

ARTICLE

Understanding Emotion in Adolescents: A Review of Emotional Frequency, Intensity, Instability, and Clarity

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Abstract

Adolescence is a time of transition from childhood to adulthood during which significant changes occur across multiple domains, including emotional experience. This article reviews the relevant literature on adolescents' experience of four specific dimensions of emotion: emotional frequency, intensity, instability, and clarity. In an effort to examine how emotional experiences change as individuals approach adulthood, we examine these dimensions across ages 10 to 19, and review how the emotional functioning of adolescents compares to that of adults. In addition, we explore whether and how gender and puberty explain age differences in emotional experience. Finally, we discuss how these findings could inform future research on both the typical trajectory of emotional experience and the development of psychopathology in adolescence.

Keywords

adolescence, development, emotion, gender, puberty

Adolescence is a time of transition from childhood to adulthood during which people experience significant changes in almost all areas of their life, including biological functioning, cognitive capabilities, social environments, and family and peer relationships (Heller & Casey, 2016; Larson & Sheeber, 2008). Puberty is associated with significant hormonal changes that give rise to physical maturation and influence a variety of behaviors, including those associated with aggression and sexuality (Buchanan, Eccles, & Becker, 1992). The prefrontal cortex of the brain undergoes change and growth via the myelination and synaptic pruning process (Steinberg, 2005). Beginning in early adolescence, formal operational thought begins to replace concrete operations, allowing for more complex thoughts, information processing, and reasoning (Rosenblum & Lewis, 2003).

The developmental changes that adolescents experience also extend to their social lives. Early adolescence typically coincides with a transition to a new, often larger, school environment with higher expectations and less individual support (Simmons, Burgeson, Carlton-Ford, & Blyth, 1987). Moreover, adolescence is a time of increased independence during which adolescents begin to interact less with their parents and more with peers (Csikszentmihalyi & Larson, 1984; Schneiders et al., 2007). Amid these other changes, adolescents experience an increase in negative life events (Ge, Lorenz, Conger, Elder, & Simons, 1994; Larson & Ham, 1993), have more family conflict (De Goede, Branje, & Meeus, 2009), and often initiate romantic relationships (Carver, Joyner, & Udry, 2003; Furman, 2002).

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Although most adolescents navigate these challenges successfully (Arnett, 1999), adolescence is a time of increased risk for mental health disorders, including mood disorders (Allen & Sheeber, 2008). The possibility that particular emotional states could indicate a psychological disorder in need of treatment, while others could represent normal experiences characteristic of a developing adolescent, makes understanding emotional development during this period especially important.

Emotions are multifaceted phenomena that involve changes in subjective experience, behavior, and physiology (Gross, 2014). (The terms “affect” and “emotion” are often used interchangeably in the literature; for the sake of simplicity, we use the term “emotion” throughout.) A core mental representation of emotion involves a sense of pleasure, in the case of positive emotions, or displeasure, in the case of negative emotions (Barrett, Mesquita, Ochsner, & Gross, 2007). Negative and positive emotions are independent constructs (as opposed to opposite ends of a bipolar scale; Watson & Clark, 1997) and can be further differentiated into more complex representations of emotion, including sadness, anger, calm, and joy. These complex emotions can vary in numerous aspects, including arousal, as well as relational and situational content (e.g., Barrett et al., 2007).

Theorists and researchers have provided taxonomies to identify and classify emotional experiences (e.g., Berenbaum, Raghavan, Le, Vernon, & Gomez, 2003; Gross & Jazaieri, 2014). Four commonly assessed dimensions of emotional experience in adolescents include frequency, intensity, instability, and clarity of emotions. Emotional frequency refers to how many times an individual experiences a particular emotion over a given period of time (Larson, Csikszentmihalyi, & Graef, 1980). In the adolescent literature, frequencies are sometimes calculated for emotions at certain intensities (e.g., frequencies of high-intensity vs. low-intensity negative emotions; Larson et al., 1980). Emotional intensity refers to the strength or magnitude of emotional response (Larsen & Diener, 1987). Emotional instability is the degree to which emotions fluctuate over time (e.g., Larsen & Diener, 1987). Although some research differentiates between the terms instability, lability, and variability (e.g., Thompson et al., 2012; Trull et al., 2008), we included literature using all three terms under the label of instability because they are similar enough for the purposes of this review. Finally, emotional clarity involves the extent to which people can unambiguously identify, label, and characterize their own emotions (e.g., Gohm & Clore, 2000).

