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# What do YOUTH feel?

Understanding  
adolescents' momentary emotions  
and emotion regulation

Hannah K. Lennarz



Behavioural  
Science  
Institute



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# What do YOUth feel?

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**Für Merle und Sophie**





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The background features a complex, abstract composition. On the left and right sides, there are dark, layered, organic shapes that resemble ink or paint splatters. The central and upper-right portions are dominated by a light, almost white area filled with a dense pattern of small, dark, circular specks, creating a textured, starry effect. The overall aesthetic is modern and artistic.

# 1

## General introduction



Emotions are an essential part of everyday life and most people experience a range of different emotions throughout each day. In the morning, we might feel anxious of what the day will bring or happy because we are expecting a positive event. During lunch, we might feel relaxed when chatting with our colleagues or worried because we have a meeting with our boss later. When we come home from work, we might feel joyful to see our partner or children and shortly after, we might feel guilty because we did not finish our task at work. In the evening, we might feel irritated because our partner came home late, guilty that we did not do an extra load of laundry, proud that we have finished a big project at work, or some combination of these feelings. Depending on how we feel we might choose different actions: If we are irritated with our partner we might call a friend to complain. If we are relaxed because we enjoy the time on our own, we might sit down and read a book or watch a movie. If we feel all emotions simultaneously, we might feel overwhelmed and not able to decide what we want to do, and hence end up not doing anything.

These examples make it clear: Emotions are changing throughout the day, sometimes within minutes, sometimes within hours. Also, they can inform us about what is going on, how we are feeling, and how we are doing (Keltner & Gross, 1999; Lazarus, 2006), and they can influence our behavior. A good understanding of what our emotions tell us and adequately reacting to that information is fundamental to our mental health (Kashdan & Rottenberg, 2010; Kuppens & Verduyn, 2015). The foundation for this understanding may be laid in adolescence, a time that is characterized by increased emotionality (Rosenblum & Lewis, 2003) and in which many mood disorders emerge for the first time (Kessler, Berglund, Demler, Jin, & Walters, 2005). The key to healthy development may rely on the degree to which adolescents experience, are able to identify, and to effectively regulate, their emotions. Given the important role of emotions and their influence on our reactions, knowing the factors that influence their experience and regulation is important. This dissertation aimed to increase our understanding of adolescents' daily processes of emotions and their regulation, the role of interpersonal context in the experience of emotions and regulation, and the prevalence and influence of specific emotions on adolescents' well-being.

## **Emotions**

Aristotle (400-300 BC) suggested: "The emotions are all those affections which cause men to change their opinion in regard to their judgments, and are accompanied by pleasure and pain; such are anger, pity, fear, and all similar emotions and their contraries" (p.173). Emotions are central to our lives and are basic fundamental processes inherent to humans. From an evolutionary perspective, emotions serve as an indicator that prepares an individual to

pursue certain actions that are in line with her or his goals (Damasio, 1999; Frijda, 1986; Frijda & Mesquita, 1994). These actions can involve fleeing from a specific situation when experiencing fear or fighting for our goals when we are angry. Hence, positive and negative emotions can be seen as functional and adaptive (Frijda, 1986)<sup>1</sup>. They inform us about what we are feeling, how we are doing, and what we want (Keltner & Gross, 1999; Lazarus, 2006). Each individual emotion serves a specific purpose which is associated with different action tendencies and cognitive and behavioral responses (Frijda, Kuipers, & Terschure, 1989; Izard, Libero, Putnam, & Haynes, 1993; Scherer, 2009). For example, if a student is afraid of failing an exam, this anxiety may encourage her/him to study for the exam. A student that does not experience some level of anxiety may not study and go to the exam unprepared. Hence, emotions help us to manage our lives in accordance to our goals and can be triggers for change or signals to continue. In that sense, all emotions, positive as well as negative ones, are valuable because each contributes to our goals in its own way.

Despite the well-established assumption that specific emotions serve different individual purposes (Izard et al., 1993; Scherer, 2009), most studies have failed to examine discrete emotions. Typically, emotions are distinguished into a valence and an arousal component (Posner, Russell, & Peterson, 2005; Watson & Tellegen, 1985). The valence component refers to the pleasantness of an emotion (positive versus negative) and the arousal component refers to the activating nature of an emotion (low arousal versus high arousal). This approach may be appropriate and useful in some circumstances because it can show global tendencies of positive and negative emotions. However, not all behaviors can be explained by the two-component model because some discrete emotions of the same valence differ in their appraisals and action tendencies (Frijda et al., 1989; Frijda & Mesquita, 1994).

Feeling anger may facilitate behavior that helps us to reach our goals (e.g., approach someone to convince them about one's opinion). Feeling fear, however, may facilitate withdrawal (e.g., avoiding someone because one is afraid of the reaction). If these two emotions are combined into one measurement of valence, discovering how individuals react in a specific situation may not be possible because the action tendencies of these two emotions are contradictory and indeed suggest opposing action tendencies that make little sense in combining.

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1 One may argue that emotions are not always in line with our goals. Importantly, emotions always have a signalling function but can elicit behavior that is not adaptive in a given situation (e.g., shouting at one's boss because one is angry). The emotion (anger) signals that one is not satisfied with the situation as is and that change is needed. The behavior (shouting at one's boss) is however oftentimes not the appropriate reaction and can work counter to specific goals (e.g., receiving a promotion).

As another example, sadness and anger (two negative emotions) differ in their impact on judgment and decision-making (Angie, Connelly, Waples, & Kligyte, 2011). The same idea holds for positive emotions. Feeling proud, for example, gives the feeling that anything can be accomplished, which may lead to setting up future similar situations that elicit more pride. Feeling relaxed, however, is related to tranquility and does not facilitate seeking new adventures or tasks. These examples show that emotions that fall under the heading of positive versus negative emotions have important functional differences, signal different things, set on to different actions, and each contributes to the interpretation of the situation in its own way. In line with this, several scholars have emphasized the importance of investigating a range of specific emotions (DeSteno, Gross, & Kubzansky, 2013; Keltner & Lerner, 2010; Lerner & Keltner, 2000). Focusing on specific emotions can reveal more insights into detailed emotional processes and can facilitate our understanding of how often discrete emotions are experienced, under which circumstances they emerge, and which specific behaviors they elicit.

The content of emotional lives is rich and diverse and being able to identify and label the discrete emotions one experiences is crucial to function effectively (Salovey, Detweiler-Bedell, Detweiler-Bedell, & Mayer, 2010). The ability to recognize and differentiate emotions has been termed emotion differentiation or emotional granularity in the literature. Emotion differentiation refers to the specificity and distinctions with which people describe their emotional states (Barrett, Gross, Christensen, & Benvenuto, 2001). Having well-developed emotion differentiation skills means that individuals can identify and distinguish their emotions with precision. Having poorly-developed emotion differentiation skills means that individuals tend to describe their emotions in global emotional states (Lindquist & Barrett, 2008). Emotion differentiation can be considered separately for positive and negative emotions and the ability to differentiate emotions is a protective factor for mental health problems (e.g., Boden, Thompson, Dizen, Berenbaum, & Baker, 2013; Erbas, Ceulemans, Lee Pe, Koval, & Kuppens, 2014; Kashdan, Barrett, & McKnight, 2015).

Another factor that needs to be considered is the distinction between trait and state emotions. Emotions can either be studied as temporary states that fluctuate within persons and are immediate reactions to the environment (state emotion) or as a stable and consistent pattern that characterizes the affective experiences of a person and that differs between persons (trait emotion; Gray & Watson, 2007). More concretely, state emotions are defined as short-lived emotional experiences that are often influenced by a specific event or situation and they are transitory. These state emotions are usually assessed by asking individuals how they feel at this current moment. Trait emotions are defined as



long-term individual propensities that express a person's general tendency to experience a particular emotion (Watson, 2000). These propensities are usually assessed by asking individuals how they felt on average during a specific period (e.g., two weeks) or how they generally feel and are related to general measures of, for example, neuroticism (Clark & Watson, 1999). Both approaches offer insight into different facets of individuals' emotional lives and examining emotions on both time scales is necessary to fully understand the relations between emotions, their regulation, and relations to psychopathology.

### **Emotion Regulation**

In everyday life, regulating emotions and dealing with negative events is often necessary. Regulation can include many different strategies ranging from suppressing the expression of the emotion to seeking social support and problem-solving. Two processes that are usually associated with the down-regulation of negative emotions are emotion regulation and coping. *Emotion regulation* (ER) refers to the ability to modify the experience and expression of emotions to respond to the environment appropriately by influencing the occurrence, timing, and nature of emotions (Gross, 2013; Gross & Thompson, 2007). ER includes the conscious and automatic regulation of emotions emerging in daily life or in response to a stressor. Further, emotions can be internally regulated (by the self) or externally regulated (e.g., by a parent or another close contact). *Coping* refers to managing feelings in response to a stressful situation (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Skinner & Zimmer-Gembeck, 2007) and is defined as a conscious activity that people use to down-regulate their emotions in response to a specific negative event. In that sense, coping can be seen as a subcategory of emotion regulation because it only includes the regulation of emotions in response to stressors and is consciously invoked (for a review see Compas et al., 2014). In this dissertation, we will use emotion regulation and coping as indicators of how well individuals are able to deal with their emotions, with a larger emphasis on emotion regulation.

ER strategies are traditionally distinguished into adaptive versus maladaptive strategies (for reviews see Aldao, Nolen-Hoeksema, & Schweizer, 2010; Skinner, Edge, Altman, & Sherwood, 2003). Some ER strategies (e.g., reappraisal, acceptance, problem/solving) are consistently linked with positive mental health outcomes whereas other ER strategies (e.g., suppression, rumination) are consistently linked with negative mental health outcomes. Even though this heuristic is clearly useful in investigating general benefits of habitual ER strategies, it fails to acknowledge context- and content-specific accounts of ER. For example, even though being able to accept may be good in most situations (e.g., waiting in line at a supermarket), acceptance may not be so beneficial in situations where

change is needed (e.g., when one is abused by one's partner). Similarly, suppressing emotions may be beneficial in some situations (e.g., not showing anger in a business meeting) whereas it may not be beneficial in others (e.g., during a conversation with a friend) because this can reduce authenticity and closeness (Gross & John, 2003). These examples show what has also been suggested recently by different scholars: ER and its impact is situation-specific and there is a need to examine how the context in which ER strategies are used contributes to their short- and long-term impact (Aldao, 2013; Bonanno & Burton, 2013; Gross, 2015b). In this dissertation, we take a step towards disentangling ER processes by examining their daily use, across momentary instances, and the success of these regulation strategies.

The majority of past research has focused on comparing a few selected ER strategies (mainly reappraisal and suppression; Gross & John, 2003). This is surprising because people actually use multiple ER strategies, often at the same time (Aldao & Nolen-Hoeksema, 2013; Brans, Koval, Verduyn, Lim, & Kuppens, 2013; Dixon-Gordon, Aldao, & De Los Reyes, 2014). Thus, studies are needed that examine the large range of ER strategies simultaneously to receive insights into regulatory processes. Further, past studies have focused on studying ER in the laboratory (Webb, Miles, & Sheeran, 2012) or with questionnaires (Aldao et al., 2010). These methods provide important information about how individuals regulate their emotions under controlled conditions (e.g., after instructed use) or how they think they habitually regulate their emotions. However, these methods fail to show how people regulate their emotions in the moment and in reaction to proximately occurring events. Examining regulatory processes with ecologically valid methods can help to refine existing theories of ER by including the actual use and impact of ER strategies.

**Adolescence.** Emotions are important throughout the lifespan. However, adolescence is a period that is especially characterized by emotionality (Rosenblum & Lewis, 2003) due to the major cognitive, physical, and psychosocial changes adolescents undergo. In general, adolescents experience more daily life hassles, more negative emotions, and less positive emotions than when they were children (Larson & Ham, 1993; Larson & Richards, 1991) as well as greater fluctuations of emotions (Maciejewski, van Lier, Branje, Meeus, & Koot, 2015; Silk, Steinberg, & Morris, 2003). Importantly, they do not experience new emotions but experience them at different intensities and frequencies (Rosenblum & Lewis, 2003). Next to increased emotionality, major developments take place in the interpersonal domain: Even though parents remain an important source of support (Smetana, Campione-Barr, & Metzger, 2006), peers become increasingly important (Collins & Laursen, 2004a, 2004b), and romantic relationships start to develop (Collins, Welsh, & Furman, 2009). Further, adolescents have to navigate

new peer relationships (e.g., after change to high school) while keeping their old friendships intact.

Importantly, all of these changes are normative and many adolescents go through adolescence without problems. However, some adolescents experience difficulties and mood disorders start to emerge during this developmental transition period (Kessler et al., 2005). Many of the difficulties arising in adolescence are emotion-related (Allen & Sheeber, 2009) and the emotional challenges adolescents go through may have to do with deficits in regulation of their emotions. Hence, the increased emotionality (Rosenblum & Lewis, 2003), more daily life hassles (Larson & Ham, 1993), and the ongoing development of ER strategies (Steinberg, 2005a) make adolescence an especially interesting and relevant period to study emotion and emotion regulation processes.

### **The Current Dissertation**

This dissertation addressed several gaps in past research: Lack of focus on discrete emotions, little attention to daily life processes, and assessment of only a small range of ER strategies. It extends conventional approaches by using an Experience Sampling Method that assessed a broad range of emotions and ER strategies and the contextual factors (e.g., interpersonal contact, emotional intensity) in which these emerged. Moreover, this dissertation focused on an especially relevant and interesting period of emotional development, namely adolescence.

**Emotion differentiation.** As previously discussed, most past research has focused on emotional valence, grouping the broad array of discrete emotions into “positive” versus “negative” emotions. Although little is known about emotion differentiation in adolescence, scholars agree that each discrete emotion serves a specific purpose (e.g., Frijda et al., 1989; Izard et al., 1993; Scherer, 2009). Nevertheless, many studies still combine multiple emotions into one variable (e.g., negative emotions rather than anger, guilt, sadness). This is unfortunate because a more detailed investigation of discrete emotions can inform us about the circumstances under which certain emotions are experienced, how often they occur, and how they relate to well-being. The ability to differentiate between negative emotions has been associated with improved mental health among adults (Boden et al., 2013; Demiralp et al., 2012; Erbas et al., 2014; Grünh, Lumley, Diehl, & Labouvie-Vief, 2013; Kashdan & Farmer, 2014; Kashdan, Ferrisizidis, Collins, & Muraven, 2010; Pond et al., 2012; Zaki, Coifman, Rafaeli, Berenson, & Downey, 2013). The ability to differentiate positive emotions has shown inconsistent results with some studies finding beneficial effects (Boden et al., 2013; Hill & Updegraff, 2012; Selby et al., 2014; Tugade, Fredrickson, & Barrett, 2004) and others not finding any effects (Barrett et al., 2001; Demiralp et al., 2012;

Grühn et al., 2013). Moreover, past studies have exclusively focused on emotion differentiation in adults. *In chapter 2 we aimed to shed more light on positive and negative emotion differentiation and their relations with well-being in adolescents.*

**Jealousy.** In the current dissertation, we focused one study on jealousy, a powerful, ubiquitous, yet understudied emotion that is likely to be particularly prevalent in adolescence because of the major changes in the interpersonal domain (Collins & Laursen, 2004a, 2004b; Collins et al., 2009; Smetana et al., 2006) and an increased awareness of others' evaluations (Somerville, 2013). Jealousy is a social emotion defined as a negative feeling that arises when an individual perceives a threat to a valued relationship (Salovey & Rodin, 1988). Individual differences exist in the amount of jealousy one experiences and some individuals are more prone to experience jealousy than others (Bingle, Renner, Terry, & Davis, 1983; Parker, Kruse, & Aikins, 2010). How often jealousy is experienced in daily life, which conditions trigger jealousy, and whether propensity to experience jealousy influences the experience of jealousy in daily life is however not understood. *In chapter 3 we aimed to examine the occurrence of jealousy and its associations with interpersonal contact in daily life.*

**Implicit theories of emotions.** Implicit theories of emotions are based on Dweck's conceptual framework of implicit theories of intelligence (1999). According to this framework, people differ in their beliefs that a certain attribute (e.g., intelligence, emotions) is malleable (Dweck, 1999). Some individuals believe that emotions are malleable (everyone can learn to control their emotions; incremental theorists) whereas others believe they are fixed (one has very little control about one emotions; entity theorists; Tamir, John, Srivastava, & Gross, 2007). The beliefs people hold about the malleability of emotions are associated with different well-being outcomes. Compared to entity theorists, incremental theorists are better adjusted psychologically (De Castella et al., 2013; Dweck, 2012; Schroder, Dawood, Yalch, Donnellan, & Moser, 2014; Tamir et al., 2007) and exhibit lower depressive symptoms (Romero, Master, Paunesku, Dweck, & Gross, 2014). Further, entity theorists tend to regulate their emotions with experiential avoidance, which is typically associated with negative outcomes (Kappes & Schikowski, 2013). This finding suggests a relation between implicit theories of emotions individuals endorse and the ability to regulate emotions. Likewise, there may also be a relation between theories of emotions and emotion differentiation in that those who believe more in the malleability of emotions may also be better at differentiating their emotions. *In chapter 2 we examined whether implicit beliefs about emotions and individuals' emotion differentiation were related.*

**Range of emotion regulation strategies.** Next to the experience of emotions, another important factor for well-being is how individuals regulate their emotions. People do not rely on only one strategy but they have a range of ER

strategies at their disposal from which they can freely choose, depending on the demands of the situation (Aldao, 2013; Aldao & Nolen-Hoeksema, 2013; Bonanno & Burton, 2013; Dixon-Gordon et al., 2014; Gross, 2015b). Most research, however, has focused on direct relations between one or two ER strategies and psychopathology (for reviews see Aldao et al., 2010; Webb et al., 2012). Indeed, only a dozen studies examined more than 3 ER strategies simultaneously (e.g., Aldao & Nolen-Hoeksema, 2013; Brans et al., 2013; Dixon-Gordon et al., 2014; Heiy & Cheavens, 2014). These studies have shown that some ER strategies (e.g., acceptance) are used more often than others (e.g., reappraisal) and that some are more effective in situations with high negative emotions (e.g., distraction) versus low negative emotions (e.g., reappraisal; Sheppes, Catran, & Meiran, 2009; Sheppes, Scheibe, Suri, & Gross, 2011).

Another important facet of ER is the flexibility with which each of the ER strategies is invoked. Flexibility is proposed to be an important facet of mental health (Bonanno & Burton, 2013; Loughheed & Hollenstein, 2012). Individuals can use different strategies simultaneously or shortly after each other in response to the same event or across different events. A broad repertoire of ER strategies to choose from is needed to regulate emotions efficiently. Indeed, previous empirical work showed that individuals who invoked a broader range of ER strategies in general reported less problematic behaviors compared to those invoking a smaller range of ER strategies (Dixon-Gordon et al., 2014; Eftekhari, Zoellner, & Vigil, 2009; Loughheed & Hollenstein, 2012). Which ER strategies are used in daily life, how they are selected, and how they relate to the down-regulation of negative affect in daily life has received little attention. *In chapter 4 we investigated the use, selection, and success of eight ER strategies throughout a two-weekend sampling period.*

**Emotional intensity.** Studies often investigate relations between internalizing disorders and ER strategies (Aldao et al., 2010) and thereby dismiss the potential role of emotional intensity (R. J. Larsen, 2009). Emotional experiences can differ widely in the intensity with which they are experienced. This can either depend on the situation (e.g., loss of a favorite pet versus having a flat tire) or on the person (e.g., one person feels irritated after receiving a bad grade whereas another person feels devastated). The intensity of emotions triggered by a situation may be related to overall mood disorders (R. J. Larsen, 2009) but also to the way individuals regulate those emotions. *In chapter 2 we investigated emotional intensity and its relation with emotion differentiation and in chapter 4 we examined the bidirectional link between emotional intensity and use of ER strategies.*

**Interpersonal context.** Emotions are inherently social phenomena (Fischer & Manstead, 2008; Frijda & Mesquita, 1994). They appear in interpersonal contexts, are influenced by others, and are regulated in these social contexts (Butler, 2011;

Campos, Walle, Dahl, & Main, 2011; Fischer, Rotteveel, Evers, & Manstead, 2004). Also, emotions serve functions that enable humans to live together, by signaling love and affection or jealousy and disgust. Consistent evidence shows that individuals feel better when they are with others than when they are alone (Csikszentmihalyi & Hunter, 2003; Schneiders et al., 2007) and contact with close others is consistently viewed as a key factor for well-being (Goswami, 2012; Umberson & Montez, 2010). At the same time, some emotions may be more likely to occur when in the company of others. Jealousy, for instance, is a social emotion that emerges when an individual perceives a threat to an existing relationship (Salovey & Rodin, 1988). In which interpersonal contexts (i.e., family, peer, alone, face-to-face, online) jealousy predominantly occurs is however not yet known.

Considering the importance of interpersonal relationships, Social Baseline Theory (SBT; Beckes & Coan, 2011; Coan & Sbarra, 2015) was proposed recently. SBT suggests that humans have a fundamental need to connect with others and function best when they are with others. According to SBT, being alone constitutes a stress factor. Empirical support showed that individuals' brain areas associated with threat were less active when a person close to them was present compared to when a stranger was present (Coan, Schaefer, & Davidson, 2006). Further, among anxious youth, the presence of a caregiver moderated the relation between anxiety responses and stressful stimuli (Conner et al., 2012). These findings stand in contrast to the tradition of investigating emotions and ER as an intra-individual process without considering the social environment. ER has mostly been studied in isolation (for a review see Campos et al., 2011), even though it is clear that emotions are often regulated with the help of close interpersonal relationships (e.g., parents who soothe a child or a friend who provides ideas on how to solve a problem). *In chapter 3, we examined the relation between jealousy and interpersonal contexts and in chapter 5 we investigated the relations between negative emotions and interpersonal relationships.*

**Variable-centered versus person-centered approaches.** Examinations of direct, variable-centered relations between emotions, ER, and psychopathology have a long tradition in psychology. A variable-centered approach can provide information about the relative impact that each predictor has on an outcome variable. It uses the average of a sample to predict the average outcome (Asendorpf, 2015) and thereby applies a "one size fits all" approach that does not take individual differences into account. In contrast, a person-centered approach enables researchers to identify subgroups with similar patterns of emotions or ER and is especially useful in describing differences between groups of people with regard to their outcomes (Asendorpf, 2015; Laursen & Hoff, 2006). These smaller, homogenous groups provide a more detailed picture and can better account for possible differences between individuals. For example, specific

combinations of coping strategies may be problematic: an individual who primarily uses rumination and suppression to regulate emotions may experience more internalizing disorders and an individual who primarily uses suppression and problem-solving may not report any problems. If this link was only examined with a variable-centered approach, finding relations between suppression and internalizing disorders or between suppression and no problematic behavior may be equally likely because the second ER strategy that completes the picture is ignored. *In chapter 5, we implemented a person-centered approach to better understand individual differences in coping strategies and how they influence the experience of negative emotions.*

## Design

Participants in the current dissertation were adolescents from different high schools throughout the Netherlands. The studies in the dissertation were based on two different samples, the Weekend ESM sample and the Swinging Moods Sample.

**Weekend ESM sample.** Adolescents in this sample were part of a larger randomized controlled trial (RCT) testing the effectiveness of the Cognitive Behavioral Therapy (CBT)-based depression prevention program 'Op Volle Kracht' (OVK; adapted from the Penn Resiliency Program; Gillham et al., 2007). Half of all adolescents participating in the RCT received the CBT-based group prevention program that aimed at preventing depressive symptoms (2011-2012). The other half followed the regular school curriculum. Both groups filled out questionnaires at school at four time points during a period of two years (for a full description of the procedure see Kindt, van Zundert, & Engels, 2012). OVK was not effective in reducing depressive symptoms over a 1-year period (Kindt, Kleinjan, Janssens, & Scholte, 2014). To make sure the prevention program would not account for our findings we included it as a covariate in all the analyses included in the dissertation. Importantly, none of our results were affected by the prevention condition.

The ESM data was collected from a subset of the RCT sample after the OVK prevention program was completed. Adolescents ( $N = 105$ ) from the first or second year at high school were approached and invited to participate in the study. Ninety-eight adolescents (93.3%) agreed to participate and received passive consent from their parents. In total, 87 adolescents (88.8%, mean age = 14) participated in the data collection in 2012-2013. In addition to the ESM data collection, adolescents filled out a baseline questionnaire that assessed demographics, depressive symptoms, anxiety, implicit theories of emotions, and social comparison orientation on a computer at home. Two to eight weeks after the baseline questionnaire, they received a smartphone for one weekend.

Approximately six weeks later they received a smartphone for the second weekend. During each weekend, the smartphone elicited buzzing signals at random time points (four on Fridays, nine on Saturdays and Sundays) that signaled adolescents to fill out the questionnaire.

**Swinging moods.** This dataset was collected among 303 adolescents (mean age = 14) in 2010-2011. Adolescents filled out a baseline questionnaire that, among other measures that were not included in this dissertation, assessed demographics and coping strategies. Following the baseline questionnaire (two to ten weeks later), adolescents participated in a 6-day sampling period (Friday to Thursday). They received smartphones from the researchers that emitted buzzing signals at nine random time points each day that signaled them to fill out the questionnaire.

**Experience sampling method.** Many factors (e.g., norms, beliefs, current emotions) can influence the reports of emotions and the weight of these factors differs for whether someone reports a current emotion (state) or a global emotion (trait). Global reports tend to be influenced by generalization of affect (e.g., by how one generally feels in these kinds of situations) whereas situation specific emotions are a purer measure of how one actually feels in a particular moment (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004; Robinson & Clore, 2002b). In typical ESM studies, including those in this dissertation, participants fill out questionnaires several times a day. Compared to traditional methods which use retrospective reports over relatively long periods, this method has important advantages: First, ESM substantially reduces recall bias because emotions are reported close to the moments in which they are experienced (Robinson & Clore, 2002b). Second, ESM has high ecological validity because adolescents fill out the questionnaires while they are experiencing emotions and daily life events. Third, the reliability of the measured variables is considered higher than with once-administered questionnaires because all variables are measured repeatedly (Hektner, Schmidt, & Csikszentmihalyi, 2007; Mehl & Conner, 2012).

### **Analytic Strategies**

**Multi-level modeling.** Because we assessed adolescents' emotions and ER strategies several times per day over a period of two weekends or six days, the data we obtained were not independent. More specifically, repeated momentary assessments were nested within individuals. To account for the nested structure of the data, we analyzed the data using multilevel-modeling in Mplus (Muthén & Muthén, 1998-2010).

**Person-centered approach.** In this dissertation we used Latent Profile Analysis (LPA) to cluster individuals in groups. LPA enables researchers to



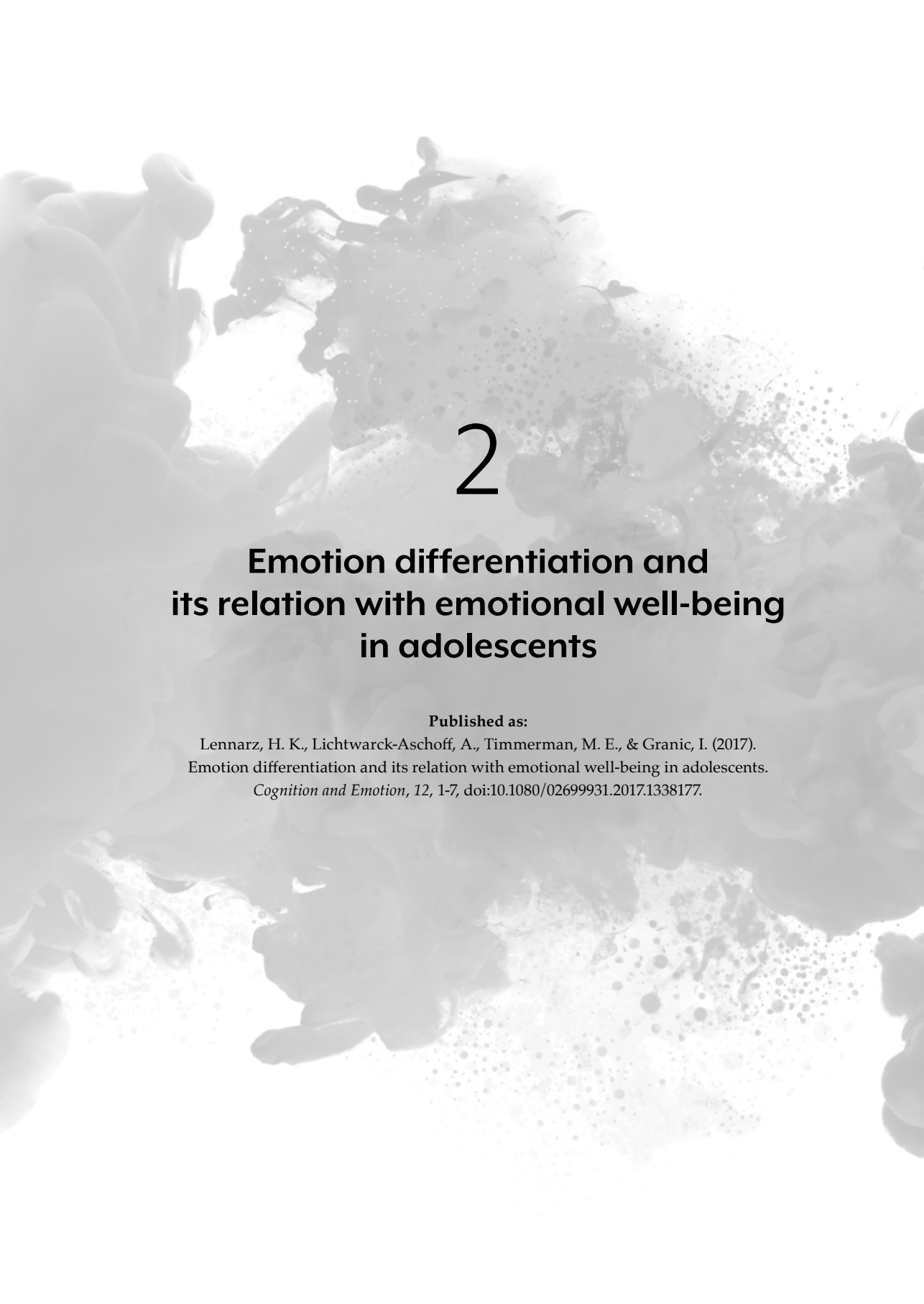
evaluate how many latent groups best describe the data and can be empirically validated because the fit indices provided indicate which solution (the number of latent groups) fits the data best (Nylund, Asparoutiov, & Muthen, 2007). The latent groups that emerged from this analysis were used as predictors and moderators in the analyses.

### **Overview of the Dissertation**

Overall, this dissertation offers a novel approach to studying emotions and ER processes in an adolescent sample. Its main focus was on momentary emotional processes and social contexts that are of influence on the experience and regulation of emotions. The studies collectively contribute to the literature by focusing on a range of emotions and ER strategies, investigating discrete emotions, focusing on one particularly salient emotion in adolescence (i.e., jealousy), describing momentary ER strategies, and using a person-centered approach to examine emotion-related processes.







