sec	-.423
(Tucker & McNamara, 1995)	123 undergraduate women as well as 115 mothers, and 95 fathers	16-39	F	BORRTI	Mo	EDI	BN	Insec	.370*
					Fa	EDI	BN	Insec	.220
(Tylka & Van Diest, 2015)	171 university students/ staff	18-56	F	ECR-S	RP	EDI	BN	AnxD	.325

Authors	N	Age range	Sex	Attach quest	Attach fig	DV quest	DV out	Attach type	*r*
	women							AvoidD	.229
							Diet	AnxD	.342
								AvoidD	.170
(Weaver, 2012)	175 undergraduate women	18-28	F	ECR	RP	EDDS	BN/BE	AnxD	.451**
								AvoidD	.265**
(Wilkinson, Rowe, Bishop, & Brunstrom, 2010)	200 university students	22.4 (6.9)	M/F	ECR	RP	TFEQ-D	BE	AnxD	.280***
								AvoidD	.040
(Wilkinson et al., 2013)	21 university students	21.19 (3.12)	F	Prime	CR	UFC	kcal	Anx	.531
Attachment and eating behaviors in clinical vs. healthy samples									
(Barone & Guiducci, 2009)	50 participants • 30 NC (female college students and community adults) • 9 female BN and 11 female BE, respectively (outpatient clinic)	--	F	AAI	Pa	DSM-IV	BED	Insec	.536
							BN	Insec	.507
(Becker, Bell, & Billington, 1987)	539 freshmen • 56 BN • 183 BED • 303 control	19.45	F	BORRTI	CR	BI	BED	Insec	.126**
(Broberg et al., 2001)	125 women chosen from a population register • 41 BN • 84 control	18-24	F	RQ	CR	DSM-IV	BN	Insec	.301***
(Brock, 2000)	108 female university students • 54 BN/BE • 54 NC	16-24	F	PAQ	Pa	Q-EED	BN/BE	Sec	-.190

Authors	N	Age range	Sex	Attach quest	Attach fig	DV quest	DV out	Attach type	*r*
(Lynette Evans & Wertheim, 2005)	177 community women • 97 BN (C and sub-C) • 80 control	18-72	F	ECR	RP	BULIT-R	BN	AnxD	.421***
								AvoidD	.307***
(Gibbs, 1989)	100 high school females	14-20	F	IPPA	Pa	EAT-26	BN	Insec	.180
	• 37 BN • 63 controls				PEER	EAT-26	BN	Insec	.164
(Illing, Tasca, Balfour, & Bissada, 2010)	249 women • 123 BN (outpatients) • 126 NC (community and university)	24.94 (7.41)	F	ASQ	CR	EDI	BN	Anx	.502***
								Avoid	.411***
(Latzer, Hochdorf, Bachar, & Canetti, 2002)	56 participants • 33 BN patients • 23 NC	21.9 (3.7)	F	AQ	RP	DSM-IV	BN	Anx	.545***
								Avoid	.488***
								Sec	-.472***
								Insec	.530***
(Lehoux & Howe, 2007)	68 women	16-40	F	RQ	Fa	DSM-IV	BN	Insec	.377*
	• 34 BN patients • 34 sisters				Mo	DSM-IV		Insec	.157
(Pace, Cacioppo, & Schimmenti, 2012)	233 women university students • 31 BED • 202 university students	18-20	F	RQ	CR	BES	BE	Anx	.222
								Avoid	-.029
								Fear	.180
								Sec	-.216
(Pollack & Keaschuk, 2007)	77 undergraduate students • 17 BN • 60 healthy/NC	19.29 (1.19)	F	BORRTI	CR	EQ-R	BN	Insec	.344**
(Raizman, 1999)	50 women • 25 BN outpatients from eating disorder clinic • 25 NC (university and	18-45	F	BORRTI	CR	DSM-III-R	BN	Insec	.745