High frequency and intensity of positive emotions, low frequency and intensity of negative emotions, instability of positive and negative emotions, and low emotional clarity have been associated with poor psychological outcomes in adolescents, including depression, anxiety, and suicidality (e.g., Rojas, Leen-Feldner, Blumenthal, Lewis, & Feldner, 2015; Salguero, Palomera, & Fernández-Berrocal, 2012; Silk, Steinberg, & Morris, 2003; van Roekel et al., 2016). The exploration of normative patterns of adolescent emotional development in the present review will hopefully pave the way to a better understanding of abnormal emotional experience, thus informing treatment research and clinical work.

To better understand how changes during adolescence may be associated with changes in emotional experience, we review the extant literature on these four dimensions of emotion across adolescence (i.e., 10 to 19 years of age; World Health Organization [WHO], 2017). By covering multiple dimensions of emotional experience, our work expands on the findings from a recent meta-analysis, which focused on emotional awareness in adolescents (i.e., perception and understanding of one's own emotional experiences; Sendzik, Schäfer, Samson, Naumann, & Tuschen-Caffier, 2017).

In this review, we also compare the emotional experiences of adolescents and adults in the four reviewed dimensions of emotional experience. We do not compare the experiences of adolescents to those of younger children, although prior work suggests they are distinct (Somerville, 2016). The purpose of this review is to better understand emotional experiences during the transition to adulthood.

Because there are individual differences in adolescents' emotional development, we also examine the role of two mechanisms central to individual differences in adolescent development: gender and puberty. Given the different socialization of girls and boys (Fischer & Evers, 2011; Kollar, Groer, Thomas, & Cunningham, 1991), some dimensions of emotional experiences will likely differ as a function of gender. Furthermore, individuals of the same gender and age are often at different hormonal and physical stages of development, which could affect emotional experience. Some evidence shows that in girls, puberty is associated with the development of areas of the brain associated with emotional experience (e.g., amygdala; Blanton et al., 2012). In both girls and boys, increased testosterone levels during puberty are associated with increased activation in the amygdala (Spielberg, Olino, Forbes, & Dahl, 2014). We review research examining pubertal status (i.e., stage of development) and pubertal timing (i.e., whether the individual's pubertal status is early, on time, or late compared to peers). Pubertal status can be measured in several ways, including self-report, assessment of hormonal changes (e.g., follicle stimulating hormone [FSH] concentrations), and classification into stages according to anatomical criteria (Tanner, 1962). Pubertal timing is calculated by comparing the individual's age and pubertal status with age norms for pubertal status.

In sum, we review research examining whether four dimensions of emotional experience, frequency, intensity, instability, and clarity, differ across adolescence (ages 10–19) and as compared to adults. We also explore whether and how gender and puberty might explain differences in emotional experience. Within each section, we review cross-sectional and longitudinal findings (we classify ecological momentary assessment [EMA] and daily diary studies as cross-sectional if the relevant data were aggregated across the sampling period). We report both within-person findings (i.e., how dimensions of emotion vary on average over time) and between-person findings (i.e., individual differences).

Studies published before September 2017 were eligible for inclusion in the review. Articles were identified from two electronic databases: PsychINFO and Google Scholar. The search

terms “adolescence” and “teenage” were used as major descriptors, and we combined these with search terms representing the four chosen emotional experience dimensions (e.g., “emotional clarity” or “clarity of emotion”) and between-person variables (e.g., “sex,” “gender,” “puberty”). The reference sections of these identified works were then hand-searched for additional research. Research was considered appropriate if it included one or more of the four dimensions of emotional experience and had participant samples who were any age between 10 and 19 years old. Research in which the majority of the sample was within this age range with only a minority falling outside this range (e.g., studies with age range 9–15) was also included. The search mostly identified peer-reviewed journal articles and reviews.