# 2

## **Emotion differentiation and its relation with emotional well-being in adolescents**

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## Abstract

Emotion differentiation (ED) refers to the precision with which people can identify and distinguish their emotions and has been associated with well-being in adults. This study investigated ED and its relation with emotional well-being (i.e., depressive symptoms, positivity and negativity intensity and propensity, implicit theories of emotions) in adolescents. We used an experience sampling method with 72 participants ( $M_{age} = 14.00$ , 71% girls) to assess adolescents' positive and negative emotions at different time points over the course of two weekends and a baseline questionnaire to assess emotional well-being. Differentiating negative emotions was related to less negativity intensity and propensity, and to the belief that emotions are malleable. Differentiating positive emotions was not related to any of the assessed well-being variables. Together, these results suggest that a detailed awareness of one's negative emotional states is an important dimension of well-being, also in adolescence.

Emotions help us to navigate through our daily lives by providing an immediate and reflective answer to the questions “what am I feeling?”, “how am I doing?”, and “what do I want?” (Keltner & Gross, 1999). Individuals vary in the degree to which they differentiate their emotions, which has been labeled *emotion differentiation* (ED) or emotional granularity (Barrett et al., 2001). Some people describe their emotional states in global terms (e.g., they feel *bad* after learning about a partner’s infidelity) whereas others describe their emotional states in specific terms (e.g., they feel *angry* and *jealous* after learning about a partner’s infidelity). So far, ED has been linked to well-being in adults only (see Kashdan et al., 2015 for a review). Adolescence, a developmental period characterized by increased emotionality and mood swings (Rosenblum & Lewis, 2003) and a rise in emotional problems (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012), was the focus of the current study.

### **Emotion Differentiation and Well-Being**

Being aware of one’s emotional states and understanding them as distinct states enables people to react to situational demands adequately and regulate emotions effectively (Kuppens & Verduyn, 2015) as focusing and dampening specific emotions (e.g., anger or sadness) might be easier compared to global states (i.e., feeling bad; Barrett et al., 2001). In line with this, correlational studies showed that across individuals higher levels of negative ED are associated with better psychological adjustment (Boden et al., 2013; Erbas et al., 2014; Grühn et al., 2013; Kashdan et al., 2010). Specifically, with regard to emotional well-being, low negative ED was associated with more depressive symptoms in healthy adults (Erbas et al., 2014) and depressed adults experienced less differentiated emotions compared to healthy adults (Demiralp et al., 2012). Importantly, none of the studies has investigated the causal link between ED and various outcomes. Overall, results from these correlational studies suggest that negative ED is positively related to mental health.

Positive ED has received substantially less attention and results are inconsistent. Some studies showed a positive relation between positive ED and well-being (e.g., Boden et al., 2013; Selby et al., 2014; Tugade et al., 2004) whereas other studies did not show any relation with well-being (e.g., Demiralp et al., 2012; Grühn et al., 2013) or emotion regulation (Barrett et al., 2001). Overall, these results suggest that positive ED may be beneficial but results are inconclusive.

### **The Present Study**

The different results for negative and positive ED signal that it is necessary to further elucidate both forms of ED separately to receive a better picture for the importance of ED for well-being. Hence, in the current study we investigated

the relation between positive and negative ED and emotional well-being in adolescents. In line with earlier studies, experience sampling (ESM; Hektner et al., 2007) was used to assess emotions. To quantify an individual's degree of ED, intraclass correlations (ICCs) between different emotions across several time points were calculated for positive and negative emotions separately (Barrett et al., 2001; Lindquist & Barrett, 2008).

Consistent with earlier studies and because those constructs are particularly relevant for adolescents, we examined emotional intensity, depressive symptoms, and implicit theories of emotions. First, intense negative emotions have been related to mood disorders (see R. J. Larsen, 2009 for a review) whereas positive emotions were identified as protective factors in the development of psychopathology (Gilbert, 2012). Second, depressive symptoms increase in adolescence (Kessler et al., 2012) and are associated with future depressive episodes (Pine, Cohen, Cohen, & Brook, 1999). Both depressive symptoms and emotional intensity have been shown to be related to ED in adults (e.g., Erbas et al., 2014; Grünh et al., 2013). Hence, we expected adolescents who are better at differentiating emotions to experience lower levels of negative emotions (intensity and propensity), higher levels of positive emotions (intensity and propensity), and lower levels of depressive symptoms. Third, implicit theories of emotions are based on Dweck's (1999) implicit theories of intelligence which state that individuals differ in the degree to which they believe that human attributes (e.g., intelligence, emotions) are malleable. Some people perceive emotions as malleable (incremental theorists) whereas others perceive them as fixed (entity theorists; Tamir et al., 2007). Compared to incremental theorists, entity theorists show poorer psychological adjustment (De Castella et al., 2013; Dweck, 2012; Romero et al., 2014; Schroder et al., 2014; Tamir et al., 2007). Because ED and implicit theories of emotions share a mutual relation with well-being, we expected incremental theorists to show higher differentiation of emotions.

## Method

### Participants

One hundred five participants were recruited from three secondary schools in high-risk neighborhoods (e.g., low income, migration background) in the Netherlands; 98 adolescents (93.3%) agreed to participate and did not receive an objection from their parents (passive consent). Eleven adolescents did not participate in the ESM because they were either sick when the study took place or withdrew their willingness to participate ( $N = 87$ ). Our sample included pupils of the high or middle educational level only and the majority (79 participants, 90.8%) was of

Dutch descent. We included only adolescents who filled out at least 25% of the ESM assessments ( $N = 86$ ,  $M_{age} = 13.94$ ,  $SD_{age} = .96$  years, 65% girls). Fourteen of these adolescents did not fill out the baseline questionnaire and were excluded from all analyses including baseline measurements which resulted in a sample of 72 participants ( $M_{age} = 13.98$ ,  $SD_{age} = .92$  years, 71% girls). No differences emerged from those who did not fill out the baseline questionnaire ( $N = 14$ ,  $M_{age} = 13.77$ ,  $SD_{age} = 1.17$  years old, 36% girls) with regard to age  $t(83) = .72$ ,  $p = .48$ , 95% CI of difference  $[-.78, .37]$ . Included adolescents were, however, more likely to be girls  $\chi^2(1) = 6.36$ ,  $p = .01$ . Adolescents participated voluntarily and received a voucher of 20€ for their participation. All procedures were approved by the Ethical Committee of the Faculty of Social Sciences (ECG2012-2606-042).

### Procedure and Measures

**Study setting.** This study was part of a randomized controlled trial investigating the effectiveness of the Dutch depression prevention program 'Op Volle Kracht' (OVK) which was adapted from the Penn Resiliency Program (Gillham et al., 2007). In the larger study, half of the adolescents followed a depression prevention program for six months and the other half followed the regular school curriculum (for a full description of the procedure see Kindt et al., 2012). OVK was not effective at reducing depressive symptoms over a 1-year period (Kindt et al., 2014)<sup>2</sup>. The current study used a subsample of adolescents participating in that larger study and was conducted after the intervention had been completed. Only adolescents from schools who agreed to participate in the second part of the research were eligible to participate. To examine whether any differences on the key variables of this study emerged between the intervention and the control group, we compared means of all study variables using t-tests and did not find any differences<sup>3</sup>. Further, regression analyses were performed with and without including intervention as a covariate. Results remained the same and thus all results presented do not include condition as a covariate<sup>4</sup>. The current study consisted of two parts: ESM and a baseline questionnaire.

2 Kindt et al. (2014) found a moderating effect of parental psychopathology for the effectiveness of the program. In our sample we did not find significant differences between adolescents from parents with and without psychopathology  $F(9,61) = .56$ ,  $p = .82$ . Hence, we did not control for parental psychopathology in our final analyses.

3 No differences emerged between the intervention and the control group on any of the variables of interest (all  $ps > .05$ ): Age,  $t(83) = .19$ ,  $p = .85$ , Sex  $t(84) = .41$ ,  $p = .68$ , Negativity propensity  $t(70) = .82$ ,  $p = .42$ , Positivity propensity  $t(70) = .48$ ,  $p = .63$ , Depressive symptoms  $t(70) = 1.27$ ,  $p = .21$ , Implicit theories of emotions  $t(70) = .36$ ,  $p = .72$ , Positivity intensity  $t(70) = .07$ ,  $p = .95$ , Negativity intensity  $t(70) = .46$ ,  $p = .65$ , Positive ICC,  $t(70) = 1.43$ ,  $p = .16$ , Negative ICC  $t(70) = .68$ ,  $p = .50$ .



**Experience sampling method (ESM).** Participants filled out the ESM on two weekends that were scheduled six weeks apart to reduce burden for participants by not having to respond to a buzzing smartphone two weekends in a row. On Fridays, participants received smartphones with an application that emitted buzzing signals at random times within 90-minute intervals. They received instructions regarding the use of the smartphones, how to fill out the questionnaires (i.e., stopping their current activity immediately) and explanations of the items. Participants also indicated times that they would not be able to answer the phone (e.g., sports training, music lessons). Each weekend participants received 22 buzzing signals (four on Friday between 4:30pm and 10:30pm, and nine on each Saturday and Sunday between 9:00am and 10:30pm). Completing the questionnaire took approximately six minutes. When participants did not respond to the first signal they were reminded a maximum of two times within six minutes after which it was no longer possible to complete the questionnaire for that assessment.

**Emotional intensity.** Positivity intensity was assessed with five items: happy, cheerful, satisfied, relaxed, and proud. Negativity intensity was assessed with nine items: jealous, anxious, ashamed, irritated, worried, angry, guilty, sad, and lonely. These items were selected from the Positive and Negative Affect Scale (Watson, Clark, & Tellegen, 1988) and other ESM studies (Wichers et al., 2007). Adolescents indicated the extent to which they felt each described emotion just prior to the assessment on a 7-point scale that ranged from (1) *not at all* to (7) *very much*.

**Other measures.** The questionnaire also assessed other variables that are not reported upon in the current manuscript. These included adolescents' current activity, where they were, with whom they were and how they felt in that company, and whether they compared themselves to others. Further, we assessed what the most negative event was that they experienced since the last assessment, which negative emotions they felt during the event, how they regulated these emotions, and also the most positive event they experienced since the last assessment.

**Baseline questionnaire.** One to three months before the ESM assessments, participants completed a baseline questionnaire on a computer at home that assessed levels of positivity and negativity propensity, depressive symptoms, and implicit theories of emotions.

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4 We ran four different regression models (separately for positive and negative ICC-r) to test whether condition influenced the results. Negative ICC-r was significantly related to theories of emotions  $b = .23$ ,  $t(70) = 2.01$ ,  $p = .048$ , and negativity intensity  $b = -.37$ ,  $t(70) = 2.84$ ,  $p = .006$ ,  $F(6,71) = 3.73$ ,  $p = .003$  when not including condition as a covariate as well as when including condition as a covariate; theories of emotions  $b = .24$ ,  $t(70) = 2.01$ ,  $p = .04$ , and negativity intensity  $b = -.37$ ,  $t(70) = 2.87$ ,  $p = .006$ ,  $F(7,71) = 3.32$ ,  $p = .004$ . Positive ICC-r was not significantly related to any of the variables, neither when not including condition as a covariate  $F(6,71) = .97$ ,  $p = .45$  nor when including it  $F(7,71) = .90$ ,  $p = .51$ .

**Emotional propensity.** Positivity and negativity propensity (Lennarz, Lichtwarck-Aschoff, Finkenauer, & Granic, 2017) were assessed with the same items as positivity and negativity intensity. Adolescents indicated the extent to which they felt each of the cues during the past 2 weeks on a 7-point scale that ranged from (1) *not at all* to (7) *very much*. The reliability of positivity and negativity propensity was good,  $\alpha = .77$  and  $\alpha = .83$ , respectively.

**Depressive symptoms.** Twenty-six of 27 items of the Children's Depression Inventory (CDI; Kovacs, 1985) were used to assess symptoms of depression: the item about suicidal thoughts was omitted due to ethical concerns. Mean scores were computed for each participant and a higher score indicated more depressive symptoms. The reliability of the questionnaire was satisfactory,  $\alpha = .77$ .

**Implicit theories of emotions.** Beliefs about the malleability of emotions were measured with the four-item Theory of Emotions Scale (Tamir et al., 2007). Two items measured the entity dimension (thinking of emotions as being fixed) and two items measured the incremental dimension (thinking of emotions as being malleable). Adolescents indicated on a 5-point Likert scale (1) *strongly agree* to (5) *strongly disagree* how much they agreed with each statement. The two entity items were reversed and a mean score across all items was calculated. Higher scores indicated believing in the malleability of emotions. The reliability of the questionnaire was satisfactory,  $\alpha = .68$ .

## Data analysis

ED was indicated via the intra-class correlations (ICCs) separately for positive and negative emotions. As the ED measure we used the reversed ICC, denoted as ICC-r =  $-1 \times \text{ICC}$ ; a higher ICC-r reflects higher ED. To investigate the strength of the ordinal relations between ED and emotional well-being, we computed Spearman rank order correlations<sup>5</sup> of ICC-r with negativity and positivity intensity and propensity, depressive symptoms, and implicit theories of emotions.

## Results

### Descriptive Statistics

Table 1 shows summary statistics for all variables included. In general, adolescents had relatively low negative emotional intensity and propensity and depressive symptoms, and relatively high positive emotional intensity and propensity. The average ICC-r for negative emotions was  $-.59$  ( $SD = .27$ ), with  $-.91$  and  $-.24$  as

<sup>5</sup> A Pearson correlation would not be appropriate as there is no reason why the pairs of variables at hand would bear a linear relationship.

the 10<sup>th</sup> and 90<sup>th</sup> percentiles, respectively. The average ICC-r for positive emotions was  $-.63$  ( $SD = .26$ ), with  $-.87$  and  $-.19$  as the 10<sup>th</sup> and 90<sup>th</sup> percentiles, respectively. Independent samples *t*-tests revealed no sex differences for negative ED  $t(84) = 1.61$ ,  $p = .11$ , (boys  $M = -.54$ ,  $SD = .29$ ; girls  $M = -.64$ ,  $SD = .25$ ) but indicated sex differences

**Table 1** Emotion differentiation and well-being. Presentation of means, standard deviations, and Spearman rank order correlation coefficients between study variables.

	N	M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Negative ICC-r	86	-.61	.27									
2. Positive ICC-r	86	-.64	.26	.23*								
3. NE intensity	86	1.66	.66	-.55**	-.16							
4. PE intensity	86	4.31	1.03	.09	.29**	-.41**						
5. NE propensity	72	2.51	1.06	-.23†	-.12	.42**	-.14					
6. PE propensity	72	5.12	1.13	.16	.08	-.25*	.43**	-.28*				
7. Implicit Theories of Emotions	72	3.18	.84	.24*	.07	-.34**	.16	-.25*	.16			
8. Depressive Symptoms	72	.35	.21	-.09	-.15	.30*	-.29*	.42**	-.50**	-.24*		
9. Sex	86	.65	.48	-.14	-.28*	.05	-.06	.14	-.09	-.10	.10	

Note. \*\*  $p < .001$ , \*  $p < .01$ , †  $p = .05$ . PE = positive emotions, NE = negative emotions

for positive ED  $t(48.35)^6 = 2.35, p = .02$ . Boys ( $M = -.54, SD = .29$ ) were significantly better in differentiating positive emotions than girls ( $M = -.69, SD = .23$ ). Therefore, we controlled for sex in analyses including positive ED.

### Emotion Differentiation and Emotional Well-Being

Spearman rank order correlation coefficients are presented in Table 1. Negative and positive ED were positively related. Further, as hypothesized, the negative ICC-r was negatively related to negativity intensity and negativity propensity, and implicit theories of emotions. After including sex as a covariate in a regression analysis, the positive ICC-r was not related to any of the well-being variables,  $F(7,64) = 1.84, p = .09$ .

## Discussion

This study investigated ED in adolescence, a time of increased emotionality and mood swings (Rosenblum & Lewis, 2003), and increased risk of onset of emotional problems (Kessler et al., 2012). ED was positively related to well-being in adolescents: more negative ED was related to less intense negative emotions and to a higher belief in the malleability of emotions. Positive ED was not related to emotional well-being.

In line with the idea that negative ED is positive, most of our hypotheses were confirmed. First, corresponding to findings among adults (Boden et al., 2013; Erbas et al., 2014), adolescents who were better able to differentiate negative emotions, experienced less intense negative emotions. Although causality cannot be inferred with the current study design it may be that less intense negative emotions are more easily differentiated, whereas high intensity negative emotions create a feeling of being overwhelmed which may reduce the ability to differentiate (Barrett et al., 2001; Kuppens & Verduyn, 2015). Second, implicit theories of emotions and ED were positively related. Again, the directionality of this association needs further investigation. On the one hand, the ability to differentiate emotions may create a feeling of being in control of one's emotions because specific emotions are less overwhelming than global negative emotional states (Barrett et al., 2001). On the other hand, believing that emotions are malleable may help to pay closer attention to the emotions because one believes one can influence the emotions. This closer attention may enable individuals to identify the different emotions and contribute to ED.

6 Degrees of freedom have decimal points if equal variances are not assumed.

Importantly, the direction of the relation between ED and well-being is not clear and more research is needed to disentangle the link. Causality could be investigated in the laboratory by priming participant with low/high intense negative emotions after which they have to differentiate emotions following Erbas et al.'s (2014) procedure for assessing ED in a laboratory or with longitudinal studies assessing emotion differentiation and emotional well-being at different time points across a longer study period (e.g., 6 times in 2 years). These findings would provide information about whether the ability to differentiate emotions influences well-being or whether well-being influences the ability to differentiate emotions.

We did not find any relations with regard to positive ED. These null findings are consistent with studies among adults that suggest that negative ED is more important for well-being than positive ED (Demiralp et al., 2012; Erbas et al., 2014; Grühn et al., 2013; Kashdan et al., 2010). Negative ED may be more important because discrete negative emotions are easier regulated (Kuppens & Verduyn, 2015) and successful emotion regulation is associated with higher well-being (Gross & Thompson, 2007). An important note is that we assessed fewer positive emotions than negative emotions, which may have led to less variability, and hence reduced power to detect relations.

The relation between positive ED and negative ED was moderately positive. This finding is consistent with two previous studies among healthy adults (Selby et al., 2014; Vandercammen, Hofmans, & Theuns, 2014). Hence, positive and negative ED may complement each other and the propensity for differentiation reflects a more general awareness and skill for labeling emotional states, regardless of valence.

This study has a few limitations. First, this study was part of a larger study investigating the effect of a depression prevention program, based on cognitive-behavioral theory. Even though no differences emerged between the intervention and the control group in the current study and also the original trial failed to identify any differences between the groups on a large set of variables (Kindt et al., 2014), we cannot rule out the possibility that the prevention program affected variables that are related to emotion regulation and emotional well-being but were not assessed in this or the original trial. Hence, these results need to be replicated in a non-prevention sample before firm conclusions can be drawn. Second, because of its correlational design, this study could not investigate direction of effects. Third, the sample size was relatively small. The results obtained from this sample were largely in line with our expectations but some of the expected relations failed to reach significance. To confirm the relations found here and to investigate ED in adolescents in more detail, replications with larger and more diverse samples (e.g., depressed versus healthy adolescents) are

needed. Fourth, levels of negative emotions in this sample were relatively low and research among adults has shown strongest effects of ED in response to intense negative events (Barrett et al., 2001; Kashdan et al., 2010). Thus, our study might not have captured (enough of) the high intensity negative events in which individual differences in ED become salient. Future research should measure adolescents' emotions in highly negative situations, for example by experimentally inducing emotions in a laboratory.

Concluding, negative emotion differentiation seems to be an important facet of emotional well-being in adolescents, as it relates to less intense negative emotions and a higher belief in the malleability of emotions. ED might thus be an important skill to promote in adolescence to prevent emotional problems.





# 3

## **Jealousy in adolescents' daily lives: How does it relate to interpersonal context and well-being?**

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## Abstract

Past studies have shown that jealousy peaks in adolescence. However, little is known about how and when adolescents experience jealousy in their daily lives. The current study aimed to examine the relation between state jealousy, the more general propensity to feel jealous, the interpersonal contexts in which jealousy arises, and different forms of social comparison. The impact of jealousy on perceptions of well-being was also explored. We used an experience sampling method during two weekends with 68 adolescents ( $M_{\text{age}} = 13.94$ ; 64.70% girls). Jealousy was common: On average, 90% of our sample experienced jealousy in 20% of the assessments. Adolescents reported more jealousy with peers than with family. Additionally, they experienced more jealousy when in online contexts than when in face-to-face peer contexts. The normative nature of jealousy, its developmental function and relation with well-being, and implications for understanding jealousy triggered in (highly social) online contexts are discussed.

Jealousy is a powerful emotion defined as a negative feeling that arises when an individual perceives a threat from someone else to a valued relationship (Salovey & Rodin, 1988). It can be seen as an adaptive and useful emotion because it can help to maintain relationships (Buss, 1995), but it may also lead to problematic behaviors such as aggression or rumination that contribute to psychopathology (Culotta & Goldstein, 2008; Lavalley & Parker, 2009; Parker et al., 2010; Parker, Low, Walker, & Gamm, 2005). Often, jealousy is associated with romantic relationships; however, it can arise in any close relationship (e.g., friends, family; DeSteno, Valdesolo, & Bartlett, 2006).

During adolescence, major developments take place in the interpersonal domain that may be particularly relevant to the study of jealousy. In general, peers become more important than parents (Collins & Laursen, 2004a, 2004b) and romantic relationships start to develop (Collins et al., 2009), which make adolescents especially vulnerable to experiencing jealousy. Additionally, adolescents become vigilant to their peers' evaluations (Somerville, 2013; Steinberg, 2011) and jealousy seems to increase in adolescence as compared to childhood (Pines & Aronson, 1983). Given these interpersonal developmental changes, studies on jealousy in adolescence are surprisingly scarce (see Parker and colleagues' work for exception; Lavalley & Parker, 2009; Parker et al., 2010; Parker et al., 2005). We know almost nothing about the everyday experiences of jealousy in adolescence: How *prevalent, frequent, and intense* is jealousy in adolescents' daily lives, in *which contexts* do they most frequently feel jealous, and how do individual differences shape adolescents' experiences of jealousy? The present study aimed to address these questions.

Past research using questionnaire methods has revealed individual differences in jealousy and showed that some individuals are generally more prone to experience jealousy than others (Bingle et al., 1983; Parker et al., 2010). However, like other emotions (e.g., guilt, happiness, sadness), jealousy is likely to fluctuate over time and across different interpersonal contexts (Baumeister, Reis, & Delespaul, 1995; Csikszentmihalyi & Hunter, 2003; Larson, 1990; Schneiders et al., 2007; van Roekel et al., 2014). Although we do expect that propensity to feel jealous and state levels of jealousy are related, they are clearly not the same. For instance, an adolescent who describes herself as generally not a jealous person may still respond with extreme jealousy under certain rare circumstances. The current study was designed to investigate the conditions that trigger instances of state jealousy in adolescents' *everyday* lives. We paid special attention to contexts in which jealousy emerged (family, peers, alone, and online) and social comparison (evaluation in comparison to others and general tendency to compare oneself).

### Contexts of Jealousy

Jealousy is characterized as a basic *social* emotion (DeSteno et al., 2006) and is likely to fluctuate depending on the nature of the interpersonal context. This might be especially salient in adolescence as developmental changes trigger reorganizations in adolescents' interpersonal relationships (Arnett, 1999). Time spent with family decreases (Larson & Richards, 1991) and negative emotionality and conflict with parents increases (Laursen, 1993). However, most family relationships remain intimate and close and provide an important source of support during early and middle adolescence (Smetana et al., 2006). Despite close emotional bonds (or perhaps because of them), family relationships remain a context in which feelings of jealousy can arise (especially among siblings; Volling, Kennedy, & Jackey, 2010).

Although parents remain important in the lives of adolescents, the relative importance and influence of peers increase (Collins & Laursen, 2004a, 2004b). In fact, a crucial developmental task during adolescence is to find a peer group among whom adolescents feel comfortable and supported; positive peer relationships are critical for adolescents' well-being (e.g., B. B. Brown & Larson, 2009). These peer relationships become more complex because adolescents need to restructure their peer networks due to normative changes such as the transition to high school (B. B. Brown, 1990). Adolescents are confronted with navigating a new peer environment, finding new friends and defining their position in the new peer group, and, at the same time, adolescents may want to maintain their established friendships. This reorganization of their friendship and peer networks can give rise to situations that elicit jealousy as social exclusion and bullying increase (Goldbaum, Craig, Pepler, & Connolly, 2007). Another important facet of these emerging peer interactions are romantic relationships (Connolly, Furman, & Konarski, 2000). Romantic relationships are a normative part of adolescent development and become common during middle adolescence (Collins et al., 2009). They can be a source of jealousy, either because one's romantic partner develops interest for someone else or because one feels neglected due to a friend spending more time with his/her romantic partner (Connolly & McIsaac, 2011). Therefore, we expected that adolescents feel most jealous when they are with peers compared to with family or alone.

Finally, the context in which these relationships are experienced seems important to consider. Interpersonal contact is not limited to face-to-face interactions but also can happen in a virtual environment. Online spaces have become an important context in which adolescents socialize with peers (Lenhart, Ling, Campbell, & Purcell, 2010). These contacts can range from chatting and playing with peers and friends they already know offline to meeting new friends in these online spaces. Jealousy has rarely been studied in these online contexts,

but one study investigating the relation between jealousy and Facebook use in young adults showed that increased use of Facebook was associated with more jealousy in romantic relationships (Muise, Christofides, & Desmarais, 2009).

Online contexts such as YouTube, Facebook, and Twitter may be especially likely to elicit jealousy because they provide a ubiquitous lens through which young people can and do compare themselves socially to their peers (Haferkamp & Krämer, 2011). These online contexts are particularly compelling contexts for jealousy to emerge (Vogel, Rose, Roberts, & Eckles, 2014), because people tend to post pictures, videos, and updates of their “ideal selves” or the best parts of their lives, omitting a great deal of the boring, mundane or negative features of these same lives (Ellison, Heino, & Gibbs, 2006; Turkle, 2011). Social media sites are also continually accessible, providing ongoing opportunities for comparisons to same-aged peers. Unlike generations before that did not have smartphones and 24-hour access to the internet, the current generation of adolescents, many of whom grow up sleeping with their phones (Hysing et al., 2015), have almost non-stop opportunities for social comparisons. Thus, we hypothesized that adolescents feel most jealousy when in online contexts.

### **Quality of Social Comparison**

Peer contexts are hypothesized to elicit higher intensity and more frequent occurrences of jealousy than when adolescents are alone or with their family. However, all peer relationships are not equal in quality. Given that jealousy arises when one perceives a threat to a valued relationship (Salovey & Rodin, 1988), it is likely that jealousy is triggered towards someone who is perceived as superior. That is, “Jane” might feel jealous because her best friend is spending all her time with a new popular girl who seems to be so much more fun to be with than Jane herself. Hence, Jane’s perceptions of the social context – her perceived role in the social hierarchy – may be critical for understanding the conditions in which jealousy is most likely felt.

Social comparison is defined by comparing one’s own achievements, competencies, and appearance to that of others (Festinger, 1954; Gibbons & Buunk, 1999). All individuals have the tendency to compare themselves to others and social comparison can serve different goals, such as self-evaluation or self-enhancement (Suls, Martin, & Wheeler, 2002). Likewise, social comparison can provide security and increase self-esteem if individuals feel a strong sense of belongingness in their peer group, or alternatively can be a source of insecurity and decreased self-esteem if individuals feel they do not belong to their peer group (Suls et al., 2002; Wood, 1989). Compared to children, adolescents are generally more insecure and have lower self-esteem (Robins, Trzesniewski, Tracy, Gosling, & Potter, 2002). Consequently, they have a higher need to compare

themselves to others than children do (Eccles, 1999). Additionally, they become increasingly aware and attend vigilantly to their peers' evaluations (Somerville, 2013; Steinberg, 2011). Comparisons enable adolescents to adjust and adapt their behavior if necessary to fit better in the peer group, but at the same time these comparisons make adolescents vulnerable to jealous feelings that can be triggered by these social comparisons.

**Evaluation in comparison to others.** Several types of social comparisons have been identified: (a) upward comparison (comparing oneself to someone who is superior), (b) horizontal comparison (comparing oneself to someone who is equal), and (c) downward comparison (comparing oneself to someone who is worse off; Festinger, 1954). Previous studies have shown that well-being decreases after upward comparison (Jordan et al., 2011) whereas it increases after downward comparison (Moskowitz, 2005a; Wheeler & Miyake, 1992). Hence, when adolescents are surrounded by people they perceive as better off than themselves (e.g., a popular peer; upward comparison), they are more likely to be jealous than when they perceive the people they are with as worse off than themselves (e.g., a bully victim; downward comparison).

**Social comparison orientation.** Although all individuals at some time or another compare themselves with others (Festinger, 1954), some individuals have a stronger tendency to do so. This heightened *tendency* to compare is related to insecurity (Gibbons & Buunk, 1999) and may make already insecure adolescents more prone to experiencing jealousy on a day-to-day basis. In addition to the direct relation between state jealousy and social comparison orientation, it might also be the case that individuals who are high versus low in their social comparison orientation experience different amounts of state jealousy depending on their interpersonal context or their self-evaluation in comparison to the other person.

### **Jealousy and Well-Being**

We argue that jealousy is a normative emotion during adolescence, as well as across the lifespan. However it might be that when feeling too much jealousy, a sense of well-being is compromised. Previous studies have indeed shown that higher levels of jealousy was related to more aggression and peer-related problems (Parker et al., 2005) and to greater emotional maladjustment among adolescents (Lavalley & Parker, 2009). The current study examined whether higher levels of state jealousy were associated with lower emotional well-being, specifically increased depressive symptoms and anxiety.

## Design and Hypotheses

Previous studies have focused on trait jealousy in adolescents (Lavallee & Parker, 2009; Parker et al., 2010; Parker et al., 2005), but these studies cannot capture how much and in which contexts adolescents experience jealousy in everyday life. As emotions fluctuate across contexts (Baumeister et al., 1995; Csikszentmihalyi & Hunter, 2003; van Roekel et al., 2014) and as jealousy is likely to be triggered by different contexts, the current study used the experience sampling method (ESM; Csikszentmihalyi & Larson, 1987; Hektner et al., 2007) to assess adolescents' state jealousy and its relation to interpersonal context. Advantages of ESM are reduced recall bias (Palmier-Claus et al., 2011), because adolescents provide answers close to their actual experiences, and high ecological validity, because adolescents fill out the questionnaire when they are in the situation (or shortly thereafter). Thus, this method enables researchers to identify unique contributions of contextual variables to the experience of jealousy.

Four research questions were addressed: (1) How *prevalent, frequent, and intense* is jealousy in adolescents' daily lives? (2) In which contexts do adolescents most often feel jealous? (3) How do individual differences shape adolescents' everyday experiences of jealousy? (4) How are jealousy and well-being related in healthy adolescents?