Authors	N	Age range	Sex	Attach quest	Attach fig	DV quest	DV out	Attach type	*r*
	community)								
(Siff, 2008)	160 women • 80 compulsive eaters from a help group • 80 NC/healthy	35-82	F	BORRTI	CR	QEWP-R	BN	Insec	.232*
(Troisi, Massaroni, & Cuzzolaro, 2005)	105 women • 41 BN (outpatient clinic) • 64 healthy, community women	17-36	F	ASQ	CR	DSM-IV	BN	Anx	.303
								Avoid	.153
								Sec	-.240

Notes: N = number of participants; Attach quest = attachment questionnaire; Attach fig = attachment figure; DV quest = dependent variable questionnaire; DV out = Dependent variable outcome; Attach type = attachment type measured $p < .05$*; $p < .01$**; $p < .001$***

Sex: F = female; M = Male; M/F = male/female

Attach quest: AAI = Adult attachment interview; AAP = Adult Attachment Prototypes; AAQ = Adult attachment questionnaire; AAS = Adult Attachment Scale; AD = Attachment dimension; AHQ = Attachment History Questionnaire; AQ = Attachment Questionnaire; ASQ = Attachment Q-Sort; BORRTI = Bell Object Relations and Reality Testing Inventory-Insecure Attachment scale; ECR = Experience in Close Relationships; ECR-R = Experience in Close Relationships-Revised; ECR-R-C = Experience in Close Relationships-Revised Child; ECR-S = Experience in Close Relationships-Short form; HCA = Healthy current attachment (adapted from Collins & Read, 1990); IPPA = Inventory of Parent and Peer Attachment Scale; PAQ = Parental Attachment Questionnaire; PIML = People in my Life; Prime = Attachment is primed with vignettes; RAAS = Revised Adult Attachment Scale; RQ = Relationship Questionnaire; RSQ = Relationship Scales Questionnaire; SAAI = Salzman Adolescent Attachment Interview; SSc = Security Scale

Attach fig: CR = close relationships; Fa = father; Mo = mother; Pa = parents; RP = romantic partners

DV quest: BES = Binge Eating Scale; BFFQ = Block Food Frequency Questionnaire; BI = Bulimia Inventory; BITE = Bulimic Investigatory Test, Edinburgh; BULIT-R = Bulimia Test-Revised; CEBQ = Child eating Behavioral Questionnaire; CEMS = Caregiver Eating Messages Scale; CFPQ = Comprehensive Feeding Practices Questionnaire; CFQ = Child Feeding Questionnaire; ChEDE-Q = Child Eating Disorder Examination Questionnaire; DEBQ = Dutch Eating Behaviour Questionnaire; DSM-III-R = Diagnostic and Statistical Manual of Mental Disorders III Reviewed; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders IV; EAT-26 = The Eating Attitudes Test-26; ECLS-B = Early Childhood Longitudinal Study-B; EDD = Eating Disorder Diagnostic; EDDS = Eating Disorder Diagnostic Scale; EDE-15 = Eating Disorder Examination-15 items; EDE-Q = Eating Disorder Examination-Questionnaire; EDI = Eating Disorder Examination Inventory; EDI-2 = Eating Disorder Examination Inventory-2; EDI-3 SC = Eating Disorders Inventory-III (EDI-III) Symptom Checklist; EES = Emotional eating scale; EOQ = Emotional Overeating Questionnaire; EQ-R = Eating Questionnaire-Revised; ESES = Eating Self-Efficacy Scale; Food Rules = Food Rules Questionnaire; FRQ = Family Ritual Questionnaire; HCF = High Caloric Food consumption; IES = Intuitive Eating Scale; MEBS = Minnesota Eating Behavior Survey; Over/BE = Overeating/Binge Eating; PFSQ = Parental Feeding Style Questionnaire (PFSQ); Q-EED = Questionnaire for Eating Disorder Diagnoses; QEWP-R = Questionnaire for Eating and Weight Patterns-Revised; SCID-B = Structural Clinical Interview for Axis I DSM-IV disorders, Bulimia; TEFQ = Three-Factor Eating Questionnaire; TFEQ-D = Three Factor Eating Questionnaire – disinhibiting subscale; TFEQ-R18 = Three-