Emotional Frequency

Normative Development in Adolescence

In a diary study of emotions experienced by adolescents ages 11–16 in a 24-hour period, happiness was among the most commonly experienced, while irritability, anger, and sadness were among the least commonly experienced (Meininger, Liehr, Chan, Smith, & Mueller, 2004). Adolescents experience low-intensity emotions (both positive and negative) more frequently than high-intensity emotions, regardless of age (Larson & Lampman-Petratis, 1989). Regarding positive emotion, cross-sectional EMA findings converge to show that older adolescents experience fewer positive (Larson & Asmussen, 1991) and high-intensity positive emotions (Larson & Lampman-Petratis, 1989) than younger adolescents. Regarding negative emotion, EMA studies have shown that older adolescents experience more frequent negative (Larson & Asmussen, 1991) and high-intensity negative emotions (Frost, Hoyt, Chung, & Adam, 2015; Larson & Lampman-Petratis, 1989) than younger adolescents. A longitudinal study that examined these constructs found a decrease in the frequency of positive emotions and an increase in the frequency of negative emotions in adolescents ages 10–14 over the next 4 years (Larson, Moneta, Richards, & Wilson, 2002).

Compared With Adults

A comparison of the emotional frequency of adolescents with that of adults reveals a consistent pattern. Compared to an adult sample (ages 19–65), adolescents in grades nine through 12 experienced more frequent high-intensity positive and high-intensity negative emotions, and fewer low-intensity emotions (Larson et al., 1980). These findings were replicated in two other studies comparing adolescents and adults on high-intensity positive and negative emotions (Larson & Richards, 1994; Verma & Larson, 1999).

Gender

A cross-sectional study found that older girls reported more frequent low-intensity positive and low-intensity negative emotional

experiences compared to younger girls. Similarly, older boys reported more frequent low-intensity negative emotional experiences compared to younger boys (Larson & Lampman-Petratis, 1989). Frost et al. (2015) reported a significant main effect of gender on frequencies of high-intensity emotion, with girls ages 11–18 reporting more frequent high-intensity positive and negative emotion than did boys. Another EMA study found that girls ages 11–16 were more likely than boys to report feeling sad, but, in contrast to Frost et al. (2015), found no gender differences in feeling happy, excited, or angry (Meininger et al., 2004).

Puberty

To date, three studies have examined puberty in relation to emotional frequency. In two studies, more advanced pubertal stage was associated with less frequent negative emotions in girls (Crockett & Petersen, 1987; Richards & Larson, 1993). Girls in the eighth grade who self-reported more advanced pubertal development on the Pubertal Development Scale (Petersen, Crockett, Richards, & Boxer, 1988) at baseline reported lower frequency of becoming upset than those with lower pubertal maturity (Crockett & Petersen, 1987). Advanced pubertal stage (as self-reported based on the Tanner stages) in girls ages 9 to 15 is associated with feeling tense and frustrated less frequently, as reported via EMA (Richards & Larson, 1993). With regard to boys, more advanced pubertal stage was associated with more frequent tense and frustrated feelings (Richards & Larson, 1993), while pubertal status was not significantly associated with frequency of emotion (Crockett & Petersen, 1987). In another study, male and female adolescents ages 11–16 with higher levels of pubertal maturity (as self-reported based on the Tanner stages) were more likely to report feeling sad or irritable and less likely to report feeling excited (Meininger et al., 2004).

Summary

Cross-sectional studies show that older adolescents experience less frequent positive and more frequent negative emotions than younger adolescents (e.g., Frost et al., 2015); similarly, there is a prospective decrease in positive emotions and a prospective increase in negative emotions from early to late adolescence (Larson et al., 2002). Adolescents have more frequent high-intensity emotions and fewer low-intensity emotions (positive and negative) than do adults (Larson et al., 1980; Larson & Richards, 1994; Verma & Larson, 1999). Findings regarding gender and puberty in relation to frequency of emotions are equivocal.

Emotional Intensity

Normative Emotional Intensity in Adolescence

Two studies to date have assessed emotional intensity using daily diary and EMA methods. Flook (2011) found that adolescents ($M_{\text{age}} = 14.9$ years) experienced higher levels of positive than negative emotion throughout the day. Barber, Jacobson,

Miller, and Petersen (1998) found that seventh-graders' mean within-person level of happiness was higher on weekends than weekdays; further, participants' state emotions became more positive from early morning to early afternoon and then turned more negative until late evening.