Regarding the first research question, we hypothesized that most adolescents would feel at least some degree of jealousy during our sampling period, based on research showing that jealousy peaks during adolescence (Pines & Aronson, 1983). Regarding the second research question, we expected that adolescents would be most jealous when with peers, followed by situations when they were with family and least jealous when they were alone because then adolescents are not confronted with interpersonal demands. However, it is clear that adolescents do not feel alone when or if they are interacting online. Thus, we expected online contexts to elicit more jealousy than face-to-face peer contexts because of the ubiquitous and frequent opportunities these online context offer for social comparisons (Haferkamp & Krämer, 2011; Vogel et al., 2014). Further, based on research on well-being (e.g., Wheeler & Miyake, 1992), we hypothesized that when adolescents compare themselves to people they deem better than themselves (upward comparison), they would feel more jealousy than when they compared themselves with those they judged to be of lesser value (downward comparison).

Regarding the third research question, we hypothesized that the propensity to feel jealousy, social comparison orientation, and age would account for jealousy experiences: Adolescents who have a higher propensity to jealousy (i.e., feel more jealous than other adolescents on average) and adolescents who tend

to compare themselves to others more often were expected to feel more jealous in daily life. Regarding age, we hypothesized that older adolescents would experience less jealousy than younger adolescents because of their increasingly sophisticated cognitive abilities (i.e., abstract reasoning, rationalizing behavior, setting and achieving goals; Steinberg, 2008) which may contribute to contextualizing social relationships and the feelings they evoke. Further, older adolescents have better developed emotion regulation skills than younger adolescents which may enable them to put their feelings into perspective and down-regulate jealousy in a more efficient way (Ahmed, Bittencourt-Hewitt, & Sebastian, 2015).

Further, we hypothesized that the propensity to feel jealousy, social comparison orientation, and age would moderate the relations between state jealousy and the nature of the interpersonal context. We expected that adolescents high in their propensity to feel jealousy would show stronger relations between upward comparison and jealousy than those low in propensity to jealousy. Also, we expected that adolescents high in social comparison orientation would be especially vulnerable to experiencing state jealousy in the peer context. Additionally, they might suffer more from the effects of upward comparison and hence react with higher levels of state jealousy. Finally, there is some evidence that older adolescents often have higher self-esteem (Erol & Orth, 2011), and they therefore may be less dependent on the evaluations of others. Thus, we expected the relations of upward comparison and interpersonal context with jealousy to be less strong for older adolescents than for younger adolescents. Our hypotheses regarding the fourth research question were based on research investigating trait jealousy and well-being in adolescents (Lavalley & Parker, 2009; Parker et al., 2005). When adolescents experienced more state jealousy we expected them to experience lower well-being (i.e., elevated depressive symptoms and anxiety).

## Method

### Participants

One hundred and five adolescents from three secondary schools in the Netherlands were invited to participate in the study. Ninety-eight adolescents (93.3%) agreed to participate and did not receive an objection from their parents (passive consent). Eleven participants did not participate in the ESM, because either they were sick at the time the study took place or they withdrew their willingness to participate, resulting in a total of 87 participants. Two participants did not provide their age but were included in the analyses. Most of the participants were born in the Netherlands (79 participants), three participants were born in Turkey, one participant was born in Suriname, and four participants

were born in other unspecified countries. In the Netherlands, the school system streams adolescents based on their academic achievement. Our sample included pupils of the high or middle educational level in high school. To ensure reliability of the data we included only adolescents who filled out at least one third of all daily assessments ( $N = 82$ ; Delespaul, 1995) and the baseline questionnaire ( $N = 72$ ). The final sample consisted of 68 adolescents ( $M_{age} = 13.77$ ,  $SD_{age} = .95$ , 64.70% girls). Participants who were excluded did not differ from participants who were included in terms of age  $t(83) = .30$ ,  $p = .77$  or gender  $\chi^2(1) = 3.17$ ,  $p = .09$ . Adolescents participated voluntarily and received a voucher of 20€ for their participation. All procedures were approved by the Ethical Committee of the Faculty of Social Sciences (ECG2012-2606-042).

### Procedure and Measures

**Baseline assessment.** Two to eight weeks before the start of the ESM assessments, adolescents filled out a baseline questionnaire on a computer at home that assessed demographics and the following constructs:

**Propensity to jealousy.** To assess propensity to jealousy, we asked participants to rate the extent to which they experienced jealousy in the previous two weeks on a 7-point Likert scale that ranged from (1) *not at all* to (7) *very much*.

**Social comparison orientation.** To assess adolescents' tendency to compare themselves with others, we used the Scale for Social Comparison Orientation (Gibbons & Buunk, 1999). Participants answered 11 questions (e.g., "I am always keen to know what others would do in a similar situation") on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Reliability of this questionnaire was good ( $\alpha = .75$ ).

**Depressive symptoms.** To assess adolescents' depressive symptoms, we used the Children's Depression Inventory (CDI; Kovacs, 1985). The CDI is a self-report questionnaire that assesses cognitive, physical, and affective symptoms of depression and consists of 27 items. In this study only 26 items were administered because the item about suicidal thoughts was omitted due to ethical concerns. Each item offers three statements and adolescents had to indicate which statement describes their feelings best (e.g., I am sad once in a while, I am sad many times, I am sad all the time). Mean scores were computed for each participant and a higher score indicated more depressive symptoms. The internal consistency of the questionnaire was good,  $\alpha = .77$ .

**Anxiety.** To assess anxiety symptoms, we used the brief version of the Screen for Child Anxiety Related Disorders (SCARED). The brief SCARED has similar psychometric properties as the full SCARED version (Birmaher et al., 1999) but reduces the burden for the participants because it consists of only five items. Participants had to indicate whether a specific phrase (e.g., "I get really frightened



for no reason at all") was true for them during the last three months on a scale from (0) "Not True or Hardly Ever True" to (2) "Very True or Often True". Sum scores were computed for each participant and a higher score indicated more anxiety symptoms. The internal consistency of the questionnaire was not satisfactory,  $\alpha = .41$ .

**Experience sampling method.** This part took place for each participant during two weekends that were approximately six weeks apart. Smartphones were programmed to elicit four buzzing signals on Friday between 4.30pm and 10.30pm, and nine buzzing signals on both Saturday and Sunday, between 9.00am and 10.30pm. During each weekend, participants completed 22 assessments, thus 44 assessments in total. Completing the questionnaire took approximately six minutes and the signals occurred randomly within 90-minute intervals. On the day of the start of the ESM assessments, participants received smartphones and instructions on how to use the smartphones in pairs. The instructions included stopping their current activity immediately after they heard a buzzing signal, explanations of the items, and what actions to take if any problems occurred during the sampling period. Additionally, adolescents indicated at what times they would not be able to answer the smartphone because of extra-curricular activities (e.g., sports trainings, music lessons). The following domains relevant to the current study were assessed at each signal:

**State jealousy.** At each assessment, adolescents were asked to indicate how jealous they felt just prior to the buzzing signal, using a 7-point Likert scale that ranged from (1) *not at all* to (7) *very much*.

**Interpersonal context.** At each assessment, adolescents indicated whether they were alone or in someone else's company. If they were alone, they indicated whether they were really alone or whether they had online contact with others. Online contact with others counted as peer contact. If they were with someone, they indicated with whom they were (i.e., family, friends, boyfriend/girlfriend, classmates, or teammates). Because base rates needed to be high enough in order to make comparisons, we recoded interpersonal context into three categories, namely alone, family, and peers (i.e., friends, boyfriend/girlfriend, classmates or teammates, online contexts) for the data analyses. The peer category was further divided into face-to-face versus online contexts.

**Evaluation in comparison to others.** When adolescents were in the company of others, we asked them how they felt in comparison to these others. They indicated the extent to which they felt (-3) *worse off* (upward comparison) to (+3) *better off* (downward comparison) on a 7-point Likert scale.

## Data Analysis

**Descriptive data.** Descriptive analyses (Pearson correlations and frequency analyses) were run to establish the frequency and intensity of jealousy. Assessments in which adolescents rated jealousy with a 2 or higher on the Likert scale were counted as 'jealousy assessments' because these assessments were characterized by some level of jealousy. Further, we investigated how jealousy was distributed across participants and summed all assessments in which participants scored at least a 2 on the jealousy scale. We also calculated the percentage of assessments that were characterized by some level of jealousy (at least a 2) per individual.

**Regression analyses.** Multilevel regression models were used to examine the relations between intensity of state jealousy and state level variations in interpersonal contexts and evaluations in comparison to others, using Mplus software (Muthén & Muthén, 1998-2010). Multilevel models were used because repeated state assessments (level 1) were nested within participants (level 2). To investigate the influence of interpersonal context on state jealousy, two dummy variables were created from the interpersonal context adolescents reported: with peers or alone. Family was used as the reference category in all models because it was the most frequently reported interpersonal context. To investigate further differences in peer context, one dichotomous variable was created: face-to-face context (0) vs. online contexts (1). Similarly, we used multilevel regression analyses to investigate the relation between state jealousy and individual differences (i.e., propensity to jealousy, social comparison orientation, and age). To examine whether individual differences moderated the relation between state jealousy and state variations in interpersonal context and evaluations in comparison to others, cross-level interactions were introduced to the models. Cross-level interactions show whether the strength of relations between level-1 variables (i.e., interpersonal context and state jealousy) varies as a function of level-2 variables (i.e., propensity to jealousy social comparison orientation or age; Aguinis, Gottfredson, & Culpepper, 2013).

To examine the relation between state jealousy and well-being state jealousy was aggregated to its person-level means. These variables were then correlated with scores on depressive symptoms and anxiety.

## Results

### Descriptive Statistics

Descriptive statistics and correlations between all variables are presented in Table 1. All level-1 variables were aggregated within persons. Mean levels of propensity to jealousy and state jealousy were relatively low. Overall, adolescents' social comparison orientation was high and on average they used more downward comparison than upward comparison. Most correlations between

**Table 1** Descriptive Statistics and Correlations for Model Variables.

Variable	Range	M	SD	N	1	2	3	4	5
1. State Jealousy	1 - 6.46	1.56	.84	68	-				
2. Propensity to jealousy	1 - 7	1.97	1.58	68	.48**	-			
3. Evaluation in comparison to others	-3 - 2.92	.73	1.01	68	-.27*	.03	-		
4. Social comparison orientation	19 - 49	34.00	6.69	68	.24†	.37**	-.10	-	
5. Age	12 - 16	13.95	.94	66	.04	.33**	.36**	-.02	-
6. Number of assessments	14 - 44	33.76	7.30	68	-	-	-	-	-

Note. All ESM variables (state jealousy and evaluation in comparison to others) were aggregated to their person-level means.

†  $p = .05$  \*  $p < .05$ . \*\*  $p < .01$ .

variables were small, but significant. As expected, higher state jealousy was related to higher propensity to jealousy, to feeling worse in comparison to others (upward comparison), and marginally to higher social comparison orientation. Further, higher propensity to jealousy was related to higher social comparison orientation. In contrast to our predictions, being older was related to higher propensity to jealousy and higher social comparison orientation. Gender differences did not emerge for evaluation in comparison with others,  $t(66) = .68$ ,  $p = .50$ , propensity to jealousy,  $t(50.58) = 1.65$ ,  $p = .11$ , social comparison orientation,  $t(57.25) = 1.61$ ,  $p = .11$ , and state jealousy,  $t(66) = .05$ ,  $p = .96$ .

**State jealousy.** Adolescents reported some level of jealousy in one fifth of the assessments (495 assessments of the 2164 total assessments). The mean intensity of these assessments was 3.41 ( $SD = 1.63$ ). The relative frequency of jealousy was similar across boys and girls with 22% and 23% of all assessments, respectively. Analysis of variance revealed that the intensity of jealousy did not vary across different days or different times of the day (day vs. nighttime)  $F(5, 2158) = .78$ ,  $p = .57$ . When adolescents experienced jealousy, they experienced it mildly (2-3) in 58% of the assessments, moderately (4-5) in 29% of the assessments, and extremely high (6-7) in 13% of the assessments. A frequency analysis revealed that only 7 participants (10%) reported not feeling any jealousy at all, 52 participants (76%) reported jealousy between 2% and 50% percent of the time, and 9 participants (14%) reported jealousy more than 50% of the time. Overall, the majority of adolescents (90%) experienced at least some amount of jealousy during the sampling period. Because we were interested in associations of jealousy with different situational factors, adolescents who did not experience any jealousy during the sampling period were excluded from subsequent analyses. Participants who were jealous ( $n = 61$ ) did not differ from those who were never jealous ( $n = 7$ ) regarding gender, age, propensity to jealousy, social comparison orientation or the percentage of time they spent with family, peers or alone (all  $ps > .05$ ). Because the groups are so different in size, the t-tests need to be interpreted with caution.

### **Associations with State Jealousy in Different Contexts.**

**Interpersonal context.** In line with our expectations, multilevel regression analysis revealed that adolescents experienced less jealousy when they were with their family compared to when they were with peers. There was no difference in state jealousy in the presence of family and when adolescents were alone (see Table 2a). In line with our expectations, we found a main effect for propensity to jealousy. In contrast to our expectations, no main effects were found for social comparison orientation and age. Further, we investigated whether propensity to jealousy, social comparison orientation or age moderated

**Table 2** State Jealousy regressed on (a) Interpersonal Context (Level-1 Only Model) and on the cross-level interactions between Interpersonal Context and (b) Propensity to Jealousy, (c) Social Comparison Orientation (SCO), and (d) Age.

Level-2 variables		Jealousy	
(a)	Family <i>Intercept</i> ( <i>SE</i> )	1.57	(.12)***
	Peers <i>B</i> ( <i>SE</i> )	.18	(.09)*
	Alone <i>B</i> ( <i>SE</i> )	.07	(.10)
(b) Propensity to jealousy	Family <i>Intercept</i> ( <i>SE</i> )	1.54	(.08)***
	Peers <i>B</i> ( <i>SE</i> )	.17	(.08)*
	Alone <i>B</i> ( <i>SE</i> )	.08	(.10)
	Propensity to jealousy <i>B</i> ( <i>SE</i> )	.37	(.11)**
	Propensity to jealousy x peers <i>B</i> ( <i>SE</i> )	-.12	(.06)*
(c) SCO	Propensity to jealousy x alone <i>B</i> ( <i>SE</i> )	-.12	(.09)
	Family <i>Intercept</i> ( <i>SE</i> )	1.57	(.11)***
	Peers <i>B</i> ( <i>SE</i> )	.16	(.09)
	Alone <i>B</i> ( <i>SE</i> )	.08	(.11)
	SCO <i>B</i> ( <i>SE</i> )	.04	(.02)
	SCO x peers <i>B</i> ( <i>SE</i> )	-.01	(.01)
(d) Age	SCO x alone <i>B</i> ( <i>SE</i> )	-.02	(.10)
	Family <i>Intercept</i> ( <i>SE</i> )	1.57	(.11)***
	Peers <i>B</i> ( <i>SE</i> )	.18	(.09)*
	Alone <i>B</i> ( <i>SE</i> )	.08	(.11)
	Age <i>B</i> ( <i>SE</i> )	.06	(.11)
	Age x peers <i>B</i> ( <i>SE</i> )	-.11	(.10)
	Age x alone <i>B</i> ( <i>SE</i> )	.10	(.18)

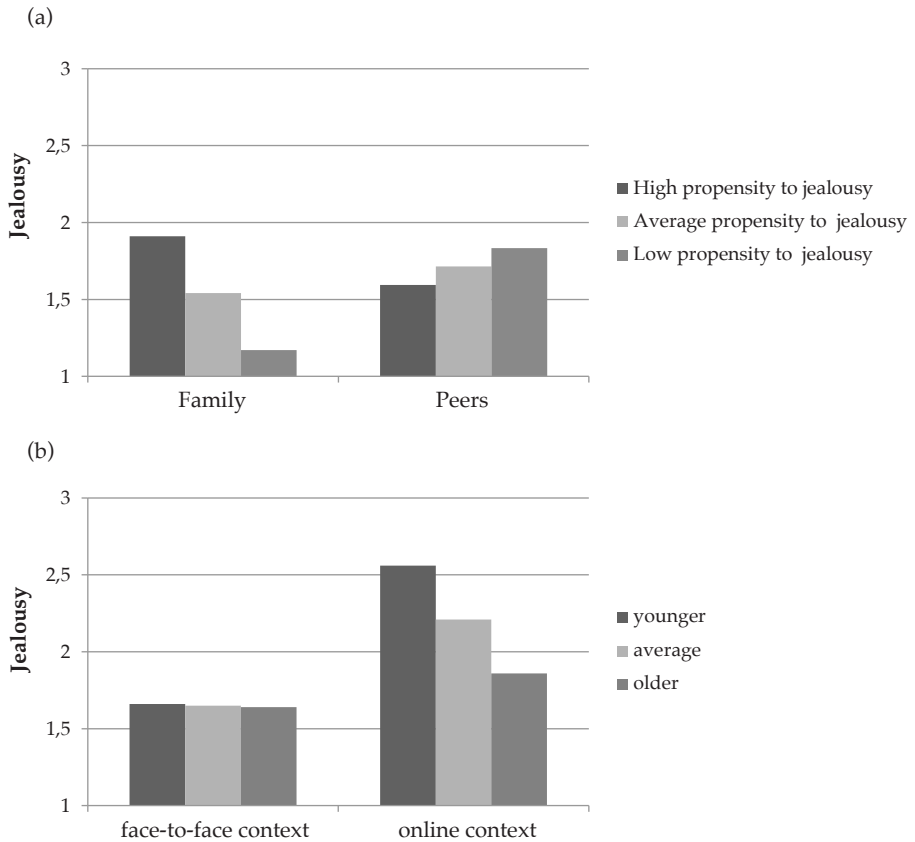
*Note.* All person-level variables (propensity to jealousy, social comparison orientation, and age) were grand-mean centered.

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

the relation of state jealousy and interpersonal context. None of these individual factors moderated this relation except propensity to jealousy (see Table 2 b, c, d). Post-hoc analyses were performed for family context and peer context separately. Results revealed no main effect of propensity to jealousy when adolescents were with peers ( $B = .24$ ,  $SE = .14$ ,  $p = .08$ ). When adolescents were with family, we found a main effect of propensity to jealousy ( $B = .39$ ,  $SE = .12$ ,  $p = .001$ ). Thus, adolescents high on propensity to jealousy experienced more state jealousy

when with family compared to adolescents low on propensity to jealousy but not when with peers (see Figure 1a).

**Online vs. face-to-face peer contexts.** To investigate the relation of online vs. face-to-face peer contexts with state jealousy, we estimated a multilevel regression model with one dummy variable. As expected, results revealed that when adolescents were in online contexts, they felt more jealous compared to when they were in face-to-face peer contexts (see Table 3a).



**Figure 1** (a) State jealousy by different interpersonal contexts, as moderated by propensity to jealousy. (b) State jealousy by different peer contexts as moderated by age. If participants were 1 standard deviation above or below the mean regarding propensity to jealousy or age they were classified as high jealous/low jealous or older/younger.

**Table 3** State Jealousy regressed on (a) different peer contexts (Level-1 Only Model) and on the cross-level interactions between different peer contexts with (b) Propensity to Jealousy, (c) Social Comparison Orientation (SCO), and (d) Age.

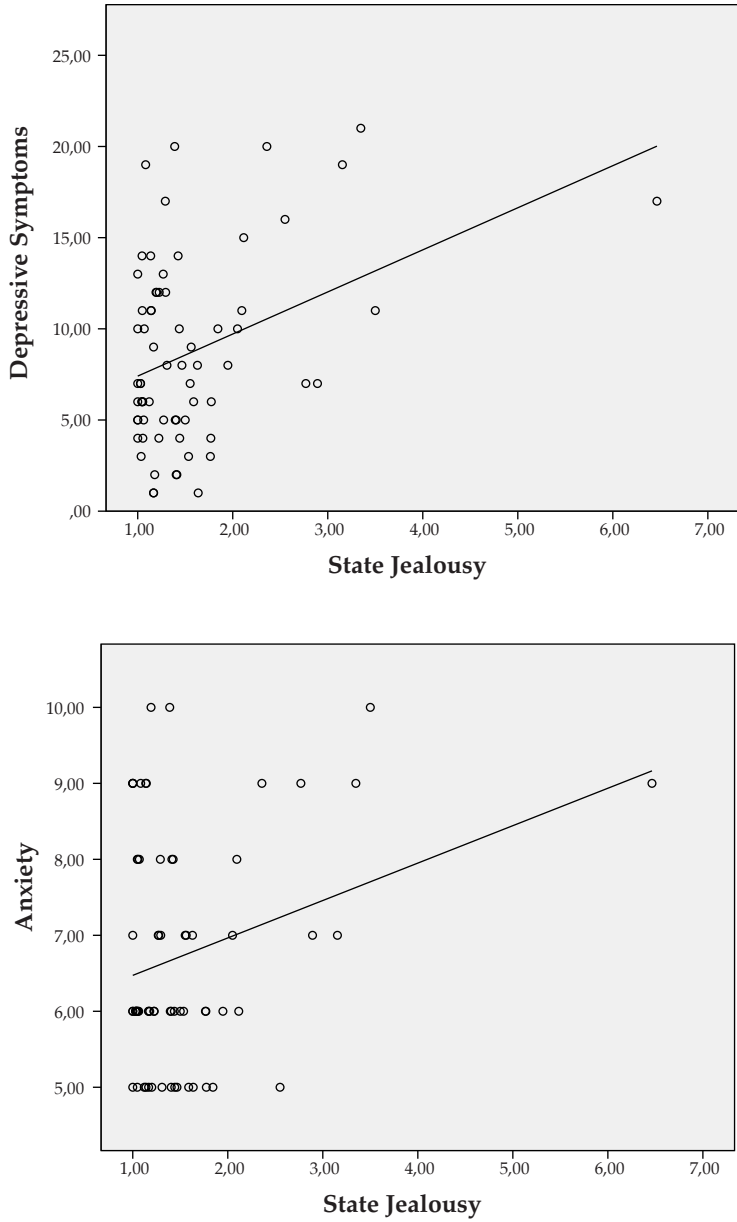
Level-2 variables		Jealousy	
(a)	Face-to-face context <i>Intercept</i> ( <i>SE</i> )	1.66	(.27)***
	Online context <i>B</i> ( <i>SE</i> )	.59	(.19)**
(b) Propensity to jealousy	Face-to-face context <i>Intercept</i> ( <i>SE</i> )	1.65	(.10)***
	Online context <i>B</i> ( <i>SE</i> )	.62	(.18)**
	Propensity to jealousy <i>B</i> ( <i>SE</i> )	.19	(.11)†
	Propensity to jealousy x online context <i>B</i> ( <i>SE</i> )	.22	(.18)
(c) SCO	Face-to-face context <i>Intercept</i> ( <i>SE</i> )	1.66	(.11)***
	Online context <i>B</i> ( <i>SE</i> )	.60	(.19)**
	SCO <i>B</i> ( <i>SE</i> )	.02	(.02)
	SCO x online context <i>B</i> ( <i>SE</i> )	.04	(.02)
(d) Age	Face-to-face context <i>Intercept</i> ( <i>SE</i> )	1.65	(.11)***
	Online context <i>B</i> ( <i>SE</i> )	.56	(.18)***
	Age <i>B</i> ( <i>SE</i> )	-.01	(.09)
	Age x online context <i>B</i> ( <i>SE</i> )	-.36	(.14)*

*Note.* All person-level variables (propensity to jealousy, social comparison orientation, and age) were grand-mean centered.

†  $p = .06$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Further, we investigated whether individual factors moderated the relation of state jealousy and different peer contexts. Results showed that none of the individual factors moderated the relation except age (see Table 3 b, c, d). Post-hoc analyses were performed for face-to-face context and online context separately. Results revealed no main effect of age for adolescents reporting on face-to-face contexts ( $B = .009$ ,  $SE = .08$ ,  $p = .91$ ). When adolescents were in online contexts, we found a main effect of age ( $B = -.42$ ,  $SE = .18$ ,  $p = .02$ ). Thus, older adolescents experienced less state jealousy in response to online contexts compared to younger adolescents but not in face-to-face peer interactions (see Figure 1b).

*Evaluation in comparison to others.* To examine how adolescents felt compared to others, we included only moments when adolescents were in the company of someone else. In contrast to our predictions, most of the time they felt equal to their company (horizontal comparison, 58%) or superior to their company (downward comparison, 40%). Only in 2% of the assessments did





adolescents feel inferior to their company (upward comparison). A multilevel regression model revealed a negative relation between evaluation in comparison to others and state jealousy: as expected, when adolescents felt superior to their company, their state jealousy was significantly lower ( $B = -.10$ ,  $SE = .05$ ,  $p = .046$ ) than when they felt inferior ( $Intercept = 1.57$ ,  $SE = .11$ ,  $p < .001$ ). Due to power limitations, because the distribution of comparisons was so unequal, we did not test any individual difference factors as moderators.

*Associations of state jealousy and well-being.* To examine whether intensity of jealousy was related to depressive symptoms and anxiety in our normative sample, we aggregated state jealousy within participants across all time points. Spearman's rank order correlations revealed a marginally positive relation between jealousy and depressive symptoms  $r = .21$ ,  $p = .09$  but not with anxiety  $r = .05$ ,  $p = .71$ . Scatter plots summarize the results in Figure 2.

## Discussion

To our knowledge, this is the first study to investigate everyday experiences of jealousy in adolescents, how state jealousy relates to their immediate interpersonal context, and the role individual differences - namely the propensity to feel jealousy, social comparison orientation, and age - play in that relation. Our results revealed that the vast majority of adolescents feel jealous during an ordinary weekend and that particular interpersonal contexts elicit more jealousy than others. Specifically, adolescents were more jealous when they were with peers compared to when they were with family and being alone elicited the same amount of jealousy as being with family. Only propensity to jealousy moderated the relation between state jealousy and interpersonal context: Adolescents who were high on propensity to jealousy experienced more state jealousy when they were with family compared to adolescents who were low on propensity to jealousy. No such difference was found when they were with peers. Further, online contexts elicited more jealousy than face-to-face peer contexts did. Only age moderated the relation between state jealousy and online contexts: Older adolescents experienced less jealousy in online contexts than younger adolescents. Additionally, as expected, we found that when adolescents downward compared, they felt less jealousy. Finally, we found a marginally positive relation between higher intensity of jealousy and depressive symptoms but not with anxiety.

## State Jealousy

Jealousy is a common adolescent emotion. In our sample, 90% of adolescents experienced at least some amount of jealousy over the course of the weekend assessments. In fact, on average, adolescents reported some feelings of jealousy in one fifth of all assessments. Given how frequently and how many adolescents feel jealous in their everyday lives, and yet how little research exists on this topic, these findings point to a program of research that could yield fascinating future results (some of which are discussed further in this section). Clear individual differences emerged in adolescents' tendency to experience jealousy: some felt it rarely whereas others felt jealous almost all the time. This finding is in line with previous research on propensity to jealousy that also has demonstrated individual differences in the susceptibility of jealousy on a more general level (Bringle et al., 1983; Parker et al., 2005).

Next, in general, adolescents' jealousy was of mild or moderate intensity. Results are consistent with research showing that emotions reported in daily life are most often of mild intensity (Scherer, Wranik, Sangsue, Tran, & Scherer, 2004). However, in almost 10% of all assessments, adolescents reported extreme jealousy. This range of intensity in feelings of jealousy raises interesting questions about the *contexts* in which these experiences happen. Therefore, we investigated different contexts that are likely to elicit jealous feelings, such as interpersonal context and evaluation in comparison to others.

**Interpersonal context.** Our hypothesis that adolescents would experience less jealousy when with family or alone than when they were with peers was confirmed. Adolescents generally feel an urgent need to belong to a peer group (B. B. Brown & Larson, 2009); and when this need is thwarted, or perceived to be blocked, jealousy may arise (e.g., seeing best friend laughing with someone else). Additionally, because adolescents are sensitive to their peers' evaluations, feelings of social rejection are likely to be triggered (Somerville, 2013), which, in turn, can influence the experience of jealousy. Unfortunately, from the data in this current study, we were unable to identify the precise reasons for why adolescents felt jealous at the moment they were assessed.

Interestingly, we found that propensity to jealousy moderated the relation between state jealousy and interpersonal context. Adolescents who were high on propensity to jealousy experienced more state jealousy when with family compared to adolescents who were low on propensity to jealousy. This was not the case for when they were with peers. This result is in line with the expectation that people high in propensity to jealousy experience more state jealousy. It is noteworthy that we only found this in the family context, not in the peer context. Recall that we found a main effect of peer context on jealousy. Seemingly, the peer context is such a strong elicitor of state jealousy that individual differences

in propensity to jealousy do not play as important a role as they do in the family context. The fact that we did not find moderation effects for the other individual difference factors (social comparison orientation and age) highlights that jealousy is a situationally sensitive emotion. Given how frequently adolescents indeed feel jealous, future research could delve more deeply into the appraisals that accompany adolescents' feelings of jealousy in the context of their peer group. Appraisals of emotions assign valence to different situations (Scherer, 2001) and it is likely that different appraisals differ between individuals and situations. For example, the intensity or frequency of jealousy and the diverse regulation efforts they may engender (Harris & Darby, 2010) may vary according to diverse appraisals that trigger the emotion in the first place (e.g., jealousy triggered by appraisals of losing a relationship vs. appraisals of threats to self-esteem; Mathes, 1991). Future research among adolescents could look more closely into that.

Further analyses revealed that online contexts elicited more jealousy than face-to-face peer contexts. This finding is in line with studies among young adults that showed that romantic jealousy increased (Muisse et al., 2009) and their well-being decreased with more Facebook use (Kross et al., 2013). There are several reasons why online environments might pull for more jealousy from adolescents than offline experiences. First, in online contexts, adolescents are confronted simultaneously with what their peers are doing and what they are missing out on, and they have access to this information continuously if they choose to look for it (e.g., activities or social connection: Fear of Missing Out; Przybylski, Murayama, DeHaan, & Gladwell, 2013). Second, it is likely that individuals post skewed, overly-positive descriptions of their daily lives on social media sites for impression management purposes (Ellison et al., 2006; Turkle, 2011). Adolescents reading these posts may develop the impression that others lead exciting, perpetually happy lives which will necessarily contrast with their own (actually lived, not "presented") lives; these comparisons are likely to trigger jealousy.

The processes by which various online activities precisely influence different emotions remain unclear. One recent study showed that increased posting on Facebook was associated with less loneliness compared to normal posting behavior, possibly because participants felt more connected to their friends (Deters & Mehl, 2013), whereas mainly consuming others' experiences was associated with increased loneliness (Burke, Marlow, & Lento, 2010). These results suggest that sharing experiences with others buffers against negative emotions such as loneliness whereas only reading others' experiences enhances negative emotions. Similar processes may apply to jealousy. Individuals who frequently share their activities may be more likely to think that their own lives

are of interest to others and would therefore feel less jealous when viewing other adolescents' profile pages. There seem to be multiple fruitful avenues for future research which could assess not only whether or not adolescents are online interacting with peers, but also what exactly they are doing and how often, with whom precisely they are sharing these online experiences, whether they indeed use more upwards social comparison compared to face-to-face interactions, and how these circumstances relate to both the elicitation of jealousy, and its possible resolution.