Factor Eating Questionnaire-Revised 18-item; UFC = Unhealthy Food Consumption; Veggie = Vegetable consumption; WECI = Weight and Eating Concerns Inventory

DV out: BE = Binge eating; BED = Binge eating disorder; BES = Binge eating symptoms; BN = Bulimia nervosa symptoms; BN/BE = Bulimia nervosa symptoms/Binge eating; Daily # of HCF = Daily number of high caloric foods; DE = Disinhibited eating; Diet = Dieting; Eat eff = Eating efficacy; EE = Emotional eating; EE-child = Emotional eating of child; Emo feed of child = Emotional feeding of child; EtE = Encouragement to eat; Freq = Frequency; FV-Ch = Fruit and vegetable consumption of child; HEI = Healthy Eating Index; Intuit eat= Intuitive eating; Kcal = caloric consumption MealRout = Meal routine; ModelEat = Modeling eating; PressEat = Pressure to eat food rules; Restrict = Restriction food rules; UE = Uncontrolled eating; UE-mo = uncontrolled eating of mother; UFC-Ch = Unhealthy food consumption of child

Attach type: Anx = anxiety; AnxD = anxiety dimension; Avoid = avoidance; AvoidD = avoidance dimension; Fear = fearfulness; Insec = insecurity; InsecD = insecure dimension; Sec = security

Table 2:

Meta-analysis results of attachment orientation–unhealthy and healthy eating behaviors in healthy individuals.

	Mean effect size (*r*)	*N*	95% CI (low)	95% CI (high)	*z*-value	*p*	*k*	*Q*	I^2	Orwin's fail-safe (.05)
Attachment orientation and unhealthy eating associations										
Insec	**.266**	5,643	.128	.393	3.71	.000	11	4.95	0.00	80
Anx	**.271**	8,067	.228	.314	11.75	.000	33	27.90	0.00	158
Avoid	**.119**	5,806	.071	.169	4.77	.000	25	26.83	10.54	42
Sec	**-.176**	7,040	-.216	-.136	-8.45	.000	27	28.77	9.61	63
Fear	**.184**	1,281	.112	.253	4.99	.000	7	5.48	0.00	20
Attachment orientation and healthy eating associations										
Insec	(-.074)	(497)	--	--	--	--	1	--	--	--
Anx	(-.430)	(249)	--	--	--	--	1	--	--	--
Avoid	**-.211**	464	-.296	-.122	-4.58	.000	2	0.05	0.00	--
Sec	.083	327	-.205	.357	0.56	.576	2	1.00	0.00	--
Fear	(-.090)	(112)	--	--	--	--	1	--	--	--

Table 3:

Detailed meta-analysis of attachment orientations and specific unhealthy eating behaviors associations.