Most longitudinal studies suggest that positive emotional intensity tends to either decline across adolescence (Forbes et al., 2010; Frost et al., 2015; Weinstein, Mermelstein, Hankin, Hedeker, & Flay, 2007) or decrease in early adolescence followed by a "leveling out" during the high school years (Csikszentmihalyi & Hunter, 2003; Larson et al., 2002; Moneta, Schneider, & Csikszentmihalyi, 2001). The one study examining trait positive emotional intensity in adolescents ($M_{\text{age}} = 12.9$ years; Lonigan, Phillips, & Hope, 2003) found positive emotional intensity stayed relatively constant over 7 months. The discrepancy between these findings and longitudinal findings may be explained by the length of the follow-up period (perhaps it was not long enough to detect decreases) or by Lonigan et al.'s assessment of trait, as opposed to state, positive emotional intensity. In terms of negative emotional intensity, studies converge showing that negative emotional intensity remains the same across adolescence (Cole, Peeke, Dolezal, Murray, & Canzoniero, 1999; Kollar et al., 1991; Lonigan et al., 2003; Weinstein et al., 2007).

Compared With Adults

Two early cross-sectional studies found that adolescents reported more intense positive and negative emotions than adults did (Diener, Sandvik, & Larsen, 1985; Larson et al., 1980).

Gender

Both cross-sectional (Cole et al., 1999; Panjwani, Chaplin, Sinha, & Mayes, 2016) and EMA (Barber et al., 1998; Flook, 2011; Frost et al., 2015; Silk et al., 2003; Stoeber & Roche, 2014) studies have shown that adolescent girls have higher emotional intensity than do boys. More specifically, girls experience more intense positive emotions, including happiness and overall positive emotion (Barber et al., 1998; Frost et al., 2015; Panjwani et al., 2016). Girls also experience more intense negative emotion in the form of anger, contempt, sadness, and shame (Cole et al., 1999; Flook, 2011; Panjwani et al., 2016; Silk et al., 2003). Although most of the aforementioned studies used self-report, Panjwani et al. (2016) were able to assess state intensity of emotion by having coders rate adolescents' (ages 14–17) facial expressions during a stressful task. In a study with mixed findings, Neumann, van Lier, Frijns, Meeus, and Koot (2011) found that girls at age 13 displayed greater levels of sadness compared to boys at baseline and a year later at age 14, but did not find differences in levels of anger or happiness at either time point. Another study found that girls ages 12–15 reported lower intensity levels of happiness than boys, but found no gender differences in negative emotions (Henker, Whalen, Jamner, & Delfino, 2002). Consistent with gender difference findings, but contrary to the trend of negative emotion remaining stable over

time, Frost et al. (2015) found that among adolescents ages 11–18, being both a girl and an older adolescent predicted higher levels of negative emotion than being a boy and a younger adolescent. In contrast, among boys ages 9–13, older age was associated with higher sad emotion (no relation between age and sad emotion was found among girls; Susman, Inoff-Germain, et al., 1987). Weinstein et al. (2007) reported a difference in longitudinal patterns of intensity of emotion between girls and boys ($M_{\text{age}} = 15.0$). In girls, intensity of positive emotion remained stable, whereas negative emotion decreased. In boys, intensity of positive emotion significantly declined, whereas negative emotion remained stable.

Puberty

To date, three studies (reported in four articles) have examined the association between emotional intensity and puberty, with mixed results. Two studies examining adolescents in approximately the same age range found no significant association between intensity of self-reported negative emotion and either pubertal status or pubertal timing (Brooks-Gunn & Warren, 1989; Richards & Larson, 1993). Importantly, providing converging evidence, these two studies used different methods to assess pubertal status and timing; Brooks-Gunn and Warren (1989) used a physical examination in a girl-only sample (ages 10–14), and Richards and Larson (1993) used self-report questions taken from the Morris and Udry (1980) Scale of Pubertal Status in a sample of girls and boys (ages 9–15). Another study found that the relation between pubertal timing and sadness intensity varied depending on the method used to assess puberty. In girls ages 9–14, earlier maturation (as assessed by comparing the individual's gonadotropin hormone levels to average levels in the same age group) was related to higher levels of sadness than was later maturation (Susman, Inoff-Germain, et al., 1987; Susman, Nottelmann, Inoff-Germain, Dorn, & Chrousos, 1987). For boys of the same age range, when maturation was measured similarly by hormonal levels (in the case of boys, comparing the individual's adrenal androgen levels to average levels in the same age group), earlier maturation was also associated with higher levels of sadness. However, when boys were given a physical examination and their maturation was measured by Tanner's pubertal stages, the findings were in the opposite direction: later maturation (i.e., the combination of older age and lower pubertal stage) was associated with higher levels of sadness. Consequently, it is difficult to make conclusions regarding any relation between puberty and emotional intensity.