Interestingly, we found that age moderated the relation between online contexts and state jealousy. Younger adolescents felt more jealous when participating in online contexts than older adolescents did. This might have to do with the fact that older adolescents are better at evaluating information that they access on the internet. Given our discussion about the tendency for people to present ideal versions of themselves by posting selective and positive information (Ellison et al., 2006), older adolescents might be better able to evaluate and rationalize information posted by others (Steinberg, 2005b), and realize that the posted information is overly positive and skewed. Perhaps older adolescents also have had more experience with these contexts and through positive and negative experiences have learned to better regulate their reactions to online stimuli just like they are better in regulating their emotions in response to social stimuli more generally (Silvers et al., 2012). Future research using a broader age range and more concrete probing of adolescents' online activities and contacts could be a very productive next research step.

**Evaluation in comparison to others.** Contrary to our hypothesis, the majority of adolescents used horizontal comparison and thus felt equal to those they spent time with. A possible explanation for this finding is that data collection took place during weekends. This is a period in which adolescents can spend time with their friends and friends are not typically people one compares oneself to negatively. Another substantial percentage of adolescents used downward comparison and evaluated themselves as better off than the person they were with. These results point to a positivity bias often observed in people in general, not just adolescents, who have the need to feel good about themselves and tend to see themselves positively (positivity bias; Moskowitz, 2005b) and better than average (Alicke, 1985; J. D. Brown, 1986). These findings may thus reflect a perceptual and reporting bias. Another explanation is that changes in abstract thinking occur in adolescence, which lead to different cognitive distortions such as seeing themselves in the eyes of an "imaginary audience" and part of a "personal fable" (Elkind, 1967; Steinberg, 2011). Because adolescents feel that they are looked at and evaluated constantly (imaginary audience), they may get an inflated opinion of themselves (personal fable) as a result of taking

themselves so seriously (Elkind, 2007). These cognitive distortions can create a feeling of being overly important and superior to the people they are with.

The relation of jealousy and evaluations in comparison to others was in line with our hypothesis. When adolescents used upward comparison, they experienced more state jealousy because feeling inferior to someone else could involve questioning their self-worth and how others view them. These results have to be interpreted with caution and warrant replication, as upward comparison occurred only a few times during the assessment period. Nevertheless, one possible mechanism in this relation is self-esteem (DeSteno et al., 2006). Individuals with higher self-esteem seem less likely to evaluate themselves as worse off than others, and may therefore experience less jealousy overall. In the current study, self-esteem was not assessed and this seems like a promising direction for future research.

**Well-being.** In line with our expectations, we found that adolescents who experienced more jealousy also tended to experience more depressive symptoms. Unexpectedly, no relation with anxiety emerged. This may be because problematic behaviors that are triggered by jealousy (e.g. rumination, Lavalley & Parker, 2009) are more relevant to depressive symptoms. Further, our measure of anxiety was not reliable and any result has to be treated cautiously. Importantly, our analysis is correlational and does not speak to the direction of effects. It is also possible that depressive symptoms produce jealousy because depressed adolescents may be less able to go out and may be jealous of how their healthy peers interact with each other or which activities they do. Nonetheless, these results suggest that there might be a threshold at which jealousy becomes maladaptive, even though experiencing some amount of jealousy is normative. Although we found this linear relation between jealousy and (less) well-being, it is important to recall that these findings come from a normative sample and do not directly implicate clinical impairments.

### **Limitations and Future Research**

A few limitations of the current study have to be mentioned. First, we had information about adolescents' interpersonal context and comparison but we did not have descriptions of the situations that elicited their jealousy. Future research may investigate which specific situations elicited these intense experiences of jealousy. Unfortunately, this information was beyond the scope of the current study, because we aimed to restrict assessment periods to very brief, 6-minute maximum assessments in order to receive the most reliable, complete data possible. There may be advantages to using fewer assessment moments per day, but making the length of those assessments longer to get more in-depth descriptions of the contexts that elicit the greatest intensity of jealousy.

As romantic relationships are potentially the strongest elicitors of jealousy, it seems important to investigate state jealousy in adolescent romantic relationships and its influence on relationship quality and adolescent well-being in particular. Second, the sample size was quite small. This might not be so much of a problem for the ESM part, because of several measurements per person; however the missing data in the baseline measurement may have contributed to low power, which makes it difficult to detect moderation effects. Future studies may want to include more participants to replicate and further investigate jealousy in adolescence.

Further, this study could not compare adolescents' jealous experiences to those of children and adults and therefore we cannot conclude that adolescence is a time of heightened jealousy compared to childhood or adulthood as has been shown in a previous study (Pines & Aronson, 1983). Due to the social transitions that occur in adolescence it is very likely that there are ample opportunities in the lives of adolescents to experience jealousy and our data confirm that by showing that jealousy occurs often among (most) adolescents. Future research may compare how, when, and why individuals experience jealousy across different developmental periods to deepen our understanding of jealousy across the lifespan. Another limitation is that data collection took place during weekends only. This study thus missed out on assessing jealousy during school days, where adolescents spend a great deal of their time during the week. Even though this makes it impossible to generalize to behavior across the week, this sampling period also had several strengths: adolescents were relatively free to choose their activities and interpersonal contexts, and the data provided insights into how adolescents experience their free time. Also, our assessment period covered Friday and Saturday nights when adolescents most frequently meet friends and go out (Arnett, 2012).

Further, even though different words exist for feeling jealous and envious in Dutch, in colloquial language the word jealous (*jaloers*) is used interchangeably for both emotions. A similar potential conflation or confusion may be common in English, where the general public may not easily distinguish the two emotional states or, more importantly, do not do so in their everyday labeling of emotional experiences. In our study, this muddiness of meaning makes it impossible to distinguish to which of the two emotions adolescents responded. Envy is usually defined as wanting to possess something that someone else has (e.g., a mobile phone; Parrott & Smith, 1993), whereas jealousy is about the feeling that a relationship is threatened by someone else (e.g., best friend has her first boyfriend; Salovey & Rodin, 1988). The possibility that participants endorsed "jealousy" when they may have actually felt *either* jealous or envious may partially explain the high prevalence of jealousy in our sample. Also, jealousy

has been shown to be more intense than envy (Salovey & Rodin, 1986) and this may explain the relatively low intensity of jealousy found in our study. In order to make sure one measures jealousy specifically, future research could ask adolescents to report on a range of negative emotions (i.e., jealous, angry, betrayed, and hurt) that together form an affective cluster that can be labeled jealousy, and that has been shown to differentiate envy from jealousy (Parrott & Smith, 1993).

### **Conclusion**

Jealousy is a pervasive emotion in adolescents' lives. It is experienced at different frequencies and intensities. These differences occur mainly because of situational factors such as the interpersonal context or the evaluation in comparison to others. Further, jealousy and depressive symptoms seem to be related. The present study extended previous work by using momentary reports of adolescents' jealousy and described how and under what circumstances adolescents feel jealous. Peer contexts (face-to-face and online contexts) comprise an important field of research when investigating jealousy and it is worthwhile to investigate specific situations that lead to increased jealousy in daily life. Overall, this study identified circumstances in which adolescents experience jealousy and increased our understanding of one of the most fascinating human emotions. Given that there was a weak relation between jealousy and well-being, perhaps including a sample of adolescents with emotional difficulties at the more extreme end might clarify whether there is a level at which normative jealousy becomes a risk factor for future emotional adjustment. We are hoping to see new research that can extend these findings into a more detailed exploration of why adolescents feel jealous and how they negotiate and regulate this powerful emotion.









# 4

## **Emotion regulation in action: Use, selection, and success of emotion regulation in adolescents' daily lives**

**Based on:**

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## Abstract

Successful emotion regulation (ER) is a central aspect of psychosocial functioning and mental health and is thought to improve and be refined in adolescence. Past research on ER has mainly focused on one-time measurements of habitual ER. Linking regulatory strategies to emotions in daily lives is key to understanding adolescents' emotional lives. Using an Experience Sampling Method with 78 adolescents ( $M_{age} = 13.91$ ,  $SD_{age} = .95$ , 66% girls), we investigated the use, selection, and success in down-regulating negative emotions of eight ER strategies across 44 assessments. Acceptance was the most often employed strategy followed by problem-solving, rumination, distraction, avoidance, reappraisal, social support, and suppression. Interestingly, negativity of the event influenced the use of ER strategies: With low intensity negative emotions, acceptance was more likely to be used and with high intensity negative emotions, suppression, problem-solving, distraction, avoidance, social support and rumination were more likely to be used. With regard to success, multilevel models revealed that problem-solving, reappraisal, and acceptance were more successful in down-regulating negative emotions than rumination. Further, the use of rumination and social support were positively associated with depressive symptoms. These results suggest that there is a reciprocal relationship between the intensity of negative emotions and ER strategies. Taken together, this study showed which ER strategies are used by a healthy adolescent sample and these results are discussed with regard to their theoretical and practical importance.

Successfully regulating emotions is central and important for psychosocial functioning and is related to mental health benefits (Gross & Thompson, 2007). Further, emotion regulation (ER) is considered a transdiagnostic process (Kring & Sloan, 2010), predictive of various psychopathological diagnoses among adults (Aldao et al., 2010). ER in adolescence is less well examined even though symptoms of anxiety and depression rise at this age (Kessler et al., 2005). Importantly, adolescents do not experience emotions that were not present in childhood (Rosenblum & Lewis, 2003); however, many challenges (e.g., changes in relationships, emergence of psychological disorders) in adolescence are emotion-related or have to do with ER deficits (Allen & Sheeber, 2009). This suggests that the emotional challenges (e.g., increased conflicts with parents, finding a supportive peer group) adolescents experience have to do with how they regulate their emotions (Steinberg, 2008). Despite important progress in research on ER with research in the laboratory and habitual ER (Aldao et al., 2010; Gross, 2015b; Webb et al., 2012), the use, selection, and success of ER strategies in the *daily lives* of adolescents remain largely unknown (see Silk et al., 2003; Tan et al., 2012 for exceptions). Linking regulatory strategies to emotions in daily lives is one critical way to understand adolescents' emotional and regulatory lives. The objectives of the current study were to examine which ER strategies adolescents use, how ER strategies are selected, how successfully strategies reduce negative emotions, and to what extent ER strategies in daily life relate to well-being (i.e., depressive symptoms).

### **Emotion Regulation in Adolescence**

ER is the ability to modify the experience and expression of emotions (Gross & Thompson, 2007). Emotions can be regulated in many ways, ranging from thinking about the problem on one's own to problem-solving with friends or distracting oneself from the emotion altogether. In the current study, we focused on eight ER strategies (avoidance, rumination, suppression, problem-solving, reappraisal, acceptance, social support, and distraction) which all show relations with psychopathology (Aldao et al., 2010; Tan et al., 2012; Webb et al., 2012). Definitions, advantages, disadvantages, and relations with well-being and problems associated with these ER strategies are presented in Table 1.

For a long time, most research has focused on ER in adults or infants and young children (Eisenberg, Champion, & Ma, 2004). During the past decade however, the importance of adolescence as a critical period for the development of ER has been recognized more and more which is also reflected by the increasing amount of studies investigating the relation between ER and psychopathology in adolescence (e.g., Riediger & Klipker, 2014; Schäfer, Naumann, Holmes, Tuschen-Caffier, & Samson, 2017). Reasons for why adolescence is a relevant developmental

**Table 1** Definitions, Advantages, Disadvantages, and Correlations with Well-being and Problems of all Eight Emotion Regulation Strategies in the Present Study.

Emotion regulation strategy	Definition	Advantage
Rumination	– Repeatedly thinking about a negative event or emotion (Abela & Hankin, 2011)	– Gives people the feeling of problem-solving (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008)
Avoidance	– Leaving or staying away from a situation or person that elicits negative emotions (Ayers & Sandler, 1999)	– Creates distance to feelings (e.g., avoiding a person to first calm down)
Suppression	– Hiding an emotion so that others do not know the emotion is being felt (Gross & Thompson, 2007)	– Helps to comfort others (e.g., suppressing grief to prevent others from worrying)
Problem-solving	– Attempts to consciously alter a situation to resolve distress (Aldao et al., 2010)	– Solution for problem may be found
Reappraisal	– Reframing a situation's meaning in a way that it changes the person's judgment of the situation (Gross, 2007)	– Can help to feel better in many daily situations (e.g., having to wait in line at the supermarket)
Acceptance	– Recognizing and embracing negative emotions to stop wanting to change the negative emotions one feels (Hofmann & Asmundson, 2008)	– Can help to feel better in many daily situations and in response to minor events (e.g., the parcel one expected did not arrive)
Social support	– Sharing one's emotions and asking others for advice (Finfgeld-Connett, 2005)	– Being with others is associated with well-being (Coan, 2008) – Problem-solving may occur
Distraction	– Shifting one's attention away from the negative stimulus and towards something unrelated (Gross, 1998)	– Can help to focus on other tasks (e.g., studying for an exam)

Disadvantage	Associations with well-being and problems
<ul style="list-style-type: none"> <li>- Focus on negativity</li> <li>- Does not help in overcoming the source of negative emotions</li> </ul>	<ul style="list-style-type: none"> <li>- More negative emotions (Moberly &amp; Watkins, 2008b), depressive symptoms (Garnefski &amp; Kraaij, 2006) and maladaptive outcomes in a review (Aldao et al., 2010)</li> <li>- Less positive emotions (Nezlek &amp; Kuppens, 2008)</li> </ul>
<ul style="list-style-type: none"> <li>- Does not help in overcoming the source of negative emotions</li> <li>- Fosters social distance</li> </ul>	<ul style="list-style-type: none"> <li>- Less negative emotions (Tan et al., 2012)</li> <li>- More negative outcomes, especially substance-use (Hayes, Wilson, Gifford, Follette, &amp; Strosahl, 1996)</li> </ul>
<ul style="list-style-type: none"> <li>- Does not help in overcoming the source of negative emotions</li> <li>- Fosters inauthenticity and social distance</li> </ul>	<ul style="list-style-type: none"> <li>- Less positive emotions and more psychopathology (Gross &amp; John, 2003)</li> </ul>
<ul style="list-style-type: none"> <li>- Some problems cannot be solved (e.g., loss of a loved one)</li> </ul>	<ul style="list-style-type: none"> <li>- Less depressive symptoms (Bell &amp; D’Zurilla, 2009)</li> </ul>
<ul style="list-style-type: none"> <li>- Does not improve situation but personal interpretation of situation (e.g., being abused by one’s partner)</li> <li>- Does not help in overcoming the source of negative emotions</li> </ul>	<ul style="list-style-type: none"> <li>- More positive emotions and less negative emotions (Gross &amp; John, 2003)</li> <li>- Beneficial effects on affect, self-esteem, and adjustment (Blalock, Kashdan, &amp; Farmer, 2016)</li> </ul>
<ul style="list-style-type: none"> <li>- Does not improve the situation</li> <li>- Does not help in overcoming the source of negative emotions (e.g., being abused by one’s partner)</li> </ul>	<ul style="list-style-type: none"> <li>- Less fear in laboratory task (Eifert &amp; Heffner, 2003)</li> </ul>
<ul style="list-style-type: none"> <li>- Rehashing problems and consequences (i.e., co-rumination, Rose, 2002)</li> </ul>	<ul style="list-style-type: none"> <li>- Co-rumination is associated with internalizing disorders (Hankin, Stone, &amp; Wright, 2010)</li> </ul>
<ul style="list-style-type: none"> <li>- Never dealing with a problem</li> </ul>	<ul style="list-style-type: none"> <li>- More emotional problems (Webb et al., 2012)</li> </ul>

period for the development of ER are that adolescents experience more daily life hassles, more negative emotions, and fewer positive emotions than when they were children (Larson & Ham, 1993) as well as greater fluctuations of emotions (Maciejewski et al., 2015; Silk et al., 2003). Additionally, adolescents have to learn to regulate these emotions more independently than when they were children (Steinberg, 2008). At the same time, their cognitive abilities develop which may enable them to better identify and regulate their emotions (Steinberg, 2005a). Importantly, studies of adolescents have either investigated changes in trait-like ER strategies across development (Gullone, Hughes, King, & Tonge, 2010; Zimmermann & Iwanski, 2014) or have related specific ER strategies to symptoms of psychopathology (e.g., Garber, 2006). Although those studies provide important information, they do not offer insight into momentary ER strategies that are characterized by an immediate reaction to emotional elicitors. Moreover, those studies do not capture adolescents' repertoire of ER strategies, the relative frequency of each ER strategy in daily life, or the situational factors that influence ER strategy "selection". In order to more fully understand adolescents' emotional lives, investigating emotions and regulation in, or close to, the moment that they occur is important.

### **Momentary Emotion Regulation in Everyday Life**

Even though the need to investigate ER in natural settings has been identified and requested by several researchers (e.g., Aldao, 2013; Gross, 2015a), only five studies have examined ER repertoires in daily lives. Three studies were carried out in adults (Brans et al., 2013; Brockman, Ciarrochi, Parker, & Kashdan, 2017; Heiy & Cheavens, 2014), the other two in adolescents (Silk et al., 2003; Tan et al., 2012).

In the first study among adolescents (Silk et al., 2003), each time a wristwatch beeped during a weeklong sampling period (48 sampling moments), participants filled out a pen-and-paper questionnaire asking about their momentary emotions, their most negative event, and how they had regulated their emotions with one of 13 ER strategies. Only high intensity negative events were selected to investigate the impact of ER strategies and ER strategies were grouped into 4 broader categories (primary control, secondary control, disengagement, and involuntary engagement). ER strategies falling in the categories of involuntary engagement (e.g., rumination) and disengagement (e.g., avoidance) were less successful in down-regulating anger and sadness. However, in contrast to expectations, primary (e.g., problem-solving) and secondary control (e.g., reappraisal, acceptance) strategies were not successful in down-regulating negative emotions either. Furthermore, in line with the idea that ER is beneficial for mental health (Gross & Thompson, 2007), adolescents who were less successful in regulating their emotions reported

more internalizing and externalizing symptoms compared to those who were more successful regulators.

In the second study, Tan et al. (2012) called adolescents four times a day (14 sampling moments) on answer-only mobile phones provided by the researchers to assess their emotions and ER strategies, and they compared ER strategy use and effectiveness of anxious and typically-developing adolescents. In both groups, acceptance, avoidance, and reappraisal were the most frequently used strategies. Moreover, avoidance, problem-solving, and reappraisal were successful in down-regulating anger, sadness, or upset (non-specific generalized distress) in both groups. Further, among healthy adolescents, acceptance was associated with lower distress in response to high intensity events.

These studies provide first insights into adolescents' daily regulatory efforts; yet three questions remain. First, the relative frequency with which ER strategies were implemented differed in each study. Hence, it is not clear which ER strategies are used most often. Second, the selection of ER strategies is not clear. The common assumption is that ER affects emotional intensity (Gross & Thompson, 2007). According to the contextual framework of ER (Aldao, 2013; Bonanno & Burton, 2013), emotional intensity also affects ER strategy selection (Dixon-Gordon, Aldao, & De Los Reyes, 2015; Sheppes et al., 2014; Zimmermann & Iwanski, 2014). Previous studies examining ER in adolescents' daily lives have not focused on this question but have selected high intensity moments instead (Silk et al., 2003; Tan et al., 2012). However, most daily emotional experiences are not very intense (Scherer et al., 2004) and examining the full range of emotional intensity can contribute to a better understanding of the selection process. In laboratory studies, adults were more likely to implement reappraisal in low negativity conditions whereas they implemented distraction in high negativity conditions (Sheppes & Levin, 2013; Sheppes et al., 2011). Whether this difference also appears in adolescents has not yet been examined. Third, there may be important differences in the impact of ER for short-term versus long-term regulatory successes. In the long-term view, ER strategies are often seen as either adaptive or maladaptive because of their relations with psychopathology (Aldao et al., 2010). However, it is likely that some of the ER strategies that are evaluated as maladaptive in the long-term serve important regulatory functions in the short-term in regulating both low and high negativity intensity emotions (Werner & Gross, 2010). This may be especially true for adolescents who are presumably still developing and refining their ER skills (Steinberg, 2008; Zimmermann & Iwanski, 2014). They may therefore be particularly sensitive to the relative success and failure of each of the strategies as they implement them in a trial and error way, learning for themselves which strategy may work best under specific circumstances. The studies by Silk and colleagues (2003) and Tan



and colleagues (2012) could not answer these questions because these studies focused on high intensity events only, grouped ER strategies into broader categories, and did not investigate ER selection.

### **The Present Study**

The current study aimed to address the aforementioned questions by investigating the frequency, selection, and regulatory success of a wide range of ER strategies (acceptance, rumination, reappraisal, problem-solving, distraction, suppression, social support, and avoidance) in a general population adolescent sample. Further, we investigated how these daily life strategies related to depressive symptoms. In line with previous studies (Brans et al., 2013; Heiy & Cheavens, 2014; Silk et al., 2003; Tan et al., 2012), we used an Experience Sampling Method (ESM; Hektner et al., 2007) to answer four primary research questions.

*What ER strategies do adolescents use in their daily lives?* We examined eight strategies several times a day to investigate ER repertoires and the impact of each strategy. Because this study was exploratory in nature, we only had hypotheses for acceptance: We hypothesized that adolescents would most often report using acceptance based on findings from previous studies (Brans et al., 2013; Heiy & Cheavens, 2014; Tan et al., 2012) and based on the knowledge that emotions in daily life are of rather low intensity (Scherer et al., 2004) which makes them easier to accept. We had no hypotheses for the other ER strategies, because of inconsistent evidence in prior research and the fact that only very few studies focused on momentary ER.

*How does the intensity of negative events contribute to the selection of ER strategies?* We hypothesized that negative event intensity would influence the number and type of strategies adolescents employ (Sheppes et al., 2014). Specifically, we expected that in line with adult laboratory research (Sheppes & Levin, 2013; Sheppes et al., 2011), distraction would be implemented in response to high negativity events whereas reappraisal would be implemented in response to low intensity negative events. Further, consistent with a study in which more coping strategies were utilized in response to intense distress (Zimmer-Gembeck, Skinner, Morris, & Thomas, 2013), we expected adolescents to invoke a greater range of ER strategies with more intense negative emotions.

*How successful are ER strategies in reducing negative emotions?* We hypothesized that rumination would be least successful in down-regulating negative emotions in comparison to all other strategies because of the consistent relation with negative outcomes (see Table 1). For all other ER strategies, we expected positive effects because we examined regulatory success in the short-term, and even putatively maladaptive ER strategies may be beneficial by momentarily and strategically reducing negative affect (Werner & Gross, 2010; e.g., avoiding a

person in order to first calm down, suppressing grief to prevent someone else from worrying or distracting to focus on other important tasks). Only if these ER strategies are invoked excessively or in inappropriate contexts (Aldao, 2013), they may show their maladaptive consequences. Notably, the success with which ER strategies are implemented in daily lives has rarely been examined in adolescents (or adults).

*How are ER strategies in daily lives related to depressive symptoms?* ER is an important process in the development of mood disorders (Allen & Sheeber, 2009; Gross & Thompson, 2007) and it is likely that everyday use of ER strategies also relates to depressive symptoms in general. However, this hypothesis has never been examined in adolescents. We hypothesized that frequently using rumination and suppression would be associated with more depressive symptoms and frequently using acceptance, reappraisal, and problem-solving would be associated with fewer depressive symptoms.

## Method

### Participants

Three secondary schools in the Netherlands agreed to participate in the current study. All schools were situated in low-income areas which means that at least 30% of all pupils attending these schools were from household that were below the average income in their postal code area. The Dutch school system streams adolescents into different tracks based on their academic achievement. The current study included only pupils from the middle or high educational school track. Schools allowed us to approach 195 participants and 105 adolescents agreed to participate in the full research program. Ninety-eight of these adolescents (93.3%) agreed to participate in the current study. In total, 87 adolescents (88.8%) participated in the ESM because 11 (11.2%) were either sick at the time of the study or withdrew their willingness to participate. Most of the participants ( $n = 79$ , 90.8%) were born in the Netherlands, three were born in Turkey, one was born in Suriname, and four were born in countries not specified. The majority of the sample (87.3%) lived in two-parent homes.

Only adolescents who completed at least one third of all daily assessments were included in the analyses to ensure reliability (Delespaul, 1995). Adolescents included ( $N = 79$ ,  $M_{age} = 13.91$ ,  $SD_{age} = .95$  years old, age range 12-17, 66% girls) and excluded ( $N = 8$ ,  $M_{age} = 14.31$ ,  $SD_{age} = 1.03$  years old, age range 12-15, 63% girls) did not differ significantly from each other on age  $t(83) = .72$ ,  $p = .48$  or gender  $\chi^2(1) = .04$ ,  $p = 1.00$ . Adolescents participated voluntarily and received a voucher of 20€ (approximately 27 US Dollars) for their participation. The Ethical

Committee of the Faculty of Social Sciences approved all procedures (ECG2012-2606-042). Analyses that included between-person variables (i.e., depressive symptoms) were only filled out by a subset of participants ( $N = 66$ ). Adolescents who completed both ESM and the baseline questionnaire did not differ from those who completed only ESM on age  $t(76) = .97, p = .33$ . They were, however, more likely to be girls  $\chi^2(1) = 5.18, p = .05$ .

## Procedure

Participants were a subset from a longitudinal randomized controlled trial (RCT) that investigated the effectiveness of the Dutch depression prevention program 'Op Volle Kracht' (adapted from the Penn Resiliency Program; Gillham et al., 2007). In the RCT, half of the adolescents received a CBT-based depression prevention program and the other half followed the regular school curriculum. Both groups filled out questionnaires at school on four time points (for a full description of the procedure see Kindt et al., 2012). The program was not effective in reducing depressive symptoms over one year as investigated with questionnaires (Kindt et al., 2014) and was completed before the start of the ESM data collection. No differences emerged between the prevention and the control condition on any of the key variables at the baseline measurement of the current study<sup>7</sup>. Nevertheless, we included condition (prevention/control) as a covariate in our analyses<sup>8</sup>.

For the current study, participants received an information letter that included passive consent from the parents. Data collection consisted of a baseline questionnaire that participants filled out on a computer at home and ESM during two weekends. The second weekend occurred six weeks later to reduce participant burden.

At school, participants received smartphones with an application that buzzed at random times within 90 minute intervals. In pairs, adolescents received instructions on how to use the smartphones and explanations of questionnaire items. At each buzz, adolescents were supposed to stop their current activity and complete the questionnaire. During instructions, participants indicated times that they would not be able to answer (e.g., sports training). Buzzes occurred on Friday 4 times between 4:30pm until 10:30pm; on Saturday and Sunday 9 times between 9:00am and 10:30pm. Responding took approximately 6 minutes. Participants were reminded a maximum of two times within six minutes if they missed a signal.

7 Current negative affect  $t(75) = .22, p = .82$ , peak negative affect  $t(75) = .16, p = .87$ , reappraisal  $t(75) = 1.62, p = .11$ , Avoidance  $t(75) = 1.19, p = .24$ , problem-solving,  $t(75) = 1.02, p = .31$ , rumination  $t(75) = .67, p = .51$ , suppression  $t(75) = 1.19, p = .24$ , acceptance  $t(75) = .54, p = .59$ , social support,  $t(75) = .07, p = .94$ , distraction  $t(75) = .87, p = .39$ , range of strategies  $t(75) = .41, p = .68$ , depressive symptoms,  $t(63) = .81, p = .42$ .

8 Results were the same when including condition as a covariate compared to when not including it.

## ESM Measures

**Current negative affect.** Current negative affect was assessed with nine items: jealous, anxious, ashamed, irritated, worried, angry, guilty, sad, and lonely. These items were selected from the Positive and Negative Affect Scale (Watson et al., 1988) and other ESM studies (Wichers et al., 2007). Adolescents indicated to what extent they felt each emotion just prior to the assessment on a 7-point scale that ranged from (1) *not at all* to (7) *very much*. A current negative affect score was derived by computing the mean across all negative affect items for each individual at each assessment.

**Negative events.** At each assessment, adolescents were asked to briefly describe the most negative event they experienced since the previous assessment. Also, they indicated how long ago the event occurred ranging from (1) *just before the assessment* to (6) *more than one hour ago*. This variable was used to control for the time that has passed since the event.

**Peak negative affect during negative events.** Peak negative affect was assessed with the same nine cues as current negative affect. Adolescents indicated the extent to which they felt each described emotion during the negative event on a 7-point scale that ranged from (1) *not at all* to (7) *very much*. A peak negative affect score was derived by computing the mean of all peak negative affect items for each individual at each assessment.

**Momentary emotion regulation.** Adolescents chose which of the eight emotion regulation strategies (avoidance, distraction, problem-solving, social support, reappraisal, rumination, acceptance, and suppression) they had used to down-regulate their event-related negative affect and could select multiple strategies simultaneously. Momentary ER strategies were eight dichotomized variables indicating whether an emotion regulation strategy had been used at each assessment. Examples of items were: “I tried to see the situation in a different light” (reappraisal), “I avoided the situation where the event occurred” (avoidance), and “I accepted that it happened” (acceptance). If none of the strategies fit, they could type their own strategy (8% of assessments). These descriptions were not included because they were not systematic enough.

## Baseline Measure

**Depressive symptoms.** Depressive symptoms were assessed with the Children’s Depressive Inventory (CDI; Kovacs, 1985). The CDI is a self-report questionnaire of 27 items. Adolescents chose one of three statements that describes their feelings best (e.g., I am sad once in a while, I am sad many times, I am sad all the time). The item about suicidal thoughts was excluded due to ethical concerns resulting in 26 items total. Sum scores were computed for each participant and a higher score indicated more depressive symptoms. There were no missing

variables so sum scores could be used instead of mean scores. Reliability of the questionnaire was good as demonstrated by a Cronbach's  $\alpha = .77$ .

## Results

Momentary measurements consisted of 2,490 assessments. Because we were interested in how adolescents regulated affect during negative experiences, we selected only assessments when adolescents reported a negative event and chose from one of the provided ER strategies ( $N = 1,843$ , 74%). Because repeated momentary assessments (level 1) were nested within participants (level 2), multi level regression models were estimated in the software Mplus (Muthén & Muthén, 1998-2010).

On average, adolescents filled out 33 of 44 assessments (75%). Adolescents' current negative affect was of relatively low intensity and their peak negative affect was significantly higher than their current negative affect  $t(78) = 7.86$ ,  $p < .001$ , Cohen's  $d = .36$  (Table 2). On average, the negative event occurred 32.89 minutes ( $SD = 12.96$  minutes) before the assessment.

To examine which ER strategies were employed most often by adolescents, we conducted a frequency analysis. Across all assessments, acceptance was used most often, followed by problem-solving, rumination, distraction, social support, avoidance, suppression, and reappraisal (Table 2). At each assessment, adolescents used 1.2 strategies on average. In 86.5% of the assessments adolescents used a single strategy, in 8.8 % of the assessments they used 2 strategies, in 2.5 % of the assessments they used 3 strategies, in 1.7 % they used 4 strategies, and in 0.5% of all assessments they used more than 5 strategies. Eighty-one possible combinations were identified, which made it impossible to detect a pattern.

