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The Future of Developmental Psychopathology: Honoring the Contributions of Dante Cicchetti

Rethinking peer influence and risk taking: A strengths-based approach to adolescence in a new era

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Abstract

The ways that psychopathology manifests in adolescence have shifted dramatically over the past twenty-five years, with rates of many externalizing behaviors declining substantially while rates of anxiety and depressive disorders have skyrocketed. This paper argues that understanding these changes requires rethinking the field's historically somewhat negative views of intense peer connections, peer influences, and adolescent risk-taking behavior. It is argued that intense peer connections are critical to development, and that peer influence and risk taking have important, often overlooked, adaptive components. The shift in observed manifestations of adolescent psychopathology over this period can be viewed at least partly in terms of a shift away from strong peer connections and toward greater risk aversion. Implications for research and intervention based on a focus on the adaptive aspects of peer influences and risk taking are discussed.

Keywords: adolescent relationships; externalizing; internalizing; peer influence; risk taking

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Introduction

The past twenty-five years have witnessed two dramatic changes in adolescent mental health in the United States[1]. The first, a dramatic decrease in a wide range of adolescent externalizing behaviors, has been fortuitous. Rates of adolescent rule- and norm-breaking behaviors have plummeted, and not just by a little. Rates of teen pregnancy, for example, have declined by over 75% (Maddow-Zimet & Kost, 2021), and rates of alcohol abuse by more than 50% (National Institute on alcohol abuse and alcoholism, 2023). Juvenile arrest rates have declined by over 70% (OJJDP, 2024). Notably, these improvements occurred in spite of considerable social upheaval across this period, including the terror attacks of 9/11, multiple school shootings, the wars in Iraq and Afghanistan, and the Great Recession. They are a testament to Cicch etti's (2016) description of the construct of resilience, and should debunk the notion that "things are worse than they've ever been."

At the same time, a countervailing trend makes clear that all is not well. In the ten years leading up to the onset of Covid, youth rates of depression soared by over 60% (Keyes et al., 2019). This appears to reflect much more than just increased willingness to acknowledge depressive symptoms, as rates of admissions to hospital emergency departments following suicide attempts have gone up by similar levels (Kalb et al., 2019). Data are still coming in, but all evidence suggests the Covid pandemic has only increased these rates (Barendse et al., 2023). Anxiety disorders are not as precisely tracked, but evidence suggests these have skyrocketed as well (Twenge et al., 2022). Looking at youth social development more globally we see that overall life satisfaction levels among juveniles have also fallen precipitously (Marquez & Long, 2021).

"It was the best of times. It was the worst of times," could easily have been written to describe the current cohort of youth. If we are to be responsive to these massive shifts in the *form* in which adolescent psychopathology now is manifest, our research emphases will need to assess adolescent development at multiple levels of analysis, as Cicchetti (2023) has suggested, and move beyond purely intrapsychic analyses of adolescent psychopathology. In the interest of jumpstarting this process, this paper is written to be provocative in laying out several strong contentions about ways our research foci should change going forward. It will seek to highlight and build upon existing research to argue that we have consistently underestimated the *positive* value of both intense peer connections and peer influences in adolescence as well as the *adaptive* elements of adolescent risk preference. We consider each issue below followed by a discussion of their potential common elements as well as their implications for future research and intervention efforts.

[1]The experience of adolescents outside the United States has likely also changed substantially Twenge, J. M., Haidt, J., Blake, A. B., McAllister, C., Lemon, H., & Le Roy, A. (2021). Worldwide increases in adolescent loneliness. *Journal of Adolescence, 93*, 257-269., although the lack of extensive research historically with these populations limits our scope Aber, J. L., Dolan, C. T., Kim, H. Y., & Brown, L. (2021). Children's learning and development in conflict-and crisis-affected countries: building a science for action. *Development and Psychopathology, 33*(2), 506-521.

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The critical importance of peer connections

One of the biggest keys to understanding the changing nature of adolescent psychopathology may be recognizing both the central role of peer relationships in adolescent development as well as the extent to which these relationships have recently changed in problematic ways. Adolescents have long been scoffed at for treating peer relationships as matters of life and death, and the intensity of adolescent peer influences has often been viewed as a source of concern. Yet, as data continue to come in, it increasingly appears that the teens approach may have been right all along: Adolescent peer relationships appear fundamentally linked to long-term mental and physical health in ways that make teens' "life and death" perspective on them appear unsettlingly realistic. Understanding the normal developmental drive to connect with peers in adolescence appears essential to understanding the pathological results that follow when this drive is thwarted (Cicchetti, 1993).