Summary

No cross-sectional studies have examined emotional intensity in adolescents. Intensity of positive emotion declines longitudinally from early to late adolescence (e.g., Forbes et al., 2010), whereas intensity of negative emotion remains relatively stable (e.g., Cole et al., 1999). Adolescents have higher emotional intensity than adults (Diener et al., 1985; Larson et al., 1980). Adolescent girls generally experience higher

intensities of positive and negative emotion than do adolescent boys (e.g., Barber et al., 1998). Findings regarding puberty and emotional intensity are equivocal.

Emotional Instability

Normative Emotional Instability in Adolescence

Adolescents have been theorized to oscillate between extreme highs and lows in a way that adults do not (Csikszentmihalyi & Larson, 1984). Nevertheless, in the only cross-sectional study on emotional instability, which assessed trait emotional instability, about 6% of children ages 7–19 and 6% of their parents reported that the children experienced “a lot” of trait emotional instability, whereas between 20 and 25% of children and parents reported only “a little” trait emotional instability (Stringaris & Goodman, 2009). Further, age was not significantly related to level of instability, which was confirmed in an EMA study that found little to no age differences in emotional instability among children ages 9–15 (Larson & Lampman-Petratis, 1989; see Gender section for a further discussion). Overall, these results suggest adolescents at different age levels have similar degrees of emotional instability.

Research has also examined changes in emotional instability longitudinally. When the sample in Larson and Lampman-Petratis (1989) was reassessed 4 years later (Larson et al., 2002), there were significant findings regarding age differences in state emotional instability. The greatest relative emotional instability was in the early adolescent years (ages 10–14); within-person emotional instability decreased in late adolescence (ages 13–18), suggesting that emotional instability declines with age. Similar results were found showing instability of happiness, anger, and sadness declining among adolescents who were followed from age 13 to 18 (Maciejewski, Lier, Branje, Meeus, & Koot, 2015).

Compared With Adults

In a study that used EMA to compare high school students' and adults' emotional experiences, adolescents experienced higher levels of positive and negative emotional instability compared to adults (Larson et al., 1980).

Gender

Cross-sectional studies consistently show that adolescent girls have greater emotional instability than do boys (Cole et al., 1999; Maciejewski et al., 2015; Neumann et al., 2011; Silk et al., 2003; Stringaris & Goodman, 2009; Weinstein & Mermelstein, 2008). More specifically, studies have found that adolescent girls experience greater happiness instability (Maciejewski et al., 2015; Neumann et al., 2011) and sadness instability (Maciejewski et al., 2015; Silk et al., 2003), but not anger instability (Maciejewski et al., 2015; Silk et al., 2003). The only contradictory study found that girls and boys ages 13 to 16 had no significant between-person differences in instability of positive

emotions (van Roekel et al., 2016). The only study of trait instability showed that girls have greater instability of negative emotion than boys ($M_{\text{age}} = 11.3$; Cole et al., 1999).

Longitudinal findings generally converge in suggesting that boys' emotional instability stays constant across adolescence, whereas the evidence on girls' emotional instability is less conclusive. An EMA study examining emotional states in adolescents ages 9–15 found that age was unrelated to emotional instability in boys, and found a marginal effect among girls with instability inversely related to age (Larson & Lampman-Petratis, 1989). In a longitudinal study with adolescents ages 13–17 that included a 15-month follow-up, levels of instability in negative emotions remained consistent over time in boys, whereas they became lower (i.e., less unstable) over time in girls (Weinstein & Mermelstein, 2013). A longitudinal study that recruited adolescents between the ages of 10 and 14 and followed them over 4 years confirmed that boys' emotion instability remained consistent over time, but found girls' emotion instability increased into late adolescence (Larson et al., 2002). Contrary to other findings showing constancy of the rate of emotion instability in boys and either an increase or decrease in girls, Maciejewski et al. (2015) found that in a sample of adolescents recruited at age 13, boys' and girls' instability increased in early adolescence and later decreased, at a similar rate of change for both genders, until age 18.

Puberty

Several studies provide preliminary evidence that the onset of puberty is associated with increases in emotion instability. In 9- to 10-year-old girls, regardless of pubertal status as self-reported on the Pubertal Development Scale (Petersen et al., 1988), FSH concentrations (higher levels of which indicate more advanced puberty) were positively associated with instability of positive and negative emotions over a month (Buchanan, 1989). Further, when mood (positive and negative) was measured across the course of the day, low estradiol concentrations as well as high estrogen and FSH variability predicted greater emotional instability (Buchanan, 1989). Similarly, in an EMA study by Susman, Nottelmann, and Blue (1983), more pubertally advanced boys self-reported greater emotional instability than their less pubertally advanced peers. However, they did not find that pubertal status was associated with self-reported emotional instability among girls (as cited in Richards & Larson, 1993). An additional study found no evidence of an association between pubertal status (self-reported using a measure developed for the purposes of the study) and self-reported emotional instability among early adolescents (sixth- to eighth-graders; Crockett & Petersen, 1987).