To answer our second research question how peak negative intensity contributed to the selection of ER strategies, we performed a logistic regression analysis in MPlus with categorical dependent variables (eight dichotomized ER strategies) and a continuous independent variable (peak negative affect) including the covariate condition. This analysis reveals the probability with which each of the ER strategies was selected based on peak negative affect. Results showed that with every one-unit change (increase) in peak negative affect, the probability of using acceptance decreased by  $B = -.39$  ( $SE = .09$ ). In contrast, the probability for problem-solving ( $B = .35$ ,  $SE = .09$ ), rumination ( $B = 1.11$ ,  $SE = .13$ ), distraction ( $B = .56$ ,  $SE = .12$ ), social support ( $B = .61$ ,  $SE = .18$ ), avoidance ( $B = .44$ ,  $SE = .12$ ), and suppression ( $B = .72$ ,  $SE = .13$ ) significantly increased by the number presented in parentheses. All  $ps$  were  $< .001$ . For reappraisal, no relation with peak negative

**Table 2** Descriptive Statistics and Correlation Matrix of all Study Variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Intensity of current negative emotion	-											
2. Intensity of peak negative emotion	.85**	-										
3. Depressive symptoms	.39**	.06	-									
4. Range of strategies	.46**	.55**	.24	-								
<b>Emotion regulation strategy</b>												
5. Acceptance	-.19	-.24*	-.17	-.13	-							
6. Problem-solving	.05	.26*	.05	.46**	-.27*	-						
7. Rumination	.52**	.59**	.25*	.71**	-.04	.30**	-					
8. Distraction	.37**	.41**	.23	.66**	-.12	.33**	.39**	-				
9. Social support	.27*	.37**	.25*	.71**	-.06	.37**	.58**	.54**	-			
10. Avoidance	.32**	.45**	.18	.76**	-.10	.38**	.61**	.61**	.62**	-		
11. Suppression	.39**	.52**	.20	.70**	-.03	.31**	.48**	.60**	.48**	.56**	-	
12. Reappraisal	-.06	.06	.03	.14	.01	.13	.17	.12	.26*	.11	.11	-
	<b>1.</b>	<b>2.</b>	<b>3.</b>	<b>4.</b>	<b>5.</b>	<b>6.</b>	<b>7.</b>	<b>8.</b>	<b>9.</b>	<b>10.</b>	<b>11.</b>	<b>12.</b>
M	1.69	2.03	8.66	1.21								
(SD)	(.92)	(.95)	(5.11)	(.37)								
% of use					73.7%	14.9%	8.7%	8.1%	4.8%	4.5%	4.1%	2.4%

Note. N = 66 for depressive symptoms, N = 78 for all other variables. Strategy use is presented in proportions  
 \*\* p < .01, \* p < .05

affect was found ( $B = -.06$ ,  $SE = .09$ ). Importantly, condition did not influence the probability of the use of any of the ER strategies; all  $ps$  were  $> .05^9$ . Further, we also examined whether adolescents' higher peak negative affect was associated with using more ER strategies. To do that we recoded the summed ER strategies into a dummy variable (0 was one strategy, 1 was more than one strategy) and performed an independent samples t-test with peak negative affect as dependent variable. Indeed, adolescents' peak negative affect was higher when they used more than one strategy ( $M = 2.38$ ,  $SD = .78$ ) than when they used only one strategy ( $M = 1.98$ ,  $SD = .55$ ),  $t(287.65)^{10} = 7.97$ , Cohen's  $d = .61$ .

To examine our third research question how successful adolescents' chosen ER strategies were in down-regulating their peak negative affect, we estimated the relation between ER strategies and current negative affect while controlling for peak negative affect, time elapsed since the event, and condition using a multilevel regression model. Rumination was used as the reference category (see equation below). This allowed us to investigate how the use of a strategy relates to changes from peak affect to current affect in relation to rumination. To control for between-person differences in negative affect, all continuous level-1 predictors were group-mean centered (i.e., around each participants' mean score; Nezlek, 2012).

*Equation:* Level 1 (assessment level).  $Current\ affect_{ij} = \beta_{0j} + \beta_{1j}(\text{reappraisal}) + \beta_{2j}(\text{distraction}) + \beta_{3j}(\text{problem-solving}) + \beta_{4j}(\text{social support}) + \beta_{5j}(\text{avoidance}) + \beta_{6j}(\text{acceptance}) + \beta_{7j}(\text{suppression}) + \beta_{8j}(\text{peak affect}) + \beta_{9j}(\text{time elapsed}) + r_{ij}$ .

Level 2 (person level).  $\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{condition}) + \mu_{0j}$ ,  $\beta_{1j} = \gamma_{10} + \mu_{1j}$ ,  $\beta_{2j} = \gamma_{20} + \mu_{2j}$ ,  $\beta_{3j} = \gamma_{30} + \mu_{3j}$ ,  $\beta_{4j} = \gamma_{40} + \mu_{4j}$ ,  $\beta_{5j} = \gamma_{50} + \mu_{5j}$ ,  $\beta_{6j} = \gamma_{60} + \mu_{6j}$ ,  $\beta_{7j} = \gamma_{70} + \mu_{7j}$ ,  $\beta_{8j} = \gamma_{80} + \mu_{8j}$ ,  $\beta_{9j} = \gamma_{90} + \mu_{9j}$ <sup>11</sup>

As shown in Table 3, when adolescents, who had peak negative affect equal to their mean (i.e., 0 because of the group-mean centering), ruminated about the negative event their current negative affect was 1.82 (intercept) on a 7-point scale. When they accepted ( $1.82 - .13 = 1.71$ ), problem-solved ( $1.82 - .12 = 1.70$ ) or reappraised ( $1.82 - .17 = 1.67$ ) the negative event, current negative affect was significantly lower than when they used rumination. This means that, compared to rumination, acceptance, problem-solving, and reappraisal were successful in down-regulating peak negative emotions. In contrast, when they avoided ( $1.82 + .04 = 1.86$ ), distracted ( $1.82 - .06 = 1.76$ ), suppressed ( $1.82 + .05 = 1.87$ ) or used

9 Acceptance ( $B = .18$ ,  $SE = .25$ ), problem-solving ( $B = .13$ ,  $SE = .47$ ), rumination ( $B = .70$ ,  $SE = 1.56$ ), distraction ( $B = -.47$ ,  $SE = .42$ ), social support ( $B = .004$ ,  $SE = .59$ ), avoidance ( $B = .21$ ,  $SE = .31$ ), suppression ( $B = .38$ ,  $SE = .33$ ), and reappraisal ( $B = .58$ ,  $SE = .46$ ).

10 Levene's Test for Equality of Variances revealed no equality of variances  $F = 23.69$ ,  $p < .001$ . Therefore, corrected dfs are reported.

11 j indicates a person and i indicates an assessment within a person. r is an error term on level 1.

**Table 3** Model Results Predicting Current Negative Emotions from ER Strategies in Comparison to Rumination, Controlling for Peak Negative Affect, Time Elapsed, and Condition.

	Current negative affect			
	Intercept	SE	b	SE
Rumination	1.82	.11		
Avoidance			.04	.09
Distraction			-.06	.07
Problem-solving			-.12*	.05
Acceptance			-.13**	.04
Suppression			.05	.10
Reappraisal			-.17†	.09
Social Support			.02	.07
Peak negative affect			.41**	.04
Time elapsed			-.02	.01
Condition			.03	.16

\*\*  $p < .01$ , \*  $p < .05$ , †  $p = .05$

social support  $1.82 + .02 = 1.84$ ), their current negative affect did not differ from when they used rumination.

Our fourth research question examining relations between momentary ER strategies and depressive symptoms was investigated by computing correlations between the relative frequency of each strategy and depressive symptoms. As shown in Table 2, out of all the ER strategies, only rumination and social support showed small significant positive associations with depressive symptoms.

## Discussion

ER is a central topic of interest in research on the development and maintenance of psychopathology but knowledge about momentary ER among adolescents is still relatively sparse. To fill this gap, we examined adolescents' regulatory efforts (ER frequency, selection, and success) with an ESM paradigm. On average, adolescents' current negative emotions were lower than their peak negative emotions indicating successful regulation. Further, we found that adolescents predominantly used acceptance to regulate their emotions; however, negativity of the event influenced the selection of ER strategies. When negativity was



higher, adolescents implemented more strategies, and they were more likely to use problem-solving, distraction, rumination, avoidance, suppression, and social support. In contrast, acceptance was more likely to be used in response to less intense negative events. Surprisingly, no relation between negativity of event and reappraisal was found. With regard to emotion regulation success, we found that only acceptance, problem-solving, and reappraisal were more successful in regulating peak negative emotions (i.e., adolescents had lower current negative emotions) than rumination. Further, as expected, rumination was positively related to depressive symptoms. Unexpectedly, social support was positively related to depressive symptoms as well. These results are discussed in light of ER development and future research prospects.

### **Emotion Regulation Frequency**

Adolescents used the ER strategies in the following order of descending frequency: acceptance, problem-solving, rumination, distraction, social support, avoidance, suppression, and reappraisal, with acceptance being used in nearly 75% of all instances. In comparison with other studies, adolescents in our sample used acceptance to the same extent but all other ER strategies to a lesser extent. In line with our findings, all studies showed that acceptance and distraction were used relatively often whereas reappraisal was used relatively little (Brans et al., 2013; Heiy & Cheavens, 2014; Silk et al., 2003; Tan et al., 2012). Differences in the relative frequency may have to do with different populations (adults vs. adolescents) as adults may have a larger repertoire of ER strategies to choose from. Further, all other studies only analyzed situations involving highly intense negative emotions. In contrast, we investigated ER in response to all events (slightly negative to intensely negative) and the frequent use of acceptance might have to do with the ease with which it can be applied in response to minor events, which were most prevalent. Our results extend previous work about momentary ER by focusing on minor negative events experienced on a regular basis throughout a day by adolescents.

### **Emotion Regulation Selection: Predicting Emotion Regulation from Peak Negative Affect**

Most research on ER has assumed that ER strategies impact negative affect, and the reverse relation has been studied far less (but see Sheppes et al., 2014). Our results showed that negativity of an event contributed to the selection of ER strategies. First, when negativity of the event was more intense, participants invoked multiple strategies. This suggests that one strategy may not be sufficient to down-regulate highly intense negative emotions, and adolescents try more strategies hoping that one will eventually be successful (Gross & Thompson,

2007). On the one hand, these findings suggest that adolescents' ER skills are still developing and underline adolescents' immaturity and lack of experience with regard to selecting ER strategies (Steinberg, 2005a). On the other hand, it may be beneficial to use more than one ER strategy at a time because they might work at different time scales of the emotion-regulation process (Gross, 2015b). Hence, it may be good to first distract from the event to cool down and to problem-solve later. Thus, using distraction or problem-solving alone may not result in successful regulation, but the two in combination might be optimal. Further, some events may require several ER strategies because they are complex, they last for a long period of time, or their impact is intensely felt.

### **Emotion Regulation Success: Predicting Current Affect from Peak Negative Affect**

Problem-solving, acceptance, and reappraisal are often seen as adaptive strategies (Aldao et al., 2010) and, as hypothesized, were more successful in down-regulating negative affect than rumination. Avoidance, distraction, suppression, and social support were not more successful in down-regulating negative affect than rumination. Avoidance and suppression, just like rumination, are often seen as maladaptive strategies (Aldao et al., 2010); however, we had expected them to be successful in regulating emotions in the short-term because under certain circumstances it may be beneficial to avoid or suppress one's emotions. One reason we did not find this may be because none of these strategies helped to overcome the elicitor of the negative affect, possibly the strongest predictor of successful ER (see Table 1). Our findings are consistent with literature on habitual ER strategies that identified negative relations of these putatively maladaptive strategies with internalizing disorders (Aldao et al., 2010; Schäfer et al., 2017). Internalizing disorders are related to deficits in ER (Allen & Sheeber, 2009) and ER is often assumed to underlie mental health problems but the direction of effects is not clear yet. Recent research showed some evidence that insufficient ER strategies precede depressive symptoms: habitual use of suppression preceded depressive symptoms in two adolescent samples (DeFrance, Lennarz, Kindt, & Hollenstein, 2016; J. K. Larsen et al., 2013). Knowledge on the short-term influence of ER strategies may contribute to resolving this important question by showing the (mal)adaptive effects of specific ER strategies in the short-term. Future research may focus on designing studies in which participants are presented with specific situations in which, for instance, avoidance or suppression may be the most appropriate first strategy to use. This could be done in the laboratory to ensure controllability of negative events and may later also be applied to more ecologically valid methods such as ESM.

One particularly unexpected and interesting finding was that social support did not do better than rumination in down-regulating negative emotions. Perhaps it is important to better understand the nature of the support that adolescents were receiving. It may be that the social support came in the form of co-rumination. Co-rumination is defined as rehashing problems with friends by dwelling on the negative emotions (Abela & Hankin, 2011) which has been associated with the onset of depression (Stone, Hankin, Gibb, & Abela, 2011) and increases in depressive symptoms but also high friendship quality in female adolescents (Rose, Carlson, & Waller, 2007). Indeed co-rumination may be a particular form of social support (i.e., adolescents feel they are being listened to and understood), but at the same time, this type of support may also be emotionally harmful. If indeed adolescents co-ruminated and focused on their negative affect, it is not surprising that current affect did not improve. Future research should examine in more depth what adolescents do when they receive social support to disentangle co-rumination from other forms of positive social support such as co-problem solving (Waller, Silk, Stone, & Dahl, 2014). Contrary to previous research (Webb et al., 2012), distraction was not more successful in down-regulating than rumination. Possibly, the distracting cues adolescents used were not strong enough.

### **Emotion Regulation Strategies and Well-Being**

Relations between ER strategies and depressive symptoms have been well-documented in questionnaire studies (Aldao et al., 2010) and ESM studies (e.g., Silk et al., 2003). We found that rumination and social support used in daily life were positively associated with depressive symptoms. For rumination, this was an expected finding and is in line with previous research (e.g.; Garnefski & Kraaij, 2006). Unexpectedly, social support also showed a positive relation with depressive symptoms. Again, this might be explained by a conflation of seeking social support with co-rumination because the percentage of girls in our sample was high (65%). Another possibility is that social support is conflated with excessive reassurance seeking. Reassurance seeking involves persistently asking whether one is doing okay and has been associated with depressive symptoms (Starr & Davila, 2008). Whether adolescents engaged in any of these behaviors is only speculation; however the results suggest that there is a need to specify social support further.

None of the other strategies showed relations with depressive symptoms. Hence, in contrast to habitual ER strategies (Aldao et al., 2010; Schäfer et al., 2017), ER strategies used in response to minor negative events in daily life may not be predictive of depressive symptoms. Another possibility is that there was too little variance in depressive symptoms in this normative sample to find

these relations. Future research should delve further into the predictive value of ER strategies used in daily life in healthy and distressed samples and compare daily use with the predictive value of habitual ER strategies to elucidate the role of daily ER strategies and well-being further.

### **Limitations**

This study's sample was relatively small with predominantly well-educated and healthy adolescents and the study was conducted during weekends only. Future research with larger, more diverse samples (e.g., samples with elevated mood disorders) are needed to confirm and possibly extend the results reported in this study. As for the timing of the assessments, we chose weekends because they are a time in which adolescents can choose relatively freely what they want to do, with whom they meet, and where they are. But because of that freedom and choice, adolescents may have experienced relatively low negative affect, avoiding experiences or contexts that may trigger more negative events. To ensure generalizability, future studies should aim for a larger sample size or a sample with clearly distinguished subgroups (e.g., depressed vs. healthy adolescents) and should try to assess emotions and ER strategies during school time as well.

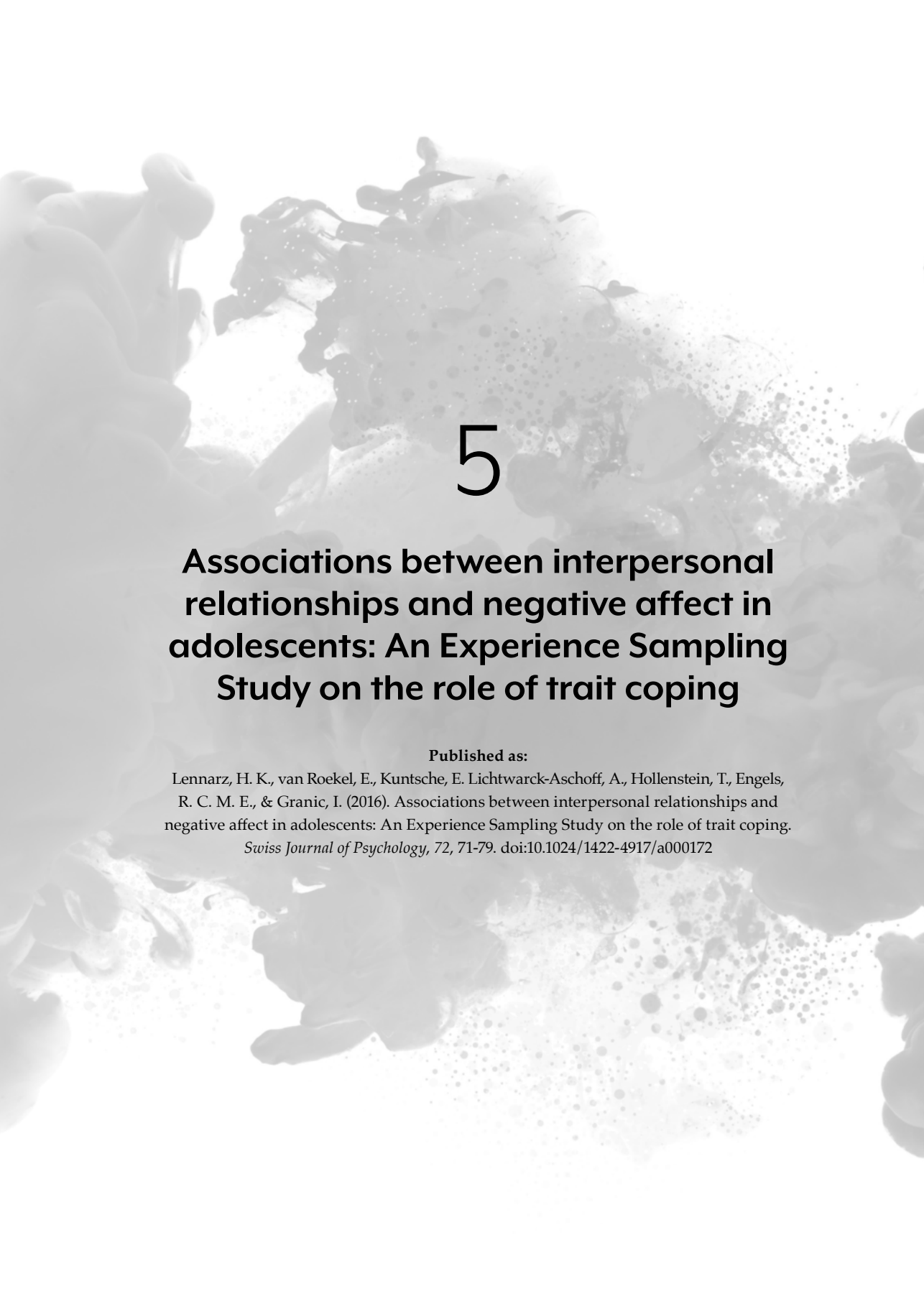
Second, even though we extended past research by examining eight ER strategies simultaneously, our list was not exhaustive. We aimed that adolescents respond to a very short ESM questionnaire and that made it impossible to include more ER strategies or to assess nuances of ER strategy use. However, future studies should aim at including more ER strategies, for example also those that facilitate the up-regulation of positive emotions (Carl, Soskin, Kerns, & Barlow, 2013). Third, we only focused on explicit ER strategies and relied on adolescents' self-report. Even though self-report provides important information about emotions, ideally, this approach should be complemented with behavioral observations in natural environments (e.g., self-talk, conversations with others). This could be done with an electronically activated recorder that unobtrusively records random sequences throughout a day and enables researchers to code the content of these sequences afterwards to receive objective information (Mehl, Pennebaker, Crow, Dabbs, & Price, 2001; Mehl & Robbins, 2012). Fourth, we combined nine negative emotions together into one negative emotions measure which gives a good indication of how successful ER strategies are in down-regulating broad negative emotions. However, it misses out on specifying the effects ER strategies can have on particular emotions. Future research could broaden our knowledge by investigating the regulation of discrete negative emotions as some emotions may be regulated differently than others (e.g., upset is regulated differently than anger; Tan et al., 2012).

**Conclusion**

It has been suggested that empirical work is lagging behind theoretical work on the structure and function of ER and that ESM studies are needed to fill these gaps (Aldao, 2013; Gross, 2015a). Our study adds to the scarce literature of momentary ER in an adolescent sample and helps to disentangle the emotional lives of adolescents. Consistent with other studies, it provides further support for the detrimental nature of rumination even in the short-term and offers interesting future directions for the role of social support. Additionally, it emphasizes the importance of external factors such as intensity of negative emotions in influencing the selection of ER strategies, and offers the promise of incorporating multiple ER strategies to examine how they work in tandem or one after the other in the most optimal ways.







# 5

## **Associations between interpersonal relationships and negative affect in adolescents: An Experience Sampling Study on the role of trait coping**

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## Abstract

Previous studies focused mostly on predicting the adjustment of adolescents based on distinct coping strategies. However, people generally do not use only one coping strategy, but rather select from a repertoire of coping strategies. This study aimed to identify these repertoires by categorizing adolescents by the coping typologies they use and by examining whether these typologies moderate the well-established relationship between negative affect and interpersonal relationships (e.g., close, acquaintances, alone). The experience sampling method (ESM) was used to assess negative affect and the interpersonal relationships of 280 adolescents ( $M_{age} = 14.19, SD_{age} = .54$ ; 59% girls) at nine randomly chosen times on six consecutive days. Coping strategies were measured with a questionnaire prior to ESM. Latent profile analysis revealed two profiles: passive copers and active copers. Furthermore, all participants reported less negative affect when they were with people with whom they had close interpersonal relationships (family and friends) than when they were with acquaintances (class or teammates) or alone. No moderation of coping typologies was revealed. The results underscore the importance of close interpersonal relationships to buffer against negative affect during adolescence and support the notion that the relationship between negative affect and close interpersonal relationships is strong, as it is not moderated by the method used to deal with negative events.

Adolescence is characterized by major cognitive, physical, and psychosocial changes. More specifically, the frequency and intensity of negative affect and the number of stressful events increase compared to childhood (Larson & Ham, 1993) and require adolescents to develop coping skills to face these challenges. Coping can be defined as managing feelings in response to a stressful situation or event (Compas et al., 2001; Skinner & Zimmer-Gembeck, 2007). Different strategies such as active coping (e.g., problem-solving), seeking social support (e.g., asking others for help), and passive coping (e.g., avoiding or ruminating) can be used to cope with the stress triggered by an event. Previous studies have focused mostly on predicting adjustment based on distinct coping strategies (e.g., active coping; Clarke, 2006). However, individuals generally do not use only one coping strategy to cope with negative events; rather, they have a repertoire of coping strategies (Duhachek & Kelting, 2009). That is, individuals display clusters of coping strategies (i.e., coping typologies) and hence a person-centered approach, using these individual characteristics as predictors for outcome variables, fits the complexity of coping use in real-life better than a variable-centered approach (Laursen & Hoff, 2006). The aim of the current study was to complement previous studies by identifying coping typologies and investigating how adolescents with different coping typologies differ in their momentary negative affect. Furthermore, it was the aim to determine whether the presence of others has an influence on momentary negative affect, dependent on these coping typologies.

### **Coping Typologies**

Three to five different coping typologies have been identified among adolescents (Aldridge & Roesch, 2008; Seiffge-Krenke & Klessinger, 2000; Tolan, Gorman-Smith, Henry, Chung, & Hunt, 2002). Three coping typologies have consistently emerged from these studies. These three were characterized by engaging in active coping (active copers), engaging in avoidant coping (avoidant copers), and using fewer coping strategies than average (low generic copers) and each typology has been associated with differential outcomes. Active copers and low generic copers did not differ in depressive symptoms and both showed fewer depressive symptoms than avoidant copers (Aldridge & Roesch, 2008; Seiffge-Krenke & Klessinger, 2000). Thus, avoidant copers seem to be at highest risk for depressive symptoms, and it seems plausible that adolescents who are identified as active or low generic copers are more capable of coping with stressors. However, it remains unclear whether coping typologies are associated with negative affect in daily life, which is what the current study aimed at investigating.

## Negative Affect and Interpersonal Relationships

Adolescents find themselves in various interpersonal relationships throughout the day, including spending time with family and friends, devoting a large amount of time to interactions in less close relationships or being alone. As children grow into adolescents, these close relationships undergo normative developmental changes (Arnett, 1999) with parents remaining an important source of support (Collins & Laursen, 2004b); however, adolescents begin to spend an increasing amount of time with friends (Collins & Laursen, 2004a). Further, research showed that parents and peers were perceived by adolescents as equally supportive (Bokhorst, Sumter, & Westenberg, 2010). Thus, both family and friends can be regarded as close interpersonal context. Next, Coan's (2008) social baseline theory proposed that humans are essentially and evolutionarily built to be social and function best when they are with close others; being with mere acquaintances or alone constitutes a stress factor. Generally, close relationships are viewed as a key factor for well-being (Goswami, 2012; Kawachi & Berkman, 2001).

Studies that investigated the relation between momentary negative affect and interpersonal relationships in adolescents' daily lives showed that adolescents experience higher levels of happiness (Csikszentmihalyi & Hunter, 2003), more positive affect, and lower levels of depressed mood (Schneiders et al., 2007) when with others than they do when alone. These results suggest that close others play an important role in down-regulating negative affect; however, it is not clear why this is the case. Coan (2008) suggested that because human beings have a need for social connection, they are simply more negative when they lack social connection. It may be that some adolescents benefit more from interpersonal relationships than others do, possibly because of individual differences

Accordingly, dispositional factors may exist to make some individuals more likely than others to benefit from being with close family or friends and thus experience less negative affect. Possible candidates for dispositional factors are coping typologies that cluster in individuals who deal with negative events in a similar manner. Several scenarios are possible of how coping typologies influence the interaction of interpersonal relationships and negative affect. First, adolescents who belong to a coping typology that is characterized by primary use of social support seeking (e.g. asking others for help), can benefit more from interpersonal relationships because the interpersonal relationships help them deal with their problems. On the other hand, these adolescents might associate seeing their friends and family with talking about problems (e.g., co-rumination; Rose, 2002) and might therefore experience more negative affect when they are with them. Second, adolescents who belong to a coping typology that is

characterized by primary use of passive coping (e.g., avoiding, ruminating) might get distracted from the problems by being with close others. In this case, interpersonal relationships might work as a buffer in the sense that less negative affect is experienced when being with others. However, they might also continue rehashing problems with their friends (Rose, 2002). Third, adolescents who use active coping (e.g., problem-solving) might have already solved the problem or are able to solve it on their own and thus might not benefit from interpersonal relationships. On the other hand, they could also associate interpersonal relations with problem-solving. The current study investigated how coping typologies moderate the relation between negative affect and interpersonal relationships.

### **The Present Study**

To examine the relation between interpersonal relationships and negative affect, Experience Sampling Method (ESM; Csikszentmihalyi & Larson, 1987; Hektner et al., 2007) was used. In ESM, participants are asked to fill out a short questionnaire several times a day. This method enables researchers to investigate the affect adolescents experience in real life and relate it to contextual factors such as their interpersonal relationships. Additionally, by measuring affect and interpersonal relationships at the moment they occur, recall bias is greatly reduced (Palmier-Claus et al., 2011). Trait coping strategies were assessed in a baseline measurement.

The aim of this paper was fourfold: (a) identifying coping typologies based on trait coping measures; (b) investigating whether differences exist in momentary negative affect between coping typologies identified in (a); (c) examining the relation between type of interpersonal relationships (i.e., close, acquaintances, and alone) and momentary negative affect in adolescents' daily lives; and (d) testing whether the coping typologies identified in (a) moderate the relation between type of interpersonal relationships and momentary negative affect. First, based on earlier research (Aldridge & Roesch, 2008), we expected to identify at least two coping typologies, active copers and passive copers. Second, we expected adolescents in more maladaptive coping typologies (e.g., passive copers) to report more negative affect than active copers because of the differences that have been found with depressive symptoms (Aldridge & Roesch, 2008; Seiffge-Krenke & Klessinger, 2000). Third, we expected adolescents to report less negative affect when in close interpersonal relationships compared to being with acquaintances or being alone; and we expected the coping typologies to moderate the relationship between close interpersonal relationships and negative affect. Fourth, due to the lack of studies investigating this relationship we did not have predefined hypotheses concerning the moderation

of coping typologies. As stated above, several different effects are possible and our aim was to investigate which of these possibilities was most likely.

## Method

### Participants and Procedures

Participants were recruited from a random selection of secondary schools in the Eastern part of the Netherlands. Of the 933 adolescents approached, 303 adolescents (32.5%) aged 13 to 16 years ( $M_{age} = 14.19$ ; 59% girls) received permission from their parents to participate in the study. The vast majority (97.3%) were born in the Netherlands. In the Netherlands, children are streamed into different types of education after primary school, depending on their academic achievement (VMBO-T, HAVO, and VWO). All educational streams were well represented in the sample (22.8% VMBO-T, 36.3 % HAVO, and 40.9 % VWO). Only adolescents who completed the baseline measurement and at least one third of all daily measurements were included in the analyses ( $N = 280$ ,  $M_{age} = 14.19$ ,  $SD_{age} = .54$ ; 59% girls) because data from participants who provide less than 30% of answers are considered less reliable (Delespaul, 1995). Analyses of Variance (age, coping strategies, negative affect, and education) and chi-square tests (gender) revealed no significant differences for any study variables between participants included or excluded (all  $p > .05$ ). Participants received 25€ for taking part in the study. The research ethics committee of the region approved all procedures.

Data collection consisted of a baseline questionnaire and momentary assessments. The baseline questionnaire was administered on a computer during school hours two to eight weeks prior to the ESM. ESM was used to assess adolescents' daily experiences. Participants were given smartphones with the open source tool MyExperience (Froehlich, Chen, Consolvo, & Harrison, 2007) one day before the start of the ESM study. Instructions were given individually and included stopping their current activity immediately after receiving a buzzing signal to fill out the questionnaire. ESM assessments continued for six consecutive days (Friday to Thursday) and the smartphones emitted buzzing signals nine times a day at randomly chosen times (54 momentary assessments per person in total). Average time between signals was 90 minutes. If participants did not respond to the buzzing signal within two minutes they were reminded a maximum of three times.