	Mean effect size (*r*)	*N*	95% CI (low)	95% CI (high)	*z*-value	*p*	*k*	*Q*	I^2	Orwin's fail-safe (.05)
Binge eating and attachment orientation associations										
Insec	**.427**	2,750	.112	.664	2.60	.009	2	1.00	0.00	--
Anx	**.289**	1,559	.216	.359	7.49	.000	8	6.96	0.00	38
Avoid	**.066**	1,559	.006	.126	2.14	.032	8	7.77	9.92	4
Sec	**-.175**	1,883	-.233	-.116	-5.75	.000	7	6.22	3.56	18
Fear	.088	160	-.080	.251	1.02	.306	2	1.00	0.00	--
Bulimic symptoms and attachment orientation associations										
¤ Insec	**.220**	2,183	.169	.270	8.23	.000	7	6.89	12.92	25
Anx	**.240**	4,270	.163	.314	5.96	.000	14	10.88	0.00	63
Avoid	**.128**	3,266	.056	.200	3.45	.001	13	11.97	0.00	25
Sec	**-.186**	5,050	-.241	-.129	-6.34	.000	19	22.76	20.91	46
Fear	**.200**	1,041	.111	.286	4.37	.000	4	2.70	0.00	13
Dieting behaviors and attachment orientations										
Insec	**.202**	713	.130	.271	5.44	.000	2	0.86	0.00	--
Anx	**.198**	2,533	.122	.271	5.05	.000	9	8.87	9.76	32
Avoid	**.101**	2,332	.018	.182	2.38	.017	8	9.21	24.03	12
Sec	**-.198**	1,014	-.321	-.068	-2.97	.003	6	6.14	18.58	13
Fear	**.186**	312	.076	.292	3.30	.001	2	0.19	0.00	--
Unhealthy food consumption and attachment orientation associations										
Insec	**.291**	710	.020	.521	2.10	.036	2	1.00	0.00	--
Anx	**.286**	782	.190	.376	5.67	.000	7	6.40	6.28	36
Avoid	**.138**	607	-.042	.310	1.50	.133	4	2.95	0.00	11
Sec	-.036	192	-.274	.207	-0.28	.776	2	1.00	0.00	--
Fear	(.280)	80					1			
Emotional eating and attachment orientation associations										
Insec	--	--	--	--	--	--	--	--	--	--
Anx	**.268**	539	.187	.345	6.31	.000	4	2.96	0.00	18
Avoid	**.130**	385	.030	.227	2.54	.011	2	0.12	0.00	--
Sec	(-.191)	112	--	--	--	--	1	--	--	--
Fear	--	--	--	--	--	--	--	--	--	--

Table 4:

Meta-analysis of attachment orientations and unhealthy eating associations in clinical versus healthy samples.

	Mean effect size (*r*)	*N*	95% CI (low)	95% CI (high)	*z*-value	*p*	*k*	*Q*	I^2	Orwin's fail-safe (.05)
Insec	**.363**	1,325	.248	.469	5.864	.000	9	11.93	32.95	45
Anx	**.397**	820	.268	.512	5.653	.000	5	3.65	0.00	36
Avoid	**.267**	820	.068	.445	2.612	.009	5	3.64	0.00	20
Sec	**-.254**	502	-.353	-.149	-4.638	.000	4	3.40	11.77	17
Fear	(.180)	(105)	--	--	--	--	1	--	--	--

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1228 References

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Foot Note:

Due to latest findings indicating both positive and negative associations between restrained eating and overeating depending on the measurement instrument used (Williamson, Martin, York-Crowe et al., 2007), we decided to exclude this variable from final analysis. Please note that no article focused solely on restrained eating; this allowed us to include other variables provided in the articles in our analyses.

1836 **Appendix 1**: Summary table of past reviews on attachment and eating

Authors	Databases	Years Covered	Review Type	*k*	Review Findings
1. O'Kearney, 1996	NA	1970-1995	Qualitative review	10	*Population*: Adults diagnosed with an eating disorder (6 of the 10 available studies used PBI) • Women with eating disorders suffered from greater attachment disturbances. • Compared to healthy young women, women with eating disorders had more anxious, insecure attachments, fear of abandonment, and difficulty with autonomy.
2. Ward, Ramsey, & Treasure, 2000	PsychLit, Medline Express, Embase, and Cochrane Library	1887-1998	Qualitative review	25	*Population*: Adults diagnosed with an eating disorder (10 of the 25 available studies used PBI) • Abnormal attachment patterns were more evident in eating disordered populations. • Eating disordered patients suffered from more severe separation anxiety (not being able to discern between common separation and more permanent leaving) vs. control. • Individuals with eating disorders saw their parents as less supportive and giving them less autonomy. They also remembered their caregivers as being less responsible, available, and trustworthy (indication of lack of secure attachment). Review documented attachment and eating disorders in health populations but it did not discuss it.
3. O'Shaughnessy & Dallos, 2009	PsychInfo, Scopus	1966-2008	Systematic review	24	*Population*: Clinical populations with anorexia (could also include BN or BED but not without anorexia)