Summary

Emotion instability is unrelated to age cross-sectionally (Larson & Lampman-Petratis, 1989; Stringaris & Goodman, 2009), but decreases longitudinally across adolescence (Larson et al., 2002; Maciejewski et al., 2015). Preliminary evidence shows

that adolescents experience higher levels of emotional instability than adults (Larson et al., 1980). Adolescent girls have greater emotional instability than do boys, including instability of happiness and sadness, but not anger (e.g., Cole et al., 1999). Boys' emotional instability remains constant across adolescence, whereas in girls, it is unclear whether it increases or decreases (e.g., Larson et al., 2002). The onset of puberty in boys, and possibly in girls, is associated with increases in emotional instability, perhaps by way of fluctuations of hormones such as FSH (e.g., Buchanan, 1989).

Emotional Clarity

Normative Development in Adolescence

Two studies suggest that emotional clarity changes throughout adolescence. The only cross-sectional study to examine emotional clarity in adolescents revealed that older age was associated with lower emotional clarity in adolescents ages 12 to 17 (Salguero, Fernandez-Berocal, Balluerka, & Aritzeta, 2010). These findings could reflect cohort differences, however, rather than change over time. Indeed, in a longitudinal study, a contradictory pattern was found: adolescents' levels of emotional clarity increased between 12 and 14 years of age (Rubenstein et al., 2015).

Compared With Adults

No existing studies have compared emotional clarity in adolescents with that of adults.

Gender

Research examining whether emotional clarity varies by gender in adolescent samples is mixed. Several cross-sectional studies did not find gender differences in emotional clarity (Hamilton, Hamlat, Stange, Abramson, & Alloy, 2014; Hamilton et al., 2016; Salguero et al., 2010; Stange, Alloy, Flynn, & Abramson, 2013), but three of these articles used one data set (Project Ace). In contrast, other cross-sectional findings showed that boys had greater emotional clarity than did girls (Alloy, Hamilton, Hamlat, & Abramson, 2016; Bender, Reinholdt-Dunne, Esbjørn, & Pons, 2012; Extremera, Durán, & Rey, 2007; Freed, Rubenstein, Daryanani, Olino, & Alloy, 2016; Neumann, van Lier, Gratz, & Koot, 2010). Two of these studies found that boys had greater emotional clarity at multiple time points during the study (Alloy et al., 2016; Freed et al., 2016). Two articles that examined the Project Ace data longitudinally found that, while no between-person gender differences in emotional clarity were seen at baseline, boys had greater emotional clarity than did girls at the longitudinal follow-ups 2 years later (Jessar, Hamilton, Flynn, Abramson, & Alloy, 2015; Rubenstein et al., 2015).

Puberty

To date, there is one study that examined emotional clarity in relation to puberty. In a cross-sectional study by Alloy et al.

(2016), adolescents ages 11 to 14 completed a self-report measure, the Pubertal Development Scale (PDS; Petersen et al., 1988). There was no significant main effect of pubertal status on emotional clarity in girls or boys (Alloy et al., 2016).

Summary

Because cross-sectional and longitudinal findings on emotional clarity across adolescence are both limited and mixed, we cannot draw definitive conclusions regarding trends across adolescence. Further, no existing studies have compared adults' and adolescents' levels of emotional clarity. Research suggests either no gender differences in emotional clarity (e.g., Hamilton et al., 2014) or that boys have higher emotional clarity than girls (e.g., Alloy et al., 2016). This ambiguity could be due to the cross-sectional design of both studies, which limits examining change over time. Indeed, longitudinal data show that while boys and girls have similar levels of emotional clarity when they are 12–13 years old, the gap between them widens with age, with boys eventually attaining significantly greater emotional clarity than girls (Jessar et al., 2015; Rubenstein et al., 2015). Finally, based on the available research, pubertal status is not related to emotional clarity (Alloy et al., 2016).