## Measures

### Baseline assessment.

**Coping strategies.** Trait coping strategies were assessed with three subscales from the Utrecht Coping List for Adolescents (UCL-A; Bijstra, Jackson, & Bosma, 1994). Participants rated how often they used specific coping strategies on a 4-point scale that ranged from 1 (*rarely or never*) to 4 (*very often*). Social support was measured with six items and assessed how likely adolescents were to look for support and consolation from others when faced with problems (i.e., I talk about the problem with my friends or family,  $\alpha = .83$ ). Passive coping was measured with seven items that included thinking about the problem a lot and withdrawing from others (i.e., I cannot think about anything else but the problem,  $\alpha = .71$ ). Actively dealing was measured with seven items and was defined as trying to find ways to solve the problem constructively (i.e., I think of different ways to solve the problem,  $\alpha = .78$ ). Social support and actively dealing were positively related ( $r = .34, p < .01$ ), actively dealing and passive coping were negatively related ( $r = -.30, p < .01$ ), and passive coping and social support were negatively related ( $r = -.13, p < .05$ ). These coping strategies were used to derive coping typologies in subsequent analyses.

### ESM assessment.

**Negative affect.** Negative affect ratings were obtained for five items: insecure, anxious, worried, low, and guilty. These items were selected from those used in other ESM studies (Peeters, Berkhof, Delespaul, Rottenberg, & Nicolson, 2006; Wichers et al., 2007). Adolescents rated the extent to which they experienced the described emotion on a 7-point scale that ranged from (1) *not at all* to (7) *very much*. To determine the reliability, we estimated Cronbach's  $\alpha$  for each assessment across all participants. Then, we computed the mean and standard deviation across all 54 measurements. The average internal consistency was  $M_\alpha = .67$  ( $SD = .12$ ). Mean scores for negative affect were computed for each individual at each assessment.

**Interpersonal relationships.** Participants were asked to indicate whether they were alone or in the company of other people. When they were in the company of others, they were also asked to report with whom they were. These answers were recoded into three categories: (a) close interpersonal relationships (i.e., family and friends), (b) acquaintances (i.e., classmates and teammates), and (c) alone. These categories were subsequently recoded into two dummy variables indicating whether adolescents were with acquaintances or alone. Being with 'close interpersonal relationships' was used as the reference category.

## Data Analysis

Coping strategies were analyzed with Latent Profile Analysis (LPA; Nylund et al., 2007) in order to obtain coping typologies. LPA enables researchers to evaluate how many latent groups best describe the data. The criteria used were the Bayesian information criterion (BIC), the adjusted Bayesian information criterion (adjusted BIC), and the Akaike information criterion (AIC). Past research employed a guideline that the lower these criteria were, the better the model fit was (Lougheed & Hollenstein, 2012; Nylund et al., 2007). Entropy values indicate a better classification by values closer to 1 (Celeux & Soromenho, 1996). To compare fit of models, two significance tests were used. If p-values of the Vuong–Lo–Mendell–Rubin (VLMR) likelihood ratio test and the adjusted Lo–Mendell–Rubin (adjusted LMR) likelihood ratio test are significant, the current model provides a better fit to the data than a model with one fewer group (Nylund et al., 2007). The coping typologies revealed from LPA served as independent variables in subsequent analyses.

Multilevel regressions in MPlus (Muthén & Muthén, 1998-2010) were used to analyze repeated momentary assessments (level-1; negative affect, interpersonal relationships) nested within participants (level-2; coping typologies). Because all predictors were binary variables, they were not centered. To examine the relation between coping typologies and negative affect, we recoded coping typologies into a dichotomous variable (0 for passive copers, 1 for active copers) and estimated multilevel regression models. Further, to investigate the relation between interpersonal relationships and negative affect, dummy variables of interpersonal relationships were created (with close interpersonal relationships as the reference category) and a baseline model with interpersonal relationships as the independent variable and negative affect as the dependent variable was estimated. To investigate whether coping typologies moderated the relationship between interpersonal relationships and negative affect, categorical variables of coping typologies were used as independent variables in cross-level interaction models. Cross-level interactions enable researchers to investigate whether the strengths of relations between level-1 variables (i.e., negative affect and interpersonal relationships) differs as a function of level-2 variables (i.e., coping typologies; Aguinis et al., 2013).

## Results

### Descriptive Statistics

Descriptive statistics for all study variables can be found in Table 1. Pearson correlations between all study variables revealed small but significant relations between most of the variables. Further, adolescents used all coping strategies to some degree. Overall, they spent most time with family/friends or alone and

**Table 1** Descriptive Statistics of all Study Variables

N = 10747	Range	M (SD)	ICC	1.	2.	3.	4.	5.	6.	7.
1. Negative affect	1-7	1.45 (.71)	.41							
<i>Coping</i>										
2. Active	7-28	16.54 (3.57)	n/a	-.11**						
3. Passive	6-24	11.40 (3.05)	n/a	.20**	-.31**					
4. Social	7-28	14.65 (3.72)	n/a	-.04**	.34**	-.12**				
<i>Interpersonal relationships</i>										
5. Close	0-1	.34 (.47)	n/a	-.10**	-.01	-.01	.02			
6. Acquaintances	0-1	.28 (.45)	n/a	.05**	-.01	-.01	-.02	-.44**		
7. Alone	0-1	.38 (.49)	n/a	.05**	.02*	.02*	-.001	-.57**	-.49**	

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



less time with acquaintances. Negative affect was aggregated within persons and was relatively low. Analysis of Variance revealed that girls ( $M = 1.55$ ,  $SD = .51$ ) reported more negative affect than boys ( $M = 1.38$ ,  $SD = .43$ ),  $F(1,278) = 8.75$ ,  $p = .004$ ,  $\eta^2 = .03$ . All subsequent analyses were controlled for gender.

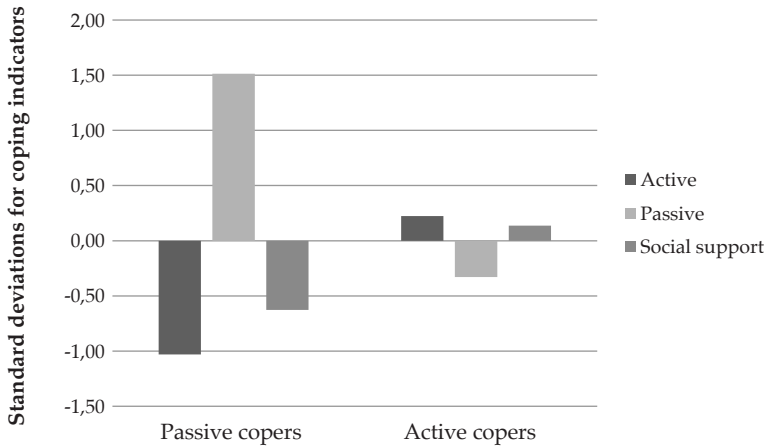
### Latent Profile Analysis of Coping Strategies

Several LPAs were conducted to identify coping profiles using MPlus (Muthén & Muthén, 1998-2010). Fit statistics are presented in Table 2. LPA revealed that a two-class solution was the best fit for the data because it had the lowest BIC values, the highest entropy and classified the data better than the one-class model. Even though the three-class solution showed a significant p-value, suggesting an improvement to the model with one fewer class, it had higher BIC values and lower entropy values than the two-class model and was therefore omitted (Nylund et al., 2007). In the four-class solution BIC and AIC were higher and entropy was rising again. However, the p-value testing, to see whether this would improve the fit above and beyond the three-class solution, was not significant and therefore we chose to omit this solution.

**Table 2** Fit Statistics for LPA Models of Coping Groups

Number of classes	N	BIC	Adjusted BIC	AIC	Entropy	VLMR p-value	Adj. LMR p-value
1	280	4487.47	4468.45	4465.67	n/a	n/a	n/a
2	50, 230	4443.20	4411.20	4407.85	0.76	.001	.001
3	43, 164, 73	4446.26	4401.87	4395.38	0.6	.006	.007
4	166, 59, 38, 17	4454.55	4397.48	4389.12	0.66	.56	.57

Figure 1 displays standard deviation scores for each of the identified profiles. These were used to identify coping typologies. The majority of adolescents (82%) were classified as active copers. These were adolescents who used active coping and social support-seeking slightly more than average and passive coping slightly less than average. The second class was labeled passive copers because they scored higher than average on passive coping and lower than average on active coping and social support.



**Figure 1** Standard deviations from the overall sample mean of each class for coping indicators.

### Coping Typologies and Negative Affect

Multilevel models estimating the relation between coping typologies and negative affect revealed that adolescents classified as passive copers reported negative affect of 1.71 (intercept) whereas adolescents classified as active copers reported significantly less negative affect:  $1.71 - .37 (B) = 1.34$  (see Table 3a).

### Interpersonal Relationships and Negative Affect

To test the relation between negative affect and interpersonal relationships, we conducted a multilevel regression analysis. This model revealed that adolescents in close interpersonal relationships experienced lower levels of negative affect than when with acquaintances or alone. No difference in negative affect was found between adolescents who were with acquaintances and those who were alone (see Table 4). In all subsequent analyses, we did not differentiate between acquaintances and alone because we did not identify differences in negative affect between these interpersonal relationships. Furthermore, based on Coan's (2008) social baseline theory (SBT; see the Discussion section), it makes sense not to distinguish between these two relationships.

**Table 3** Negative Affect Regressed on (a) Coping Typologies (Level-2 Only Model) and (b) on the Cross-Level Interaction Between Negative Affect and Interpersonal Relationships with Coping Typologies, Either Controlled for Gender or Separately for Boys and Girls.

	Gender		
	All	Boys	Girls
(a) Passive copers <i>Intercept (SE)</i>	1.71 (.08)***	1.51 (.08)***	1.91 (.11)***
Active copers $B_1$ ( <i>SE</i> )	-.37 (.09)***	-.15 (.09)	-.46 (.11)***
Gender $B_2$ ( <i>SE</i> )	.13 (.05)*		
(b) Passive copers and no close interpersonal relationships <i>Intercept (SE)</i>	1.74 (.09)***	1.52 (.10)***	1.96 (.12)***
Active copers and no close interpersonal relationships $B_1$ ( <i>SE</i> )	-.38 (.10)**	-.14 (.11)	-.47 (.12)***
Passive copers and close interpersonal relationships $B_2$ ( <i>SE</i> )	-.15 (.06)**	-.10 (.13)	-.17 (.06)**
Active copers and close interpersonal relationships $B_1 * B_2$ ( <i>SE</i> )	.04 (.06)	.01 (.13)	.05 (.07)
Gender $B_3$ ( <i>SE</i> )	.14 (.05)**		

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

**Table 4** Multilevel Model Results for the Association Between Interpersonal Relationships and Negative Affect Controlled for Gender.

	Level-1 Negative Affect			Level-2
	Close	Acquaintances	Alone	Gender
Intercept	1.30 (.04)*** <sup>a</sup>			
B(SE)		.12 (.02)***	.11 (.02)***	.18 (.06)**
Intercept		1.42 (.04)*** <sup>a</sup>		
B(SE)		-.12(.02)***	-.02 (.02)	.18 (.06)**

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

<sup>a</sup> These parameters represent the interpersonal relationship for the reference group (i.e., when the dummy variable was 0).

**Coping typology as moderator for the relation between negative affect and close interpersonal relationships.** To investigate the hypothesis that coping typology moderates the relation between negative affect and interpersonal relationships, a cross-level interaction was included in the model. Contrary to expectations, the results revealed no moderation effect of coping typology (see Table 3b). Passive copers who were without close interpersonal relationships had negative affect of 1.74. When active copers were without close relationships, their negative affect was significantly lower:  $1.74 - .38 = 1.36$ . When passive copers were with close interpersonal relationships, their negative affect was significantly lower:  $1.74 - .15 = 1.59$ . When active copers were with close interpersonal relationships, their negative affect did not reduce significantly:  $1.74 - .38 - .15 + .04 = 1.25$ . Thus, no matter the coping typology, adolescents reported less negative affect when in close interpersonal relationships than when with acquaintances or alone.

We explored gender differences by including main effects and interaction effects in analyses and calculating a multi-group model. These analyses revealed that, for girls, active copers had less negative affect compared to passive copers. For boys, the difference between active and passive copers was not significant (see Table 3a). Furthermore, when girls were passive copers, their negative affect reduced significantly when they were in close interpersonal relationships. No such difference was found for boys (Table 3b).

## Discussion

This study aimed to identify coping typologies in adolescents, to examine whether these coping typologies differed in the negative affect and whether they moderated the relation between interpersonal relationships and negative affect in daily life. The results revealed two coping typologies: active copers and passive copers. Active copers experienced less negative affect in daily life than passive copers. We did not find the hypothesized moderating effect of coping typologies: Independent of coping typology, all adolescents reported the least negative affect when in close interpersonal relationships. Further, the relation between negative affect and interpersonal relationships was in line with the hypotheses: When adolescents were in close interpersonal relationships they experienced less negative affect compared to situations in which they were alone or with acquaintances. This effect was especially pronounced for girls.

Adolescents were classified as active copers and passive copers. These typologies partly replicated those found in earlier research (Aldridge & Roesch, 2008; Seiffge-Krenke & Klessinger, 2000; Tolan et al., 2002). In contrast to previous studies that identified three to five typologies we identified only two. The group

of active copers has been consistently identified in earlier studies as well. The passive copers typology has the most overlap with the avoidant copers typology identified in previous research (see Aldridge & Roesch, 2008). However, we have chosen to name that group differently because adolescents of this typology score high on the relevant items on the 'passive' scale of the questionnaire, which focuses on rumination and withdrawal rather than avoidance.

Differences from results in previous studies are due to several reasons. First, one of the major problems with LPA or other clustering approaches is that the solution is specific only for the current sample, because even though these approaches are empirically validated and provide model fit characteristics, they are data-driven and depend on the questionnaires used, the coping strategies administered, and the population studied, amongst other factors. Thus, results from LPA cannot be generalized and are difficult to replicate. Second, all studies measured and built typologies from different coping strategies which might be responsible for the different results. Moreover, there is still no consensus of how many coping factors exist. Suggestions range from two (problem-focused vs. emotion-focused; Lazarus & Folkman, 1984) to three or more (Compas et al., 2001). In this study, active copers were characterized by greater use of problem-solving and social support. Passive copers were characterized by an increased use of passive coping and less use than average of active coping and social support seeking. This typology was characterized by withdrawal from the situation and worrying (Bijstra et al., 1994). These two typologies are in line with the theoretical notion that coping consists of two factors, problem-focused and emotion-focused coping (Lazarus & Folkman, 1984) or approach and avoidance coping (Moos & Schaefer, 1993). Importantly, most theory about coping is based on variable-centered approaches. Using a person-centered approach might lead to different results because it analyzes the used strategies by individual rather than frequency of strategies for the entire sample. Results suggest that in the current sample, adolescents can be classified into two groups of people: those who cope rather actively and those who cope rather passively.

Consistent with our expectations, active copers reported less negative affect than passive copers. Passive copers were characterized by rehashing the problem and avoiding it and they are likely also to have ruminated. Rumination in this context is defined by repetitively focusing on feelings, thoughts, causes, and consequences of a problem or a negative situation (Aldao et al., 2010; Nolen-Hoeksema, 1991). This finding suggests that passive copers relive their negative experiences and re-experience negative affect. In contrast, active copers are likely to approach negative situations by solving the problem or asking others for help; therefore, their negative affect might not resurface after a problem arises and is dealt with.

Consistent with the hypotheses, adolescents reported less negative affect when they were in close interpersonal relationships than when they were with acquaintances or alone. These results are in line with the association between close interpersonal relationships, increased happiness and low levels of negativity in daily life (Csikszentmihalyi & Hunter, 2003; Schneiders et al., 2007) and the broader assumption that interpersonal relationships are related to well-being (Collins & Laursen, 2004a, 2004b; Goswami, 2012; Kawachi & Berkman, 2001). Remarkably, there was no difference between negative affect when adolescents were with acquaintances versus when they were alone. The current study did not provide an answer to why this was the case. One explanation might be that being alone feels similar to being with acquaintances in that the benefits of intimacy are missing in both cases (Coan, 2008). Researchers have suggested that depending on the reasons for being alone, it can either be a risk or a positive factor (Corsano, Majorano, & Champretavy, 2006). To shed more light on this relationship, it is important to include adolescents' perceptions of being alone and being with acquaintances in future research.

We did not find a moderating effect of coping typologies in the relation between interpersonal relationships and negative affect. Thus, both coping typologies benefitted from close interpersonal relationships. This indicates that close interpersonal relationships are a strong buffer against negative affect. One possible way to explain this finding is with Coan's social baseline theory (2008) which emphasizes individuals' need for intimate interpersonal relationships when coping with stressful circumstances. Importantly, our results do not suggest that the negative affect adolescents experience when with acquaintances or alone is maladaptive per se. Adolescents may be still learning how to overcome their negative affect and, thus, these negative feelings may drive teenagers to initiate relationships. Hence, future research should investigate what adolescents actually do when with others, to identify the factors causing the beneficial effect of interpersonal relationships. This would also increase knowledge about the less well-studied underlying mechanisms of the positive effect of close interpersonal relationships. Further, it is very likely that adolescents connect with friends on social media/mobile phones when they are alone, so it would be interesting to investigate how this contact differs from actually being in the company of close interpersonal relationships.

Gender differences did emerge with respect to the benefit from close interpersonal relationships. Girls who were passive copers experienced less negative affect when in close interpersonal relationships. For boys this difference was not significant but pointed in the same direction. Explanations might be that girls started off with higher negative affect and therefore had more room for improvement. Additionally, boys seem to be a more heterogeneous group

regarding their negative affect, as can be seen from the high standard error. Investigating gender differences was not the main goal of our paper; however, the results strengthen the assumption that close interpersonal relationships are important, perhaps even more so for girls. This finding requires further research. Additionally, girls who were passive copers had more negative affect than when they were active copers. This result suggests that girls suffer more from passive coping than boys and might add to studies that attempt to explain the well-established gender difference in depressive symptoms that emerge in adolescence (Nolen-Hoeksema & Girgus, 1994). In line with this, a recent study among adults suggested that women experience more depressive symptoms because of their tendency to ruminate (Michl, McLaughlin, Shepherd, & Nolen-Hoeksema, 2013).

A few limitations have to be acknowledged. We focused exclusively on negative affect without distinguishing between different types of negative emotions. Additionally, the negative emotions we assessed did not include basic emotions such as anger and sadness, but focused on anxious-depressed affect. Future studies should investigate a broader range of discrete emotions because it is likely that various emotions elicit different coping strategies, and some coping strategies may work better with certain emotions than others. Further, we did not examine positive emotions. We chose not to include positive emotions in our analyses because we were interested in how adolescents coped with negative affect. Future studies should include positive affect to shed more light on adolescents' emotional lives and investigate the possible beneficial effects of strategies to up-regulate positive emotions (Quoidbach, Berry, Hansenne, & Mikolajczak, 2010). Additionally, for future studies it may be interesting to further specify interpersonal relationships; for instance, distinguishing between family and friends, as in later adolescence these two relationships might have different functions. Also it would be useful to investigate how comfortable adolescents feel with their interpersonal relationships and how that relates to their negative affect.

In the current study, we viewed coping as a trait construct that is inherent in individuals and that makes them deal with negative events in certain ways. However, coping strategies and their impact might differ based on the context in which they are used (Lazarus & Folkman, 1984). Future studies should thus aim at measuring coping in daily life and could investigate whether the coping strategies that adolescents use in moment-to-moment interactions resemble their generic typologies. This would provide a more detailed and accurate picture of how adolescents cope with everyday life stressors. Also, by assessing stressors in daily life, one could learn more about to whom adolescents turn for various problems, as research suggests that they talk about school/career-related problems with parents, whereas they discuss dating-related problems (e.g., how

to dress) with friends (Brittain, 1963). Another limitation was that the coping scale did not distinguish between different types of stressors, which made it impossible to determine if their coping differed depending on the type of stressor. Further, the coping strategies we assessed were not exhaustive; future studies should include a wider variety of coping strategies to create meaningful typologies. In addition, typologies might be specific to the adolescent period we examined, and might change over the course of a lifetime. Coping strategies only begin developing in adolescence (Steinberg, 2005a) and not everyone develops them at the same pace. To increase understanding of the development of coping in adolescents, future research should include longitudinal studies to detect whether and how adolescents' coping typologies change as they mature and to determine the effect of these changes with respect to adaptive and maladaptive outcomes.

In conclusion, the present study extended existing literature using a person-centered approach for coping strategies rather than a variable-centered approach. Additionally, it provided support for the well-established relation between close relationships and negative affect in adolescents and showed that this relation might be even stronger than previously thought. Taken as a whole, the results suggest that family and friends buffer adolescents against experiencing negative emotions in their daily lives.





The background of the page is an abstract composition of dark, textured, organic shapes that resemble ink splatters or biological cells. These shapes are set against a light, speckled background that also has a cellular or granular appearance. The overall effect is a complex, layered texture.

# 6

## General discussion



The aim of this dissertation was to extend conventional approaches investigating emotions and emotion regulation in adolescents in order to increase our understanding of daily processes of emotions and their regulation, the role of interpersonal context in the experience of emotions, and the role of specific emotions in well-being. In this last part of the dissertation, I will briefly summarize and discuss the main findings. Additionally, I will give suggestions for future research based on the results we obtained and limitations we identified, and provide applied implications that emerged from this work.

## Summary of and Reflections on the Main Findings

### Emotions

**Emotion differentiation.** Emotion differentiation is defined as the ability to identify the emotions experienced with precision (Barrett et al., 2001) and has been associated with well-being in adults (e.g., Boden et al., 2013; Erbas et al., 2014; Kashdan et al., 2015). In chapter 2, we examined differentiation of positive and negative emotions separately and found that differentiation of negative emotions was positively related to adolescents' emotional well-being. More specifically, as hypothesized, adolescents who were better able to differentiate negative emotions experienced less negative emotions, however unexpectedly no relation with depressive symptoms emerged. The absence of a relationship between emotion differentiation and depressive symptoms stands in contrast with studies that have found a negative relation between negative emotion differentiation and depression among healthy adults (Erbas et al., 2014) and in which depressed adults differentiated their negative emotions less than healthy adults (Demiralp et al., 2012). Our null finding may be explained by the normative sample in which only few adolescents experienced elevated depressive symptoms. Thus, we might have had too little variation in depressive symptoms scores to find the expected effect. In order to increase variability, outcome variables that are more relevant and common in a healthy sample, such as perceived stress could be used as an indicator of mild psychological distress (Crum, Salovey, & Achor, 2013). Further, future studies may include samples of individuals with elevated scores of depression or other mood disorders to further disentangle the role emotion differentiation plays in well-being, especially in adolescence.

Next to negative emotionality and depressive symptoms, we also focused on implicit theories of emotions and extended past research by showing an association between negative emotion differentiation and implicit theories of emotions. Adolescents who believed in the malleability of emotions were also

better at differentiating negative emotions. This was in line with our hypotheses: Adolescents who believed they could change their emotions seemed to pay more attention to these emotions and get to know them better, which in turn may have helped them to regulate emotions better (Kashdan et al., 2015). Notably, the relation could also work the other way around: Adolescents who were more adept at differentiating negative emotions may have believed more in the malleability of emotions. Discrete emotions may provide the feeling of being in control and are easier regulated than global emotional experiences (Kuppens & Verduyn, 2015).

With regard to positive emotion differentiation we did not find any relations with well-being. Past research on positive emotion differentiation has shown mixed results with some studies showing that positive emotion differentiation is positively related to well-being (Boden et al., 2013; Hill & Updegraff, 2012; Selby et al., 2014; Tugade et al., 2004) and others not showing any relation between the two constructs (e.g., Demiralp et al., 2012; Grühn et al., 2013). Our finding is consistent with some research among adults and is also in line with the assumption that negative emotion differentiation may be more important for well-being (Barrett et al., 2001; Demiralp et al., 2012; Erbas et al., 2014). The relative importance of negative emotion differentiation more so than positive emotion differentiation may be explained by the idea that an appropriate reaction and action-readiness in line with an emotion that signals that something is not going well (e.g., anger) is more important than a likewise similar reaction to an emotion that signals that all is well (e.g., happiness). This may be because consequences that emerge from an inappropriate reaction to a negative emotion are probably more harmful than consequences that emerge from an inappropriate reaction to a positive emotion.

Although differentiation of positive and negative emotions seem to show different relations with well-being, we identified a moderately positive relation between positive and negative emotion differentiation. Studies among healthy adults also found this positive relation (Selby et al., 2014; Vandercammen et al., 2014) whereas no relation emerged among depressed adults (Demiralp et al., 2012). Together, these findings indicate that some individuals have a general propensity to differentiate their emotions which may reflect a more general awareness of their emotions and more skills for labelling emotional states with precision, and this skill set may be missing among depressed individuals. This is especially interesting because depressed individuals did not show differences in positive emotion differentiation compared to non-depressed individuals (Demiralp et al., 2012). Hence, a lack of negative emotion differentiation seems to be associated with depression and depressed individuals do not seem to transfer their skills from positive emotion differentiation to negative emotion differenti-

ation, whereas non-depressed individuals do. However, it should be noted that all of these results were based on averages across groups. Possibly, individuals or subgroups within each group exist which do (not) show a relation between positive and negative emotion differentiation. Implications that follow from these results will be outlined later in the discussion.

One important shortcoming in emotion differentiation research is that the direction of the relation between emotion differentiation and other variables (e.g., well-being, emotion regulation) is not yet clear. Disentangling the causal relations is an important avenue for future research which should include experimental and longitudinal designs. Typically, intraclass correlations calculated across different emotions in an ESM design are used to derive an index of emotion differentiation. Recently, Erbas et al. (2014) derived emotion differentiation indices from an experimental paradigm. To approach causality in the relation between emotion differentiation and well-being, combining either ESM or experimental research with longitudinal studies will be necessary. One should keep in mind that this creates an intense design and asks for a high involvement of the participants. However, as our results (and that of others) suggest negative emotion differentiation is an important factor of mental health, including emotion differentiation in the study of emotional processes seems promising.

**Jealousy.** Emotion differentiation seems to be an important skill for well-being in adolescence and each discrete emotion serves a specific purpose (e.g., Frijda et al., 1989; Izard et al., 1993; Scherer, 2009). Hence, specific discrete emotions may be particularly relevant to understanding developmentally salient experiences in adolescence, a period characterized by emotionality (Rosenblum & Lewis, 2003) and fluctuating emotions (Maciejewski et al., 2015; Silk et al., 2003). In this dissertation, we focused on jealousy, an emotion that is likely to be ubiquitous in adolescence because of major changes in the interpersonal domain (Collins & Laursen, 2004a, 2004b; Collins et al., 2009; Smetana et al., 2006) and an increased awareness of others' evaluations (Somerville, 2013). Indeed, our study was among the few to investigate and show that jealousy was prevalent in adolescents' daily lives and the majority of adolescents experienced it frequently. Consistent with past research (Lavalley & Parker, 2009; Parker et al., 2005), individual differences emerged in the experience of jealousy with some adolescents experiencing jealousy on more occasions than others. Moreover, situational differences were important for the experience of jealousy: Jealousy was especially prevalent when adolescents were with peers rather than when they were with family or alone, and when adolescents were in online contexts compared to face-to-face peer contexts.

Despite the indisputable importance of romantic relationships as a context for jealousy, jealousy has been proposed to occur in any important relationship (DeSteno et al., 2006; Harris, 2003; Volling et al., 2010). Our data support this postulation as peers were a strong elicitor of jealousy and are in line with research by Parker and colleagues (2010; 2005) who showed that friendship jealousy is common among adolescents and influences their well-being. The impact of peers on the experience of jealousy may result from the increasingly important role that peers play throughout adolescence (Collins & Laursen, 2004a, 2004b), the changing peer environments due to changing schools which possibly result in different friendship preferences, and the fact that comparisons with others and rejection from others becomes more common, especially in peer contexts. Therefore, it is likely that the perceived closeness and stability of a friendship influences how jealous someone feels. Hence, the type of relationship (i.e., romantic relationship, friendship) may not be the most important factor for the elicitation of jealousy but the perceived quality of the relationship (e.g., closeness, comfort level) may be especially relevant. Nevertheless, it may seem surprising that romantic relationships did not appear as a strong elicitor of jealousy from our study because romantic relationships have received most attention in jealousy research in adult samples (Harris & Darby, 2010). We did probably not identify romantic partners as a main source of jealousy experiences because these romantic relationships were so infrequent at this relatively early stage of adolescent development (11 out of 1500 assessments). Because romantic partners often are in the same peer group during early adolescence (Meier & Allen, 2009), we treated those instances as peer contact. Future research on jealousy should further study the role of different sorts of interpersonal contacts (including romantic relationships but not limited to them) and also include the perception of the quality of the relationships assessed.

In addition to situational differences, we identified two individual difference factors that seemed important for jealousy, namely propensity to feel jealousy and age. Adolescents high in propensity to feel jealousy experienced more jealousy in the family context but not in the peer context compared to adolescents low in this propensity to feel jealousy. Peers seem to be such a strong elicitor of jealousy that even the general tendency to experience jealousy is overruled by their presence, but in the family context more fluctuations seem possible. Further, in online contexts but not in face-to-face contexts younger adolescents experienced more jealousy than older adolescents. Older adolescents may be better able to evaluate and rationalize the overly positive information posted by others online (Ellison et al., 2006; Steinberg, 2005a) or they might have had more experience with online contexts and are generally better able to regulate the emotional impact of social stimuli (Silvers et al., 2012). Another individual

difference factor that may be important to consider is self-esteem. Self-esteem is defined as the view (favorable or unfavorable) one holds about one's worth, value, and importance (Blascovich & Tomaka, 1991) and has been related to trait jealousy (Parker et al., 2005). Possibly, self-esteem also influences the experiences of momentary jealousy, for example through a different perception of social exclusion (Leary, 1990). However, there may be particular situations that elicit momentary jealousy in high- and low-self-esteem individuals (e.g., infidelity or betrayal of confidence). Identifying the role of self-esteem (as well as other individual difference factors) in the experience of momentary jealousy can inform how jealousy may be prevented, in which situation jealousy serves a purpose, and why individual differences persist to exist.

Our research focused on momentary jealousy and extends previous findings that have focused on trait jealousy by showing that individuals experience different frequencies and intensities of jealousy in daily life. Further, experiencing a lot of jealousy in daily life may be related to depressive symptoms as we identified a marginal relationship. Considering also findings from trait jealousy studies that showed relations between jealousy and emotional maladjustment (Lavalley & Parker, 2009; Parker et al., 2010; Parker et al., 2005), there may be a threshold at which intense jealousy becomes pathological. When that is and who is most prone to the damaging effects of jealousy still needs to be explored. Importantly, our results with respect to jealousy pave the way to also examine other discrete emotions (e.g., shame, guilt) as they occur in daily life. Shame and guilt are self-conscious emotions (Tangney & Dearing, 2002) that are, just like jealousy, likely to emerge in adolescence because of adolescents' increased awareness of others' evaluations (Somerville, 2013) and their increasing cognitive abilities in abstract thinking and putting things into perspective (Steinberg, 2005b). Examining these emotions together with jealousy and to see how they are related may therefore be especially interesting. Furthermore, assessing a variety of discrete emotions in daily life could offer unique insights into facets that would otherwise be underexposed, for example the role of discrete daily emotions in the development and maintenance of psychological disorders (Kim, Thibodeau, & Jorgensen, 2011).