					• Prevalence of insecure attachment in eating disordered patients ranged between 70%-100%. • Eating disordered patients were more likely to be categorized as anxious, avoidant, or fearful. The authors emphasize the significance of an unresolved (or fearful) attachment style in this population. • Eating disordered patients were more likely to suffer from extreme separation anxiety and unresolved trauma and loss.
4. Zachrisson & Skarderud, 2010	PsychInfo, ScienceDirect	1887-2009	Systematic review – AAI only	9	*Population*: Adults with a diagnosed eating disorder interviewed using the AAI *Findings*: • There is a higher prevalence of insecure attachment types within eating disordered populations and a lower prevalence of secure attachment. First paper to inquire about the many faceted mechanisms of attachment and disordered eating. These include, the retrospective approach, the general risk approach, and direct expressions of the psychological and emotional processes.
5. Kuipers & Bekker, 2012	MedLine, Psych, Info, Embase Psychiatry, and Cochrane	1996-2011	Systematic review – AAI only	9	*Population*: Adults with a diagnosed eating disorder interviewed using the AAI (4/9 had a control group) *Findings*: • Insecure attachment classifications were more frequent in eating disordered groups. • Specifically, in eating disordered patients, insecure attachment frequencies (included dismissive, entangled, unresolved, and cannot classify) ranged from 69.3% to 100% whereas in healthy adults, it

					ranged from 44.8 to 52.5%. • Moreover, in all studies included, dismissive and entangled attachment frequencies occurred systematically more in disordered eating populations than in healthy eating controls. • Subscales of the AAI indicated that idealization of parents and problematic relationships with mother, meaning anger or idealization, were positively associated with an eating disorder diagnosis (Barone & Guiducci, 2009; Fonagy et al, 1996). Mentalization or the ability to understand mental states or the mental states of others was studied as a mediating variable, however, evidence was not conclusive.
6. Tasca & Balfour, 2014	MedLinw/PubMed, PsychInfo	2000-2014	Systematic review	32	*Population*: Adults diagnosed with an eating disorder *Findings* (also includes conclusions from previous reviews): • Individuals with eating disorders were more likely to report greater attachment insecurity (Caglar-Nazali et al., 2014). • Moreover, when interviewed (AAI), individuals with eating disorders had a 70% to 100% higher prevalence of attachment insecurity (Kuipers & Bekker, 2012). • Need for approval, as measured by the AAS, is linked positively with severity of eating disorder psychopathology, even when controlling for important variable such as depression. • Childhood trauma, potentially leading to disorganized attachment, is more likely to be reported by individuals with eating disorders. • Mentalizing abilities, as assessed by the AAI, were especially lower in individuals with anorexia.

					Possible mechanisms were not tested but included affect regulation and maladaptive perfectionism which could put someone at risk for eating disorders and also maintain a negative reinforcing cycle.
7. Caglar-Nazali et al., 2014	Embase, Medline, PsychInfo, Web of Science	1806-2013	Meta-analysis	8	*Population*: Eating disordered vs. healthy individuals *Findings*: Compared to healthy controls, individuals with eating disorders: • Had greater attachment insecurity measured by self-report (d = .91; r = .41). This was the second largest effect, right after negative self-evaluation. • Experienced lower parental care as measured by the PBI (d = .53; r = .24) • Showed less coherence in their recall of attachment figures as measured by the AAI (d = 1.34; r = .53) • Had increased dysfunctional attachment (d = .37; r = .17) and separation anxiety (d = .58 to .66; r = .26 to .30)
8. Jewell et al., 2016	Embase, Medline, PsychInfo	1806-2015	Systematic review	15	*Population*: Healthy children and adolescents aged 8-20 *Findings*: • The authors found a positive relationship between attachment insecurity and eating pathology in 14 over the 15 findings in the review. • Longitudinal findings indicated that attachment in adolescence was a better predictor of disordered eating than attachment in infancy. • Insecure attachment was *correlated* with eating pathology but also a *risk factor* of disordered eating. The jury is still on regarding whether changes in attachment orientation alter the risk of eating pathology.

			• It appears that peer relationships rather than parental relationships are more predictive of eating pathology in children and adolescents. One possible mechanism was studied, mentalization (in children) or reflective functioning (in adults) which was defined as the "ability to reflect on the mind of self and others in the context of attachment relationships."

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