Discussion

Given the dramatic social and biological changes that occur during adolescence, understanding emotional development across this period is imperative. Results from this review indicate that emotional experience across adolescence is quite dynamic, and that there is not a pattern of emotional experience that is typical for all adolescents. Instead, within- and between-person factors help clarify how and when emotional experiences vary among adolescents.

In comparison to adults, adolescents experience more frequent high-intensity positive and negative emotion, greater emotional intensity, and greater instability. These findings support the "storm and stress" theory of adolescence (Hall, 1904), and are consistent with neurodevelopmental research. In contrast to adults, adolescents primarily respond to emotional cues with increased activity of subcortical circuitry (Heller & Casey, 2016). During the transition to young adulthood, prefrontal input to subcortical circuitry increases, allowing better modulation of emotional responses (Ernst & Fudge, 2009; Heller & Casey, 2016). This heightened emotionality might be adaptive during adolescence, serving as a social cue to others that one is in need of support. Indeed, adolescents' close friends generally respond supportively to emotional displays (Klimes-Dougan et al., 2014). Moreover, frequent or intense emotions in a peer context could communicate information about the desirability of a potential romantic partner or friend.

With regard to gender, findings from the review suggest that girls have higher intensity and instability of emotions and (in later adolescence) a poorer understanding of those emotions than do boys. There is also preliminary evidence that girls have higher frequencies of positive and negative emotions than do

boys. Differences in emotional frequency, intensity, and instability could be explained in part by gender socialization: from an early age, girls are encouraged to experience their emotions fully, whereas boys are encouraged to suppress and control their emotions (Fivush, Brotman, Buckner, & Goodman, 2000). There are also well-documented neuroanatomical differences between boys and girls that could influence emotional experience, such as differences in amygdala size and functionality (Blanton, Chaplin, & Sinha, 2010). Boys and girls show opposing patterns of functional connectivity between parieto-occipital cortices and subregions of the amygdala (Alarcón, Cservenka, Rudolph, Fair, & Nagel, 2015). Most likely, environmental experiences and neurobiology each contribute and interact to produce different emotional experiences in girls and boys. Future studies in transgender youth might provide an opportunity to more closely examine the dual influences of biological sex and gender socialization.

Given how puberty affects neurobiology during adolescence, the lack of emergent patterns elucidating the relation between puberty and emotionality is surprising. For example, multiple studies have found differences in emotionality pre- to postpuberty using physiological assessment measures such as pupillary reactivity to emotion words (Silk et al., 2009) and cerebral blood flow in affective regions (Kaczurkin et al., 2016). Neuroendocrine changes during puberty are associated with increased activation and growth of white matter in brain regions implicated in emotion processing (Ladouceur, Peper, Crone, & Dahl, 2012; Spielberg et al., 2014), suggesting that we would reasonably see corresponding changes in self-reported emotional experience. We think the current dearth of literature examining how emotional experience changes over stages of puberty is the primary reason for the lack of notable findings; we expect more definitive patterns that better dovetail with neurological findings will emerge as more research is conducted.

Our review suggests it is typical for adolescents to have more intense emotions than adults and that emotions become increasingly unstable throughout adolescence. At the same time, increased intensity and instability of negative emotion have been linked to various forms of adolescent psychopathology, including depression (Silk et al., 2003). However, researchers are beginning to document important distinctions in the emotional experience of typically developing adolescents and their depressed peers. For example, depressed adolescents have even greater negative emotionality than nondepressed adolescents, as illustrated by biased processing of negative stimuli compared to healthy controls (Ho et al., 2014) and increased activation in response to both positive and negative stimuli in brain regions implicated in emotion processing compared to healthy controls (Yang et al., 2010).

Given the number of changes adolescents undergo in virtually every domain of their lives, it is not surprising that adolescence is a time of particularly high risk for mental disorders (e.g., Lewinsohn, Klein, & Seeley, 2000; Lovibond & Lovibond, 1995). Perhaps developmental changes in frequency, intensity, instability, and clarity of emotion can make adolescents more susceptible to responding negatively to other risk factors for

mental disorders (e.g., social isolation, impulsivity). Consistent with this notion, adolescent girls with higher (vs. lower) emotional frequency, intensity, and instability and lower emotional clarity are at an increased risk for mood and anxiety disorders (e.g., Nolen-Hoeksema & Girgus, 1994).