### **Emotion Regulation**

**Daily use.** Emotions are omnipresent in our daily lives and provide signals how we are doing and whether we should continue or change something in a specific situation (Keltner & Gross, 1999; Lazarus, 2006). If the experienced emotion does not fit with an individual's goal in that situations, regulation needs to take place (Gross, 2013; Gross & Thompson, 2007). Until now, empirical research has rarely focused on examining a broad range of ER strategies in daily life, even though



several scholars recognize and recommend studying this range of ER strategies in the moments they occur (e.g., Bonanno & Burton, 2013; Gross, 2015b). In chapter 4, we extended past research by empirically assessing eight ER strategies and showed that acceptance was the most often employed strategy followed by problem-solving, rumination, distraction, avoidance, reappraisal, social support, and suppression. These findings are consistent with research among adults which also identified acceptance as the most often used strategy (Brans et al., 2013; Heiy & Cheavens, 2014). Further, individuals seem to choose from a range of strategies which do not necessarily correspond to the strategies most often studied (i.e., reappraisal and suppression; Gross & John, 2003). Our results suggest that acceptance seems an important ER strategy to learn more about. Healthy adolescents invoked acceptance a great deal, suggesting that accepting negative events is normative and possibly beneficial in everyday life. Hence, the importance of acceptance for successful everyday functioning and identifying circumstances in which acceptance is beneficial or maladaptive should become a focus of future studies.

Similarly, selection of ER strategies has rarely been studied. We started to identify circumstances in which different ER strategies are used by examining how negativity of an experienced event influenced the use of ER strategies. Our results showed relations between negativity of the event and all strategies but reappraisal. With low-intensity negative emotions, acceptance was more likely to be used compared to high-intensity negative emotions. With high-intensity negative emotions, suppression, problem-solving, distraction, avoidance, social support, and rumination were more likely to be used compared to low-intensity negative emotions. These findings suggest that adolescents select the ER strategies they use, among other unknown factors, on the basis of the extent of negativity they felt towards particular events. These findings were in line with laboratory studies among adults in which negativity of a stimulus influenced the use of suppression versus distraction (Sheppes & Levin, 2013; Sheppes et al., 2011) and with recent findings that a fit between the situation and the ER strategy used provides the most successful regulation (Haines et al., 2016). Together with our results, these findings stress the importance of including situation-specific factors in ER research and also to further examine reciprocal relations between emotions and ER.

Moreover, we investigated how successful momentary ER strategies were in down-regulating peak negative emotions. Problem-solving, reappraisal, and acceptance were more successful in down-regulating negative emotions than rumination. This was in line with our hypotheses and is consistent with the literature that shows a detrimental association of rumination with well-being, in the short-term as well as in the long-term (Aldao et al., 2010; Genet & Siemer,

2012; Moberly & Watkins, 2008b). Relatedly, based on the trait literature consistently showing a positive relation between maladaptive adjustment and rumination (e.g., Aldao et al., 2010; Webb et al., 2012), we also expected a positive relation between momentary rumination and depressive symptoms. This is also what we found. Furthermore, we also found a positive relation between social support and depressive symptoms. Explanations for this unexpected finding may be twofold. On the one hand, adolescents who feel depressed may be overwhelmed by their feelings and not able to deal with the negative emotions on their own, which may make them more prone to ask for social support. The kind of social support they receive may however be crucial in how they feel. If social support is mainly used as a source of co-rumination (i.e., dwelling on negative affect with a peer; Rose, 2002) or excessive reassurance-seeking (i.e., continuously asking others to confirm one's self-worth; Coyne, 1976; Joiner, Alfano, & Metalsky, 1992), social support may not be beneficial. If, however, social support comes in the form of a positive interaction, like co-problem-solving it may be beneficial (Waller et al., 2014). In this dissertation, we did not have any information about which kind of social support adolescents encountered

On the other hand, withdrawal and therefore less social support is a characteristic of depression (American Psychiatric Association, 2013) and considering these symptoms the relation between social support and depressive symptoms may be odd. However, withdrawal may in fact apply to full-blown depressed episodes (Ayuso-Mateos, Nuevo, Verdes, Naidoo, & Chatterji, 2010; Judd & Akiskal, 2000) rather than to the low depressive symptoms that adolescents in our sample experienced. Slightly depressed adolescents may actually look for more social support because they are trying to make sense of their feelings and may need the help of others to do so. We had too little information about the precise nature of social support that adolescents received, to draw any conclusion about why social support was positively related to depressive symptoms. Future research may investigate what kind of social support adolescents receive (i.e., co-problem-solving versus co-rumination; Waller et al., 2014), what the effect is of not receiving social support when needed (e.g., rejection after excessive reassurance-seeking; Joiner et al., 1992), and how these differences in social support relate to internalizing disorders and the use of other ER strategies. Furthermore, future research that utilizes longitudinal designs to assess depressive symptoms and information about social support in healthy as well as depressed adolescents over a period of a few months/years are needed to examine causal relationships between specific ER strategies and the development of internalizing disorders.

Another fruitful avenue for future studies may be to examine how the selection of ER strategies is related to internalizing disorders and which role the

combined use of ER strategies play, in the down-regulation of negative emotions as well as in the development of internalizing disorders. Identifying patterns of ER strategies that are consistently used by those who experience internalizing disorders and which healthy adolescents do not invoke may be possible. Especially as our results showed that adolescents used 81 different combinations of ER strategies that ranged from using two strategies (e.g., problem-solving and acceptance) to using all eight strategies simultaneously, the focus on combinations of ER seems promising and crucial. Disentangling all these combinations and analyzing their impact was beyond the scope of this dissertation. Yet, our findings add to the scarce literature of momentary use of ER informing about the most frequently used ER strategies in daily life, and suggest that future research should take into account a broad range of different ER strategies to assess their possible interactions and their relations with internalizing disorders.

**Person-centered approach.** Next to the daily use of ER strategies, we also added to existing literature by determining subgroups of adolescents with regard to their preferred coping strategies using a person-centered approach. Chapter 5 examined the relation between interpersonal relationships and negative emotions and assessed whether coping typologies derived from a person-centered analysis moderated this relation. Analyses revealed two types of copers: adolescents who primarily coped with negative events by using rumination and withdrawal (passive copers) and adolescents who primarily coped with negative events with problem-solving and social support (active copers). These coping typologies were partly consistent with typologies identified in earlier studies (Aldridge & Roesch, 2008; Seiffge-Krenke & Klessinger, 2000). Across the whole sample, all adolescents had least negative emotions when they were in the company of close others compared to when with acquaintances or when alone. Remarkably, no difference in negative emotions emerged when adolescents were in the company of acquaintances or when they were alone. Further, coping typologies did not moderate the relation between negative emotions and interpersonal relationships. These findings suggest that close interpersonal relationships are an important buffer against the experience of negative affect. Individuals may feel better when with others, interpret negative events as less extreme or experience less negative events when with others. Hence, social relationships seem to be a potent source of protection against negative emotions, a finding that will in more detail be discussed later in the discussion.

## Theoretical Implications

After having provided reflections on the main findings of the current dissertation, I am going to link our findings to existing theories. Even though we did not set out this dissertation to test the social baseline theory (SBT), some of the findings are consistent with SBT. Further, I am going to discuss how our findings add to the refinement and development of one of the most influential theories of ER (Gross, 1998, 2015b).

### Social Baseline Theory

SBT was recently developed and assumes that humans are a social species that function best when in the company of others whereas being alone constitutes a stressor (Beckes & Coan, 2011; Coan & Sbarra, 2015). SBT has mainly received support on the neurological level for adults and adolescents (e.g., Coan et al., 2006; Conner et al., 2012). Our results in chapter 5 were consistent with SBT on a behavioral level. Adolescents had least negative emotions when with close intimate relationships independent of the coping strategies they predominantly used. Hence, interpersonal relationships may be so beneficial for our well-being that they have the potential to overrule individual differences such as the way one usually copes with negative events. However, in contrast to close others, we did not find a difference in negative emotions between being alone and being with acquaintances. In light of SBT this seems surprising as according to SBT any social contact should be more beneficial than being alone. However, the connection we have with the person seems to be important, both in our research and in that of others (Coan et al., 2006). One study for example found that neural system activity varied as a function of who was present (stranger vs. husband), and the relationship quality (Coan et al., 2006). Concretely, individuals more satisfied with their relationship showed less activation in threat-related areas of the brain than those less satisfied when confronted with the threat of an electric shock. Hence, including the perception of the relationship quality or the amount of closeness felt to the interaction partner can contribute to disentangling the beneficial effects of social relationships.

Importantly, research on SBT is still in its infancy and has specifically focused on the beneficial effects of social relationships (or the detrimental effects of not having social contact; Beckes & Coan, 2011). However, even though social relationships are hypothesized to be the default some relationships may also have harms or elicit high momentary negative emotions. In chapter 3, being in the company of peers (putatively close relationships) was associated with more jealousy and being alone was associated with least jealousy. Jealousy is an inherently social emotion (DeSteno et al., 2006) that is elicited because of a felt

threat to a relationship (Salovey & Rodin, 1988). This threat is probably more potent in the presence of others. Importantly, despite its reputation as a negative emotion (Salovey & Rodin, 1988) and its associations with detrimental outcomes (Culotta & Goldstein, 2008; Lavalley & Parker, 2009; Parker et al., 2010; Parker et al., 2005), jealousy is a normative emotion that is not negative per se but can also help to maintain relationships (Buss, 1995). Hence, feeling jealousy in the presence of peers may indicate that one values the relationship and is afraid of losing it. Jealousy then signals a need to invest in the relationships which, if successful, may lead to more relationship satisfaction and higher well-being. But nevertheless, jealousy is a negative emotion that is predominantly felt in the presence of others. Thus, our finding goes against the well-established assumption that social relationships are beneficial (Csikszentmihalyi & Hunter, 2003; Goswami, 2012; Schneiders et al., 2007). In chapter 5, in which we combined measures of all negative emotions, we indeed showed the well-established assumption of social relationships being beneficial. Showing that social relationships can also elicit negative emotions was only possible because we moved beyond averaging across different negative emotions and focused on jealousy. Another possibility to provide a more nuanced conceptualization of the emotional landscape of individuals would be to not only examine discrete emotions but also to take the different situations into account (e.g., conflict situations that possibly elicit high anger and irritation scores but less anxiety).

SBT has until now only focused on the beneficial effects of “real” interpersonal contact. Nowadays, another important interaction channel is online communication. Examining the role of online interactions, and whether someone needs to sit right next to us to provide emotional support or whether contact via an electronic device can have the same effects, could become the focus of future research to better understand the impact of this increasingly popular communication channel on our emotional lives. Moreover, different forms of instant messaging (WhatsApp, e-mail, Snapchat, Facebook) may have differential effects on our emotions and well-being. For example, talking to someone on video-call or sending pictures may provoke more felt closeness to others than typing messages on WhatsApp or Facebook and hence be associated with different neurological or behavioral reactions. In line with this, Snapchat, an instant messaging program with which one can send pictures with brief text that are only visible for a limited amount of time, was especially used for communication with close family and friends (Piwek & Joinson, 2016) or flirting whereas Facebook was used for communication with friends and acquaintances (Utz, Muscanell, & Khalid, 2015). This may be because Snapchat or video-chatting give more social information or because they better resembles physical contact which has been positively associated with emotional and physical well-being

(Field, 2010). Whether the use of instant messaging (or any other technological advances) may ultimately be able to substitute or supplement face-to-face contact, especially with regard to the positive effects, and hence how these communication channels can provide beneficial effects could become a focus of future research.

In part, this dissertation provides support for SBT by showing that adolescents had less negative emotions when in the company of close others but also extends it because peers were also a source of negative emotions (i.e., jealousy). Currently, we do not understand why social support is so beneficial (Coan & Sbarra, 2015) and under which circumstances it may not be beneficial – is the mere presence of others protective, do people need to be present physically or would talking on the phone also be beneficial? Does the mindset of a person change when with others and hereby help to interpret situations differently compared to when alone, and which role does closeness felt to the other person play? SBT provides a framework to answer these questions but has, until now, not received enough empirical attention to be conclusive about them. Our results suggests that there is more to social support than the mere presence of others but they do not speak to what that “more” could be.

### **Emotion Regulation**

The current dissertation also contributes to the refinement of theories of ER (e.g., Gross, 1998, 2015b). Classic theories of ER distinguish antecedent-focused and response-focused ER strategies (Gross, 1998, 2015b) or adaptive and maladaptive ER strategies (Aldao et al., 2010). Empirical studies have often neglected the situation-specific impact and intrapersonal preferences of individuals with regard to their use of ER strategies even though scholars have theorized about their importance (Aldao, 2013; Bonanno & Burton, 2013). Chapters 4 and 5 add to the development of this fast-growing field, each by highlighting different facets of the emotion regulation process. Chapter 4 adds to the scarce literature on momentary ER and chapter 5 adds by using a person-centered approach to coping.

Consistent with past research (Abela & Hankin, 2011; Brans et al., 2013; Heiy & Cheavens, 2014; Moberly & Watkins, 2008a), acceptance was the most prevalent ER strategy used and rumination was the least successful in reducing negative affect. Further, we examined reciprocal effects of emotions and ER that have until now often been neglected. Gross (1998, 2015b) developed one of the most influential theoretical frameworks of ER which assumes that an emotion emerges and that this emotion needs to be regulated if it does not fit the demands of the situation. This can be done either in an antecedent-focused way (i.e., before the emotion is full-blown, e.g., by avoiding a situation) or in a response-focused

way (i.e., after the emotion has emerged, e.g., by suppressing the emotion). In this framework, ER is seen as influencing the experience of emotions (Gross & Thompson, 2007). However, it has also been suggested that emotions and ER interact with each other (Cole, 2014) and that high-intensity emotions call for different ER strategies than low-intensity emotions (Brockman et al., 2017; Dixon-Gordon et al., 2015). Our results provide support for an interplay between emotions and ER and add to our understanding how emotions and ER strategies interact and influence each other. This mutual influence is important to take into account when studying ER as neither emotions nor ER exist in isolation (Hollenstein, 2015).

Further, despite strong evidence on a trait level that some ER strategies are related to mental health problems (Aldao et al., 2010; Webb et al., 2012), only two momentary ER strategies, namely rumination and social support, were positively related to depressive symptoms. Based on the literature (Aldao et al., 2010; Webb et al., 2012), we expected the relation with rumination but were surprised by the relation between social support and depressive symptoms. These findings support the call for context-specific investigations of ER (Aldao, 2013; Bonanno & Burton, 2013) in healthy samples as well as samples with mood disorders. Adolescents in our study mainly experienced minor negative events. Maybe only regulation of very intense negative events in daily life is associated with mental health problems. Investigating the regulation of high-intensity emotions (e.g., asking adolescents to fill out a questionnaire after each argument they had) with an event sampling method that combines the advantages of short-time interval measurements with the possibility to assess emotions in which they are most intense could yield important insights (Reis & Gable, 2000). Additionally, this method could add to our understanding of social support in the regulation of high-intensity and low-intensity negative events.

The use of a person-centered approach that clustered coping strategies within adolescents and created homogeneous groups of adolescent copers contributed to the understanding that coping strategies do not occur in isolation but that individuals have a repertoire of coping strategies (Duhachek & Kelting, 2009). This information is important as most research studied the direct effect of one specific coping strategy on adjustment (Clarke, 2006) despite individuals often invoking more than one strategy (Aldao & Nolen-Hoeksema, 2013; Brans et al., 2013; Dixon-Gordon et al., 2014). Assessing how strategies cluster in adolescents and how adolescents in the different clusters react to negative emotions in daily life (and eventually what their psychological adjustment looks like) better resembles how complex humans' coping efforts are than variable-centered approaches (Laursen & Hoff, 2006). Future studies that assess a broader range of ER strategies to derive clusters of individuals who share regulatory characteristics

can provide more insights into the regulatory capacities of individuals and the interplay of different ER strategies, and also their relations with well-being.

## Applied Implications

Even though all our results were obtained in a normative sample of relatively highly-educated adolescents, they offer some possibilities for applied suggestions. Firstly, information about adolescent emotions and emotion regulation in daily life can inform those who are surrounded by adolescents, for example parents and teachers. Knowing more about the normative emotional lives of adolescents (such as experiencing outbursts of jealousy or accepting minor negative events) can improve adolescent-adult relationships by enhancing understanding and empathy because adults may be better able to put adolescents' behavior and feelings into perspective. Further, being aware of the circumstances that elicit certain emotions, such as peers, online interactions, or negative events, may help to structure adolescents' lives to prevent them from experiencing intense emotions at times in which they may not be appropriate because they may interfere with a healthy sleeping pattern (e.g., no more online interactions after 9 pm during weekdays).

Second, some of the knowledge obtained may be used in psychological education, either at schools or in therapeutic contexts. Since many problems during adolescence are emotion related (Allen & Sheeber, 2009) and emotion differentiation is associated with beneficial mental health both in our study and in other studies (e.g., Erbas et al., 2014; Lindquist & Barrett, 2008), we argue that it is important to emphasize the importance of understanding and classifying emotions with precision. More concretely, this could mean that just like we are teaching English and Math, adolescents could be taught how to recognize and differentiate their emotions in role-play sessions. Adolescence may provide a sensitive window for such interventions because adolescents develop abstract reasoning skills, show increasing levels of cognitive complexity, and become more self-aware compared to when they were children (Steinberg, 2005a). Together, these changes may promote increasing cognitive skills for identifying emotions and the acquisition of vocabulary which is necessary for successful emotion differentiation (Lindquist & Barrett, 2008). Indeed, an intervention teaching emotion differentiation among school-aged children has improved social and academic skills (Brackett, Rivers, Reyes, & Salovey, 2012). Whether such an intervention would also improve mental health, and whether it is equally applicable to adolescents as children, is still unclear.



Third, this research has shown that tracking adolescents' emotions across a week/two weekends is possible. Hence, this method may be used not only as a research tool but also as a therapeutic tool in which individuals provide information about their daily emotions, activities, or the company they are keeping, and which may help to improve depressive symptoms (Snippe et al., 2016). Monitoring emotions was a successful mean to decrease depressive symptoms (Kauer et al., 2012; Kramer et al., 2014; Poppelaars et al., 2016) and is seen as promising to supplement clinical treatment by enhancing individuals' awareness and control about their emotions (Wenze & Miller, 2010; Wichers et al., 2011). Mechanisms that might be at play are increased self-awareness and feelings of control. Additionally, information obtained from the monitoring questionnaires could help therapists to identify positive and negative interaction partners with their clients, give feedback on feelings in specific circumstances, or draw a map of the development of feelings during the sampling period. Furthermore, the monitoring can show whether a client successfully uses newly learned strategies or under which circumstances she/he falls back in their old patterns. This information can be used to focus on problematic experiences during therapy sessions and could hereby help to tailor psychological treatments (Kelly et al., 2012).

## Strengths

This dissertation's main strength was its use of ESM. In contrast to conventional approaches that retrospectively ask individuals to reflect on their emotions and which can have problems with recall and other biases (Kahneman et al., 2004; Schwarz, 2012), ESM offers high ecological validity because it measures all constructs close to the moments to which they occur. In this study, we used a time-intensive measurement with a high number of assessments (4-9 per day) within a relatively short time frame (90 minute apart) across one week or two weekends. The large amount of measurements allowed us to obtain a detailed picture of adolescents' emotions and their regulation throughout an entire day. Next to that, we also assessed and examined positive and negative emotions and can hereby add to the relatively scarce literature on positive feelings and well-being in adolescents. Further, we measured a broad range of ER strategies which allowed us to examine the prevalence and frequency of each of these strategies. Additionally, we used two samples in this dissertation that filled out the ESM during different time periods. The *weekend sample* that most of the results were based on filled out the questionnaire during two weekends, a period in which adolescents have limited constraints and can relatively freely

choose their activities and company. The *swinging moods sample* filled out the questionnaires during a full week, including time spent at school, and the weekend. Adolescents spend quite a lot of their time at school and they are likely to experience many events there, either with regard to peer groups or to academic achievement (e.g., receive grades that are a pleasant surprise or produce deep disappointment). We did not compare experiences between weekend and weekdays, however, others have shown that emotional experiences differ during these periods (e.g., Egloff, Tausch, Kohlmann, & Krohne, 1995). Future studies may delve deeper into differences between these two contexts and also examine what that means for the results we obtained.

## Limitations and Directions for Future Research

When we designed the *weekend* study, ESM was still considered very burdensome, complex, and was used infrequently, while being viewed as the gold-standard design to do ecologically-valid, process-oriented research. However, this method also has its pitfalls which I will address in this section. On a general level, one limitation of all ESM research is that every researcher uses their own wording, descriptors, and scales because no reliable and normed questionnaires exist for this methodology specifically (aan het Rot, Hogenelst, & Schoevers, 2012; Ebner-Priemer & Trull, 2009). This lack of standardized questionnaires makes comparison of results across studies difficult. Hence, designing and validating of ESM questionnaires will be an important task for researchers to improve comparability and to facilitate replication of studies.

The large number of assessments per participant can be seen as a clear strength of this dissertation. However, the density and frequency of these assessments may also be a limitation. Participants might have perceived the high number of assessments as a burden because they constantly had to respond to the request to complete these phone-based questionnaires. The continuous reflection on feelings and disruption of their daily routines or fun activities may have triggered annoyance and potentially led to less reliable, or biased (by research participation), data. We tried to avoid this problem by asking adolescents how they felt *just prior* to the beep. However, it is still possible that reports of their feelings were colored by their annoyance about needing to fill out the questionnaire (again). The relatively high intensity and prevalence of reported irritation and anger could be a reflection of that but may also reflect the relatively authentic intense negative emotions adolescents experience (Larson & Richards, 1991). Future studies should consider either having fewer assessments per day or design questionnaires that are filled out in even shorter period time frames

(e.g., 1-2 minutes) to reduce the burden for the participants. These decisions should be taken depending on the core questions one aims to answer because one design may be better suited to answer some questions than others (e.g., some researchers may be interested in the description of specific events which requires more time to fill out than merely filling out an intensity rating of emotions). Despite the possible burden, it is important to note that the response rate of our sample was high and that once adolescents started, they completed the data collection on both weekends.

Furthermore, all our results were based on self-report of adolescents and are thus a reflection of what adolescents think they are feeling. For emotions and emotion regulation, objective ratings are difficult to obtain because recognizing emotions in others is even more difficult than recognizing one's own emotions. Also, having someone else report on the emotions of a third person or use of physiological measures does not get to the core of the experience of emotions for an individual. Hence, self-reports are probably the best way to obtain information about emotional experiences (Diener, 2000; Gray & Watson, 2007), especially self-reports of current emotions as used in this dissertation (Robinson & Clore, 2002a). Nevertheless, studies would benefit from a multiple-informants approach in which parents, peers, and teachers also provide information about adolescents' emotionality and regulatory capacity.

Additionally, it may be possible to complement self-report measurements with less intrusive measurements (e.g., automatically activated recorder; Mehl et al., 2001; Mehl & Robbins, 2012) and to make more use of the opportunities that technology offers in terms of passive data collection. The Global Positioning System (GPS) that is available in each smartphone could be used to infer location, data from an accelerometer may be used as an indicator for participants' physical activity, and information about how often, and to whom, text messages are sent can be used as an indicator of sociability (Sandstrom, Lathia, Mascolo, & Rentfrow, 2016). Further, physiological measures (e.g., heart rate) could provide a better understanding of situations eliciting distress and how quickly they are regulated. Another possibility may be that adolescents only receive the request to fill out a questionnaire when their heartrate reaches a certain cut-off, or that audio-recording starts when adolescents are surrounded by others (as indicated with a social beacon network that detects other smartphones using bluetooth; Bevelander, Buijs, Smit, van Woudenberg, & Buijzen, 2016). These additional passive data-collection methods would provide researchers with even richer data without putting more burden on participants.

Another limitation was that the variables' order in our ESM questionnaire was not counterbalanced. This may have been especially relevant to the assessment of ER strategies because adolescents had to indicate whether they

had used a specific strategy. The strategy presented first (acceptance) was also the most frequently reported strategy. This was consistent with studies among adults (Brans et al., 2013; Heij & Cheavens, 2014) and also with the assumption that acceptance is most easily implemented in response to minor negative events. However, we cannot rule out the possibility that the order in which the strategies were presented, influenced their selection. Additionally, we measured ER dichotomously: adolescents indicated whether or not they used a specific strategy but not the extent to which they used it. In order to fully capture momentary ER strategies, combinations of strategies, and success of these strategies, it would be necessary to also assess the extent to which each of the strategies was used (e.g., not at all, a bit, a lot, only this strategy) to gain more insight into the specifics of the use of each strategy and combinations. Moreover, we could not investigate possible spill-over effects of one event across different time points because we did not assess whether an event was still relevant at the following time point. An event that happened in the morning may influence how adolescents feel during the day or how they perceive their environment, and this spill-over effect could have a cumulative impact on the subsequent development of mental health problems (Wichers, 2014). Hence, future research may further focus on the spill-over effects of specific contexts and emotions and how these influence the perception of future emotions, the success of ER strategies, and how individual differences in reactions are related to mental health problems.

Another limitation of this research was the sample size and the related limited generalizability of the results obtained. Even though we had enough power to answer our main research questions due to the multiple measurements per person, there was limited power to investigate potential important inter-individual factors, for example, sex. A common lay assumption is that women are more emotional than men. However, empirical evidence is rare and differences between men and women are actually very small (for a review see Fischer, 1993); similar lack of sex differences were also revealed in a meta-analysis on children studies (Chaplin & Aldao, 2013). Especially in the context of momentary assessments which are influenced to a lesser extent by global assumptions of how one should feel (Kahneman et al., 2004; Schwarz, 2012), girls and boys are possibly similar in their emotions. Nevertheless, in light of the rise in depression among adolescent girls (Kessler, Avenevoli, & Merikangas, 2001), identifying differences in momentary emotions and ER would be interesting. To study possible differences, future studies should design ESM studies with a large enough sample to assess sex differences. Furthermore, a study that includes more adolescents actually experiencing mood disorders could contribute to disentangling relations between emotions and ER in daily life with mood

disorders in adolescence. More knowledge about these relations may eventually lead to better intervention and prevention programs that improve adolescents' mental health.

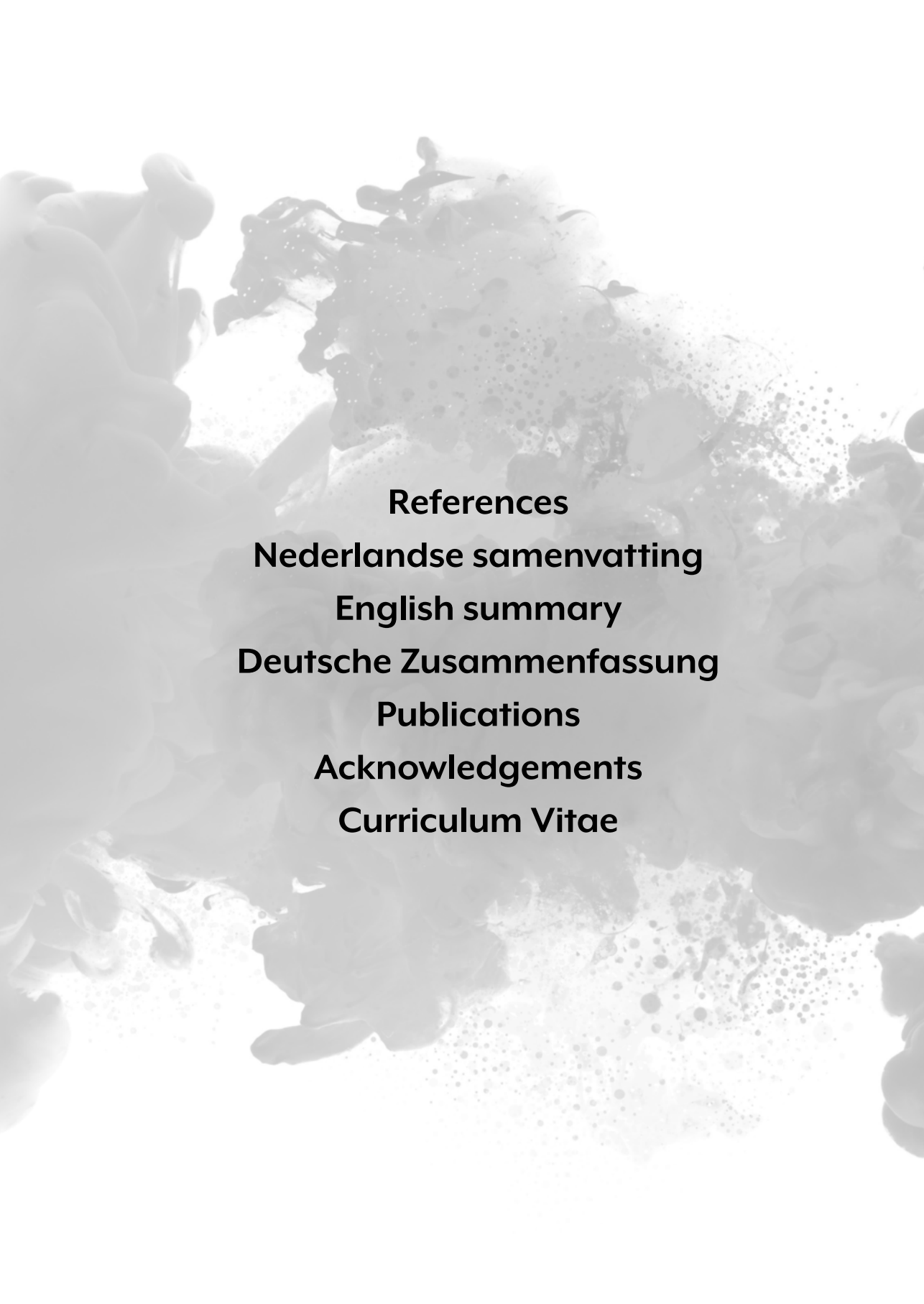
The current dissertation exclusively focused on emotions and emotion regulation in a typically developing adolescent sample. Whether replication of these findings is possible in clinical samples and how the findings differ remains to be investigated. As emotional problems are seen as a hallmark for the development of psychological disorders such as depression and other mood disorders (Allen & Sheeber, 2009), comparing emotions and ER of typically developing adolescents with adolescents who have psychological problems is crucial. Research on momentary emotions and ER is especially scarce in clinical samples of adolescents. Possible barriers are that approaching clinical samples would require working together with therapeutic institutions and that obtaining ethical permission for doing research with this population rather than a community sample may be more difficult. Another problem is that the continuous reflection and introspection may make adolescents even more aware of their negative emotions which may trigger certain unwanted behaviors (e.g., self-harm, suicide). By using a more technology-based approach (as outlined above), including this vulnerable population may be possible without putting (too much) of a burden on them. Including clinical samples of adolescents is important because, just as among adults, differences may emerge in affective dynamics (i.e., intensity, frequency, variability, and stability of emotions; Wichers, Wigman, & Myin-Germeys, 2015), but also in the regulatory processes. These affective dynamics have been related to the development of future depressive episodes in adults (Wichers et al., 2010). Examining those differences in adolescents is especially crucial as depressive symptoms in adolescence are an important predictor of future depressive episodes (Fergusson, Horwood, Ridder, & Beautrais, 2005; Pine et al., 1999). If individual problematic dynamics are identified, prevention or intervention programs that are tailored to the individual's needs can be developed.

## **Conclusion**

With this dissertation, we aimed to provide an answer to the question "What do YOUth feel?" In daily life, adolescents experience a variety of positive and negative emotions (i.e., jealousy) that differ in intensity and frequency. Their emotions are influenced by contextual factors such as interpersonal relationships and momentary ER but also by between-person differences such as emotion differentiation and coping typologies. Results from this dissertation suggest

that to successfully navigate the normatively fluctuating emotional intensities of adolescence, it is important to be aware of one's emotions, to have close relationships with others, to accept minor negative events, and to avoid ruminating.



The background of the page features a soft-focus image of white flowers, possibly tulips, with dark ink splatters and dots scattered across them, creating a textured, artistic effect.

**References**  
**Nederlandse samenvatting**  
**English summary**  
**Deutsche Zusammenfassung**  
**Publications**  
**Acknowledgements**  
**Curriculum Vitae**





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## Nederlandse samenvatting

Emoties zijn een essentieel onderdeel van ons dagelijks leven. De meeste mensen ervaren een scala aan verschillende emoties op één dag en emoties kunnen binnen enkele uren of zelfs minuten veranderen. Ook verschillen de emoties in intensiteit en frequentie waarmee ze gedurende de dag ervaren worden. Dit kan afhankelijk zijn van situationele factoren (bv. gezelschap) maar ook van persoonlijke factoren (bv. leeftijd).

Emoties hebben belangrijke functies: ze signaleren wat er gaande is, of we tevreden zijn met de situatie en ze kunnen ook ons gedrag beïnvloeden. Ondanks deze belangrijke signaleringsfunctie lopen onze emoties niet altijd gelijk met onze doelen en daarom is regulering van emoties soms noodzakelijk. Het begrijpen van en adequaat reageren op onze emoties is een fundamenteel onderdeel van onze mentale gezondheid aangezien problemen met emotieregulatie ten grondslag liggen aan veel psychische stoornissen. De adolescentie is een ontwikkelingsperiode die gekarakteriseerd wordt door een verhoogde emotionaliteit en een toename in stemmingsstoornissen. Tegelijkertijd ervaren adolescenten grote cognitieve, fysieke en psychosociale veranderingen, waardoor de adolescentie een bijzonder interessante en relevante periode is om emoties en emotieregulatie te bestuderen.

In tegenstelling tot eerdere studies waarin emoties en emotieregulatie vooral in kunstmatige situaties bijvoorbeeld in het laboratorium of met vragenlijsten onderzocht werd, werden in dit proefschrift emotionele processen en sociale contexten in het “echte” leven van adolescenten onderzocht. In dit proefschrift zijn de volgende vier onderzoeksvragen onderzocht:

1. Hoe goed kunnen adolescenten hun emoties onderscheiden en in hoeverre hangen emotiedifferentiatie (het vermogen om verschillende emoties nauwkeurig te onderscheiden en te benoemen) en emotioneel welbevinden samen?
2. Hoe vaak en in welke sociale contexten zijn adolescenten jaloers?
3. Welke emotieregulatiestrategieën gebruiken adolescenten in hun dagelijks leven, welke invloed heeft de negativiteit van een gebeurtenis op de selectie van deze strategieën, en hoe succesvol zijn deze strategieën bij het reguleren van negatieve emoties? Hoe hangt het gebruik van de emotieregulatiestrategieën samen met depressieve symptomen?
4. Wat is het verband tussen sociale relaties en negatieve emoties en welke rol spelen iemands gebruikelijke coping stijlen hierin?

Om deze vragen te beantwoorden hebben wij de Experience Sampling Methode (ESM) gebruikt waarin adolescenten meerdere keren per dag een vragenlijst invullen. Dit deden zij óf tijdens twee weekenden óf gedurende een hele week. In vergelijking met traditionele methoden waarbij wordt teruggekeken op

emoties over een relatief lange periode (bv. 3-4 weken of zelfs langer), heeft ESM een aantal voordelen: De herinneringsbias wordt verkleind omdat de beoordeling van de emotie relatief kort na de beleving van de emotie plaatsvindt. Verder is de geldigheid van de resultaten voor het leven van adolescenten (ecologische validiteit) hoog omdat adolescenten de vragenlijsten in hun normale omgeving invullen.

## **Hoofdstuk 2**

In hoofdstuk 2 hebben we onderzocht hoe emotiedifferentiatie samenhangt met emotioneel welbevinden. Uit de resultaten bleek dat adolescenten hun emoties net zo goed konden onderscheiden als volwassenen en dat emotiedifferentiatie ook bij hen positief samenhangt met welbevinden. Adolescenten die hoog scoorden op emotiedifferentiatie ervoeren minder negatieve emoties en geloofden meer dat emoties vormbaar zijn. Deze resultaten duiden erop dat een gedetailleerd inzicht in de eigen negatieve emoties een belangrijk onderdeel is van emotioneel welbevinden.

## **Hoofdstuk 3**

In hoofdstuk 3 hebben we de prevalentie en omstandigheden van een alomtegenwoordige maar onderbelichte emotie onderzocht: jaloezie. Jaloezie is een negatieve emotie die optreedt wanneer een bedreiging van een gewaardeerde relatie wordt ervaren. Tijdens onze studie ervoeren 90% van de adolescenten jaloezie. Adolescenten ervoeren de meeste jaloezie in gezelschap van leeftijdsgenoten, vergeleken met familie of alleen zijn. In online contacten ervoeren zij bovendien meer jaloezie dan in persoonlijke contacten met leeftijdsgenoten. Twee persoonlijke factoren beïnvloedden deze relaties, namelijk vatbaarheid voor jaloezie en leeftijd. Adolescenten die over het algemeen meer vatbaar waren voor jaloezie, ervoeren ook meer jaloezie wanneer zij met familie waren dan adolescenten die minder vatbaar waren voor jaloezie. Dit verband was niet te zien wanneer zij met leeftijdsgenoten waren. In deze gezelschap waren alle adolescenten even jaloers ongeacht hun vatbaarheid voor jaloezie. Dit suggereert dat de aanwezigheid van leeftijdsgenoten het ervaren van jaloezie sterk oproept. Bovendien modereerde leeftijd de relatie tussen jaloezie en online contact. Jonge adolescenten waren jaloerser dan oudere adolescenten bij online contacten. Een mogelijke verklaring is dat jongere adolescenten (nog) niet zo goed in staat zijn de online gepresenteerde informatie objectief te evalueren en dat zij zich er niet van bewust zijn dat de meeste mensen online een rooskleuriger plaatje van zichzelf schetsen. Onze resultaten laten zien dat jaloezie een veel voorkomende emotie is bij adolescenten die verschilt in frequentie en intensiteit tussen personen en situaties en dat sommige situaties meer jaloezie oproepen dan andere.

## Hoofdstuk 4

In hoofdstuk 4 hebben we de frequentie, de selectie en het succes van emotieregulatie strategieën onderzocht en hoe het gebruik van deze strategieën gerelateerd is aan depressieve symptomen. Uit de resultaten bleek dat adolescenten hun emoties het meest reguleerden met behulp van acceptatie, gevolgd door probleem oplossen, ruminatie (piekeren), afleiding, vermijding, reappraisal (herevaluatie), sociale steun en suppressie. Verder beïnvloedde de negativiteit van een gebeurtenis de waarschijnlijkheid waarmee adolescenten een strategie kozen. Bij minder intense negatieve gebeurtenissen gebruikten adolescenten vooral acceptatie. Bij intensere negatieve gebeurtenissen gebruikten zij vooral probleem oplossen, ruminatie, afleiding, vermijding, sociale steun en suppressie. Er bestond geen verband tussen reappraisal en negativiteit van de gebeurtenis. Bovendien waren probleem oplossen, reappraisal en acceptatie succesvollere strategieën bij het reguleren van negatieve emoties dan ruminatie. Het gebruik van ruminatie en het opzoeken van sociale steun hing positief samen met depressieve symptomen. Onze resultaten tonen aan dat er een wederzijdse relatie bestaat tussen negatieve emotionele intensiteit van een gebeurtenis en het gebruik van emotieregulatie strategieën, en dat sommige emotieregulatiestrategieën in het dagelijks leven samenhangen met depressieve symptomen. Deze resultaten kunnen, als zij gerepliceerd worden, belangrijke implicaties hebben voor het ontwikkelen van interventies die gericht zijn op het voorkomen en behandelen van stemmingsstoornissen bij adolescenten.

## Hoofdstuk 5

In hoofdstuk 5 hebben wij onderzocht hoe het ervaren van negatieve emoties samenhangt met verschillende sociale relaties (hechte relaties, kennissen, alleen) en hoe specifieke combinaties van copingstijlen (copingtypes) deze relatie beïnvloeden. Adolescenten ervoeren minder negatieve emoties wanneer zij met hechte relaties (familie of vrienden) waren, in vergelijking met wanneer zij met kennissen (klas- of teamgenoten) of alleen waren. Bovendien identificeerden we twee copingtypes: adolescenten die vooral actieve copingstrategieën gebruikten (actieve copers) en adolescenten die vooral passieve copingstrategieën gebruikten (passieve copers). Actieve copers ervoeren minder negatieve emoties dan passieve copers. Echter, copingtypes beïnvloedden de relatie tussen sociale relaties en negatieve emoties niet. Deze resultaten suggereren dat hechte sociale relaties bescherming kunnen bieden tegen het ervaren van negatieve emoties, ongeacht de manier waarop individuen over het algemeen met negatieve gebeurtenissen omgaan.

## **Conclusie**

De resultaten uit dit proefschrift geven nieuwe inzichten in de ervaring van emoties en emotieregulatie van adolescenten. Door het gebruik van ESM waren wij in staat om bij te dragen aan een beter inzicht in het emotionele leven van adolescenten. Onze bevindingen kunnen als uitgangspunt gebruikt worden voor meer onderzoek naar emoties en emotieregulatie bij adolescenten met stemmingsstoornissen, voornamelijk in het dagelijks leven. Over het algemeen benadrukte dit proefschrift het belang van onderzoek naar emoties en emotieregulatie in het dagelijkse leven van adolescenten en leverde unieke informatie over hoe adolescenten zich voelen tijdens de adolescentie.





## English summary

Emotions are an essential part of everyday life and most people experience a range of different emotions throughout each day. These emotions fluctuate throughout the day and can change within hours or even minutes. Furthermore, emotions differ in intensity and frequency with which they are experienced, depending on situational factors (e.g., company) but also personal factors (e.g., age).

Importantly, emotions signal what is going on and how we are doing, and they can influence our behavior. Despite this important signaling function, they are not always in line with our goals, and sometimes regulation is necessary. Understanding and adequately reacting to our emotions is fundamental to our mental health as deficits in emotion regulation underlie many psychological disorders. Especially during adolescence, a developmental period characterized by heightened emotionality and a rise in mood disorders, emotions are important. At the same time adolescents undergo major cognitive, physical, and psychosocial developments which makes adolescence an especially interesting and relevant period to study emotions and emotion regulation.

In contrast to past studies that have often focused on examining emotions and emotion regulation in the laboratory or with questionnaires, the main focus of this dissertation was on emotional processes and social contexts that influence the experience and regulation of emotions in “real” life. Specifically, the present dissertation investigated the following research questions:

1. How well can adolescents differentiate their emotions and how does emotion differentiation relate to emotional well-being?
2. How often and in which social contexts do adolescents experience jealousy in daily life?
3. Which emotion regulation strategies do adolescents invoke in their daily lives, how does the negativity of an event influence the selection of these strategies, and how successful are the strategies in down-regulating negative emotions? How do momentary emotion regulation strategies relate to depressive symptoms?
4. What is the relation between social relationships and negative emotions and which role do habitual coping styles play?

To answer these questions, we used Experience Sampling Method (ESM) in which adolescents filled out a questionnaire several times a day for either two weekends or one week. Compared to traditional methods which use retrospective reports over relatively long periods (e.g., 3-4 weeks or even longer), ESM has several advantages: It reduces recall biases because ratings of emotional experiences are given close to the moments they occur. Further, relevance for



the life of adolescents is high (ecological validity) because adolescents fill out the questionnaires in their everyday lives.

## **Chapter 2**

In chapter 2 we examined how emotion differentiation (i.e., the ability to distinguish and label different emotions with precision) was related to emotional well-being. Results showed that adolescents were equally able to differentiate emotions as adults and that also in adolescence differentiating negative emotions was positively related to well-being, especially decreased negative emotions and to the belief that emotions are malleable. These results suggest that a detailed awareness of one's negative emotions is an important facet of emotional well-being.

## **Chapter 3**

In chapter 3 we examined the prevalence and circumstances of an ubiquitous and yet understudied emotion, namely jealousy. Jealousy is a negative emotion that emerges when a threat to a valued relationship is experienced. During our sampling period, 90% of the adolescents experienced jealousy. Adolescents experienced most jealousy when in the company of peers compared to family or alone. Further, in online contexts, they experienced more jealousy than in face-to-face peer contexts. Interestingly, two between-person factors influenced these relations, namely proneness to jealousy and age. Adolescents who were more prone to experience jealousy also experienced more jealousy in family contexts. In peer contexts all adolescents, regardless of their proneness to jealousy, experienced an equal amount of jealousy. This result suggests that peers are a strong elicitor of jealousy. Further, age moderated the relation between jealousy and online contexts with younger adolescents experiencing more jealousy than older adolescents, possibly because they are not (yet) able to evaluate the information given online objectively and with the knowledge that most others present an overly positive impression of themselves. Our results suggest that jealousy is a prevalent emotion in adolescents that differs in frequency and intensity between persons and situations, with some situations being stronger elicitors of jealousy than others.

## **Chapter 4**

In chapter 4 we examined the frequency, selection, and success of momentary emotion regulation strategies, and how their use related to depressive symptoms. Results revealed that adolescents most often used acceptance to regulate their negative emotions, followed by problem-solving, rumination, distraction, avoidance, reappraisal, social support, and suppression. Furthermore, negativity

of the experienced event influenced the likelihood with which emotion regulation strategies were invoked: in response to less negative events, adolescents were more likely to use acceptance; in response to higher negative events, adolescents were more likely to invoke problem-solving, rumination, distraction, avoidance, social support, and suppression. Moreover, problem-solving, reappraisal, and acceptance were more successful in down-regulating negative emotions than rumination. Furthermore, the use of rumination and social support was positively related to depressive symptoms. These results suggest that there is a reciprocal relationship between negative emotional intensity and the use of momentary emotion regulation and that some emotion regulation strategies in daily life relate to depressive symptoms. If replicated, these results may have important implications for interventions and treatment targeting mood disorders among adolescents.

## **Chapter 5**

In chapter 5 we examined the relation between experiencing negative emotions and different social relationships (close, acquaintances, and alone), and how habitual coping strategies influenced this relation. We found that adolescents had least negative emotions when with close others (friends and family) compared to when with acquaintances (class- or teammates). Further, we identified two coping typologies based on habitually used coping strategies: adolescents who predominantly used active coping strategies (e.g., problem-solving and social support-seeking; active copers) and adolescents who predominantly used passive coping strategies (withdrawal and avoidance; passive copers). Active copers experienced less negative emotions than passive copers. However, coping typologies did not influence the relation between social relationships and negative emotions. These findings suggest that close social relationships are an important buffer for the experience of negative emotions, regardless of the general tendency to cope with negative events.

## **Conclusion**

Results from this dissertation provided new insights into the momentary experience of adolescents' emotions and emotion regulation. Using ESM we were able to contribute to a better understanding of the emotional lives of adolescents, and our findings can serve as a starting point for more research on how emotions and emotion regulation manifest in adolescents with mood disorders, especially in daily life. Overall, the present dissertation highlighted the importance of examining emotions and emotion regulation in adolescents' daily lives and provided unique information how adolescents feel during adolescence.



## Deutsche Zusammenfassung

Gefühle sind wichtiger Bestandteil unseres alltäglichen Lebens. Im Laufe eines Tages erleben Menschen viele verschiedene Gefühle, die sich während weniger Stunden, Minuten oder sogar Sekunden verändern können. Außerdem gibt es verschiedene Gefühle, die unterschiedlich oft auftreten und sich in der Intensität, mit der sie erlebt werden unterscheiden. Die Art und Intensität der Gefühle kann von verschiedenen Situationen (z.B. der Gesellschaft in der sich jemand befindet) oder persönlichen Faktoren (z.B. dem Alter) abhängen.

Gefühle haben verschiedene wichtige Funktionen: Sie informieren das Individuum darüber, wie es ihm geht, wie es sich in einer bestimmten Situation fühlt und sie können darüber hinaus das Verhalten beeinflussen. Trotz dieser wichtigen Signalfunktion, passen unsere Gefühle nicht immer adäquat zur Situation und müssen deshalb reguliert werden. Gefühle zu verstehen und angemessen auf sie zu reagieren ist ein essentieller Bestandteil unserer geistigen Gesundheit. Defizite in der Emotionsregulation weisen einen Zusammenhang mit vielen psychischen Krankheitsbildern auf. Vor allem während der Adoleszenz, einer Entwicklungsperiode die durch erhöhte Emotionalität und einem Anstieg von affektiven Störungen charakterisiert wird, spielen Gefühle eine wichtige Rolle. Jugendliche durchlaufen weitreichende kognitive, physische und psychologische Veränderungen, die großen Einfluss auf ihr Verhalten und das Empfinden von Gefühlen haben. Deshalb ist die Adoleszenz ein besonders interessanter und relevanter Zeitabschnitt um Gefühle und Emotionsregulation zu erforschen.

Während frühere Studien Gefühle und Emotionsregulation vor allem auf klassische Art und Weise und in künstlichen Situation, z.B. im Labor oder mithilfe von Fragebögen erforscht haben, wurde in der vorliegenden Dissertation das Empfinden von Gefühlen im „echten“ Leben erfasst. Dabei wurden emotionale Prozesse und soziale Kontexte, die das Empfinden und die Regulation von Gefühlen beeinflussen können, erforscht. Folgende Forschungsfragen wurden untersucht:

1. Wie gut können Jugendliche ihre Gefühle unterscheiden und inwiefern hängt die Emotionsdifferenzierung (die Fähigkeit verschiedene Gefühle zu erkennen und zu benennen) mit emotionalem Wohlbefinden zusammen?
2. Wie häufig und in welchen sozialen Kontexten empfinden Jugendliche Eifersucht?
3. Welche Emotionsregulationsstrategien verwenden Jugendliche im Alltag, wie beeinflusst die Negativität eines Erlebnisses die Wahl der Strategien und wie erfolgreich sind diese Strategien bei der Regulation von negativen Gefühlen? Wie hängen Emotionsregulationsstrategien und depressive Symptome zusammen?

4. Welcher Zusammenhang besteht zwischen sozialen Beziehungen und negativen Gefühlen und wie beeinflussen die gewohnheitsmäßig genutzten Copingstrategien (Herangehensweisen an negative Erlebnisse) diesen Zusammenhang? Um diese Fragen zu beantworten, haben wir die Experience Sampling Methode (ESM) verwendet. Bei der ESM in unseren Studien haben Jugendliche entweder während zwei Wochenenden oder während einer kompletten Woche mehrere Male am Tag kurze Fragebögen zu ihren Gefühlen, ihren negativen Erlebnissen und ihren Emotionsregulationsstrategien auf einem Smartphone ausgefüllt. Im Vergleich zu traditionellen Methoden, die Gefühle über einen längeren Zeitraum (z.B. drei bis vier Wochen oder länger) erheben, hat die ESM mehrere Vorteile, die es ermöglichen neue Einsichten in die Emotionalität von Jugendlichen zu erlangen: Erinnerungsfehler (recall bias) können reduziert werden, da die Jugendlichen ihre Gefühle sehr kurz nachdem sie diese erlebt haben wiedergeben. Außerdem ist der Bezug zum Leben der Jugendlichen hoch (ökologische Validität), da die Jugendlichen die Fragebögen in ihrem normalen Alltag ausfüllen.

## **Kapitel 2**

In Kapitel 2 haben wir untersucht wie Emotionsdifferenzierung mit emotionalem Wohlbefinden zusammenhängt. Die Ergebnisse zeigten zum einen, dass Jugendliche genauso gut wie Erwachsene in der Lage waren ihre Emotion zu unterscheiden. Zum anderen hing Emotionsdifferenzierung auch in der Adoleszenz mit erhöhtem emotionalen Wohlbefinden zusammen. Jugendliche, die ihre Gefühle gut unterscheiden konnten, empfanden weniger negative Gefühle und waren davon überzeugt, dass sie selbst ihre Gefühle beeinflussen und verändern können. Diese Ergebnisse zeigen, dass eine detaillierte Kenntnis der eigenen negativen Gefühle ein wichtiger Bestandteil emotionalen Wohlbefindens ist.

## **Kapitel 3**

In Kapitel 3 haben wir das Vorkommen und die Umstände eines allgegenwärtigen, jedoch wenig erforschten, Gefühls untersucht: Eifersucht. Eifersucht ist eine negative Emotion, die entsteht, wenn jemand eine Gefahr für eine bestehende Beziehung wahrnimmt. 90% der Jugendlichen empfanden während der Studie Eifersucht. Im Vergleich zu der Gesellschaft von Familie bzw. dem Alleine sein, empfanden Jugendliche die intensivste Eifersucht, wenn sie in der Gesellschaft von Gleichaltrigen waren. Außerdem empfanden sie bei virtueller Kommunikation mehr Eifersucht als bei persönlichen Kontakten mit Gleichaltrigen. Interessanterweise haben zwei persönliche Faktoren diese Zusammenhänge beeinflusst, nämlich die Tendenz Eifersucht zu empfinden und das Alter. Jugendliche, die eine hohe Tendenz zum Empfinden von Eifersucht hatten,

empfanden auch mehr Eifersucht, wenn sie mit der Familie zusammen waren. Wenn Jugendliche in der Gesellschaft von Gleichaltrigen waren, hatte die Tendenz Eifersucht zu empfinden keinen Einfluss auf das momentane Empfinden von Eifersucht und alle Jugendlichen empfanden gleichviel Eifersucht. Des Weiteren hatte das Alter der Jugendlichen einen Einfluss auf das Empfinden von Eifersucht, wenn Jugendliche virtuell kommunizierten. Jüngere Jugendliche empfanden mehr Eifersucht, wenn sie virtuell kommunizierten als ältere Jugendliche. Dies ist vermutlich darauf zurück zu führen, dass sie noch nicht dazu in der Lage sind die Informationen, die im Internet preisgegeben werden objektiv zu beurteilen oder sie sich nicht bewusst sind, dass die meisten Menschen dort ein äußerst positives Bild von sich selbst präsentieren. Unsere Ergebnisse deuten darauf hin, dass Eifersucht ein häufig vorkommendes Gefühl ist, dessen Häufigkeit und Intensität sich aufgrund von Personen und Situationen unterscheidet.

#### **Kapitel 4**

In Kapitel 4 haben wir untersucht, mit welcher Häufigkeit Jugendliche acht verschiedene Emotionsregulationsstrategien verwenden, nach welchen Prinzipien Jugendliche die Strategien auswählen und wie erfolgreich die Strategien darin sind negative Gefühle zu regulieren. Außerdem haben wir den Zusammenhang zwischen der Verwendung der Emotionsregulationsstrategien und dem Auftreten depressiver Symptome untersucht.

Jugendliche regulierten ihre Gefühle am häufigsten mit Akzeptanz und verwendeten danach in absteigender Häufigkeit Problemlösen, Grübeln, Ablenkung, Vermeidung, Umbewertung des Erlebnisses, soziale Unterstützung und Unterdrückung als Strategien. Außerdem beeinflusste die Negativität eines Erlebnisses welche Emotionsregulationsstrategien Jugendliche verwendeten. Bei weniger negativen Erlebnissen, verwendeten sie vor allem Akzeptanz. Bei stärker negativen Erlebnissen verwendeten sie vor allem Problemlösen, Grübeln, Ablenkung, Vermeidung, soziale Unterstützung und Unterdrückung. Ein Zusammenhang bestand außerdem zwischen dem Auftreten von depressiven Symptomen und dem Gebrauch der Strategien Grübeln und sozialer Unterstützung. Je höher die depressiven Symptome waren, desto mehr grübelten Jugendliche und desto mehr soziale Unterstützung suchten sie auf.

Unsere Ergebnisse zeigen einen wechselseitigen Zusammenhang zwischen der Negativität der Erlebnisse und ihrer Regulation auf. Außerdem scheint die Verwendung einiger Emotionsregulationsstrategien im täglichen Leben einen Zusammenhang mit depressiven Symptomen zu haben. Wenn es möglich ist diese Ergebnisse zu replizieren, können sie wichtige Bausteine zur Verbesserung der Behandlungen und Interventionen von affektiven Störungen bei Jugendlichen liefern.

## **Kapitel 5**

In Kapitel 5 haben wir untersucht, wie das Empfinden von negativen Gefühlen und verschiedenen sozialen Beziehungen (enge Beziehung, Bekanntschaft, alleine) zusammenhängen und ob die Verwendung bestimmter Copingstrategien diesen Zusammenhang beeinflusst. Jugendliche empfanden die wenigsten negativen Gefühle wenn sie in Gesellschaft von Menschen waren mit denen sie eine enge Beziehung (Familie und Freunde) hatten, verglichen mit den Gefühlen, die sie in der Gesellschaft von Bekannten (Klassenkameraden und Sportkameraden) oder dem Alleinsein empfanden. Außerdem haben wir zwei typische Copingprofile identifiziert: Jugendliche, die vor allem aktive Copingstrategien (z.B. Problemlösen, soziale Unterstützung) verwendeten (aktive Coper) und Jugendliche, die vor allem passive Copingstrategien (z.B. Zurückziehen und Vermeiden) verwendeten (passive Coper). Aktive Coper erlebten im Allgemeinen weniger negative Gefühle als passive Coper. Die Copingprofile haben den Zusammenhang zwischen den sozialen Beziehungen und negativen Gefühlen jedoch nicht beeinflusst. Diese Ergebnisse zeigen, dass enge soziale Beziehungen eine wichtige Rolle in der Regulation von negativen Gefühle spielen und dass dies unabhängig von der Art und Weise ist, wie Jugendliche selbst mit negativen Erlebnissen umgehen.

## **Fazit**

Die Ergebnisse dieser Dissertation zeigen neue Einsichten über das Empfinden von Gefühlen sowie Emotionsregulation von Jugendlichen. Die Nutzung der ESM ermöglichte es uns Einblicke in das emotionale Leben von Jugendlichen zu bekommen und gleichzeitig zu einem besseren Verständnis der Beziehung von empfundenen Gefühlen und affektiven Störungen bei gesunden Jugendlichen beizutragen. Unsere Ergebnisse können als Ausgangspunkt für weitere Forschungen genutzt werden, die untersuchen inwiefern Gefühle und Emotionsregulationsstrategien bei Jugendlichen mit affektiven Störungen (z.B. Depressionen) in Erscheinung treten und wie sie z.B. mit dem Behandlungserfolg zusammenhängen. Insgesamt hat die vorliegende Dissertation die Wichtigkeit hervorgehoben Gefühle und Emotionsregulationstrategien im täglichen Leben von Jugendlichen zu untersuchen und einzigartige Informationen darüber geliefert wie Jugendliche sich während der Adoleszenz fühlen.







## Publications

### Publications included in this thesis

- Lennarz, H. K., Lichtwarck-Aschoff, A., Timmerman, M. E., & Granic, I. (2017). Emotion differentiation and its relation with emotional well-being in adolescents. *Cognition and Emotion, 12*, 1-7, doi:10.1080/02699931.2017.1338177.
- Lennarz, H. K., Lichtwarck-Aschoff, A., Finkenauer, C., & Granic, I. (2017). Jealousy in adolescents' daily lives: How does it relate to interpersonal context and well-being? *Journal of Adolescence, 54*, 18-31. doi:10.1016/j.adolescence.2016.09.008
- Lennarz, H. K., Hollenstein, T., Lichtwarck-Aschoff, A., Kuntsche, E., & Granic, I. (in press). Emotion regulation in action: Use, selection, and success of emotion regulation in adolescents' daily lives. *International Journal of Behavioral Development*
- Lennarz, H. K., van Roekel, E., Kuntsche, E., Lichtwarck-Aschoff, A., Hollenstein, T., Engels, R. C. M. E., & Granic, I. (2016). Associations between interpersonal relationships and negative affect in adolescents: An Experience Sampling Study on the role of trait coping. *Swiss Journal of Psychology, 72*, 71-79. doi:10.1024/1422-4917/a000172

### Other publications

- De France, K., Lennarz, H. K., Kindt, K. C. M., Hollenstein, T. (2016). *Expressive suppression: Antecedent or outcome of depressive symptomology?* Unpublished manuscript.
- Wols, A., Larsen, J. K., Lennarz, H. K., English, T. (2017) *Components of authentic emotion regulation are associated with depressive symptoms and negative affect after controlling for emotion regulation strategies.* Unpublished manuscript.



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## Curriculum Vitae

Hannah Katharina Lennarz was born on March 12<sup>th</sup> 1986 in Coesfeld, Germany. After completing her secondary education at Geschwister-Scholl-Gymnasium in Münster, Germany she spent eight months in Vidaråsen Landsby, Norway where she worked with and cared for handicapped adults. In 2006, she started studying Psychology at Radboud University Nijmegen, the Netherlands where she graduated from the Research Master Behavioural Science in 2011. During the master study she spent three months at the Department of Developmental and Social Psychology, Cambridge University, UK (Dr. Simone Schnall).

In 2011 she started her PhD project on adolescents' emotions and emotion regulation. During her PhD project she coordinated two intense data collection tasks that included collaborations with different high schools in the Netherlands. Furthermore at different times, she collaborated with several researchers throughout the country (Prof. dr. Catrin Finkenauer, Prof. dr. Marieke Timmerman, Dr. Eeske van Roekel) and overseas (Dr. Tom Hollenstein, Canada) which resulted in publications presented in this dissertation. In addition, she spent two weeks in Lausanne at Addiction Info Switzerland with Dr. Emmanuel Kuntsche to apply new data analyzing techniques in 2013. She presented her work at several international conferences (e.g., European Association for Research on Adolescence in 2012 and 2014, Society for Child Research in 2013, International Convention of Psychological Science in 2015), and participated in an international summer school organized by the European Association for Research on Adolescence/ Society for Research on Adolescence in Utrecht, the Netherlands. Additionally, she supervised several master students, gave seminars, and provided lectures for first year Child psychology students. Next to these tasks, during 2013 to 2014 she performed a voluntary weekly internship at Institutsambulanz für Kinder und Jugendliche, LVR-Klinik Bedburg Hau, Germany where she assisted psychologists in individual therapy and group therapy.

Currently, she is on parental leave. In the future, she would like to contribute to the mental health of society – either by investigating precursors and maintenance of psychological disorders or by advising and counseling individuals who work with at-risk children and adolescents.





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