In addition to mood and anxiety disorders, emotional experience is important in considering nonsuicidal self-injury (NSSI), which occurs among as many as 13–23% of adolescents (Klonsky & Muehlenkamp, 2007; Nock, 2009) and is a risk factor for suicidality (Guan, Fox, & Prinstein, 2012). Adolescents are more likely to engage in NSSI as emotional intensity and instability increase (Klonsky, 2007; Santangelo et al., 2017), perhaps in an effort to increase positive and decrease negative emotions (Nock & Prinstein, 2004). Given that adolescents—and, in particular, adolescents who self-injure—have more challenging emotional obstacles to contend with than adults (e.g., higher emotional intensity and instability; Santangelo et al., 2017; Selby, Franklin, Carson-Wong, & Rizvi, 2013), it could be that more adaptive emotion regulation strategies do not work well for them, leading to self-injury. For example, cognitive reappraisal is less effective when emotions are very intense (vs. less intense; Sheppes & Gross, 2011). Future research should further explore emotional experience and emotion regulation strategies in self-injuring adolescents.

Examining past research methodologies can help inform future research and allow us to draw stronger conclusions about emotional experience in adolescence. In the studies reviewed, emotional experience was assessed primarily via self-report. One benefit of this method is that it can be used to assess differences in discrete negative emotions (Quigley, Lindquist, & Barrett, 2013). However, given that adolescents are particularly susceptible to peer influence (Brechwald & Prinstein, 2011), self-report (and other-report) tools might be especially reflective of social desirability effects during this developmental phase. In contrast, physiological indices are less susceptible to social desirability effects (Mauss & Robinson, 2009). Ideally, future research should increase the use of multimethod assessment to best capture adolescent experience. Secondly, although there is research examining changes in emotional experience over time, it typically focuses on longer periods of time like hours, months, or years. Given how quickly emotions can change, research examining emotional experience over shorter periods of time, such as seconds and minutes, is also critical.

We want to note a few limitations of the review. Firstly, our inclusion of specific emotion states and dimensions of emotional experience was constrained by the scope of this review. We did not include findings on “anxious” or “depressed” mood in adolescents since our review did not focus on psychopathology. Further, two recent reviews addressed emotional functioning and psychopathology in adolescents (Mathews, Koehn, Abtahi, & Kerns, 2016; Sendzik et al., 2017). Secondly, we did not include composites of multiple dimensions such as “emotional salience”—a composite of duration, frequency, and intensity (e.g., Stapley & Haviland, 1989)—if data for the separate components were not presented. Neither did we include studies that focused on neurological correlates of emotional experience

(except as it pertained to puberty). Finally, we did not include some dimensions of emotion, such as attention to emotion (i.e., how much attention one pays to what one feels; Salovey, Mayer, Goldman, Turvey, & Palfai, 1995), which was not commonly assessed; or emotional reactivity (i.e., emotional change in response to a stressor; Nock, Wedig, Holmberg, & Hooley, 2008), which overlaps with emotional instability (e.g., Thompson et al., 2012).

In addition to addressing limitations of the literature and exploring additional dimensions of emotional experience, future research should expand its scope to other factors that might influence emotional experience in adolescence. Recent research has begun to explore desired emotional states—which emotions individuals want to feel and when—with the notion that these preferences shape the experience and regulation of emotion (e.g., Tamir & Gutentag, 2017; Thompson, Kircanski, & Gotlib, 2016). Given that individuals have preferences for certain emotions, they might reasonably have preferences as to, for example, how frequently or intensely they feel those emotions. Some individual differences in desired emotional experiences might be based on beliefs about emotions, another potential avenue for further research. Beliefs that parents hold regarding their adolescent children's emotions are positively associated with the adolescents' beliefs about their own emotions (Hunter et al., 2011), suggesting that such beliefs might be passed down from caregiver to child. Such beliefs may influence emotional experience; for example, an adolescent who believes her emotions are useless might report low emotional clarity on a daily basis. Another area of recent inquiry is how emotional experiences change as a function of context. Research can examine contextual changes in the experiences of emotional frequency, instability, and clarity (e.g., while with peers or with parents; over the course of a day spent at school or at home).

In sum, this review details the typical trajectory of emotional experience during adolescence. Adolescents experience changes in a variety of emotional dimensions, with different patterns emerging in adolescents of different ages, genders, and pubertal stages. These findings will also apply to clinical research and practice: an adequate understanding of what experiences are typical for adolescents will facilitate assessment, prevention, and treatment when emotional experiences become aberrant and difficult to regulate.

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