As much as peer influences may be feared, the great bulk of accumulating evidence now suggests that it is the *lack* of strong connections to others that may currently be the more potent short- and long-term risk factor for psychopathology. Unfortunately, our youth are clearly suffering from a lack of connection. Rates of adolescent loneliness appear to have skyrocketed over the past twenty years (Twenge et al., 2021) and are not only high, but higher than for any other age cohort (Shovestul et al., 2020), an effect which the pandemic only seems to have exacerbated (Cigna Corporation, 2021). Even prior to the pandemic, adolescents had begun spending significantly less time in in-person interactions with their friends (Twenge et al., 2019). Understanding adolescent psychopathology in the current era requires attending closely to the meaning of these changes.

In adulthood, social relationships are now recognized as being as fundamental to survival as food, water, and shelter (Holt-Lunstad, 2023). Lack of social connection is linked to everything from depression and anxiety to stroke risk, dementia, respiratory illness, and even early mortality (Cohen, 2021; Mann et al., 2022; Valtorta et al., 2016). Our own recent data suggest that these findings are at least equally relevant to adolescents.

Our research has found, for example, that the absence of strong peer relationships in adolescence, whether reported by the adolescents' themselves, their peers, or their parents, is a stronger predictor of future depressive symptoms in adulthood than even concurrent levels of depressive symptoms within adolescence (Allen et al., 2022). Similarly strong findings appear with regard to predictions of adult trait anxiety (Allen et al., 2024). These findings are striking in that they identify the absence of strong social connections in adolescence as a potentially more potent risk factor for future psychopathology than even concurrent levels of symptomatology – a striking and disturbing example of heterotypic continuity. The clear implication is that the underlying psychopathological processes at work with regard to long-term anxiety and depressive symptoms may actually be the *lack* of positive relationships. Similar findings also suggest long-term links of poor social connection in adolescence to poor academic performance and poor future career outcomes (Guay et al., 1999; Loeb et al., 2020).

As concerning as are the observed links between adolescent peer relationships and future mental health and social functioning, findings regarding physical health are even more problematic. Inability to manage conflict in friendships beginning in early adolescence is predictive of higher levels of inflammation measured via Interleukin-6 levels in the bloodstream by the late twenties (Allen et al., 2018). Poor quality close friendships in adolescence, as reported by close friends, predict both reported poorer physical health a decade later in the mid-twenties and a faster than expected rate of epigenetic aging by age 30 (Allen, Danoff, et al., 2023; Allen et al., 2015). Those with a history of poor friendships literally age more quickly in a way that is already becoming apparent by age 30.

These findings are consistent with long-term studies in adulthood finding that poor social relationship quality creates a greater risk for early mortality than even cigarette smoking, obesity, or heavy drinking (Holt-Lunstad et al., 2010). These findings in essence support what adolescents appear to intuitively realize: that humans are intrinsically social beings and pack animals right down to the physiological level (Blakemore, 2008).

Of course, it is not simply that adolescents express concern about their peer relationships, but also it is the intensity of these relationships and the influences that accompany this intensity, that often troubles adults. Yet, it may be that this intensity exists *precisely* because it is what is important to future adult functioning. Indeed, a series of studies both by our own group and others suggests that although broad popularity in the peer group has significant advantages within adolescence, it is the presence of high quality, intense close friendships that best predicts positive adult mental and physical health outcomes (Letkiewicz et al., 2023; Narr et al., 2019; Woodhouse et al., 2011). These close relationships likely provide a context for developing the empathy, caregiving competence and healthy support-seeking behaviors needed to establish strong relationships in adulthood (Allen, Costello, et al., 2023; Stern et al., 2021). In sum, the biggest social problem adolescents face currently appears not to be the intensity of their peer bonds, but rather the lack of these intense peer bonds.

Reconsidering the role of peer influence

Recognizing just how critical peer bonds are to adolescent development suggests a need to also reconsider the strong negative connotation the field has attached to the phenomena of peer influence in adolescence. This paper makes three assertions in this regard: First, our field has been making a version of the same mistake often made by parents in looking to peer influence to explain concerning behavior that is best understood at a different level of analysis. Second, we need to more consistently recognize the symmetrical nature of peer influences: They can be directed either toward *or away* from maladaptive behaviors. Finally, we must recognize the degree to which being influenced by one's peers is fundamentally isomorphic with becoming well-socialized and adapting to larger social norms – a process that is critical to a successful adulthood. Each will be covered in turn below.

Deviant peer or problematic culture?

It has long been recognized that much apparent peer influence is simply an artifact of peer selection effects; deviant teens often select similar teens as peers (Field & Prinstein, in press; Kandel, 1978). However, even in research that takes selection effects into account, there is a more fundamental, logical problem in looking to peer influences as a primary driver of adolescent pathology: Negative peer influence in most cases presumes *already developed* pathology elsewhere in a peer network, either with individual peers, or with regard to broader peer norms. Said differently, being influenced by a deviant peer requires the prior existence of that deviant peer. From this perspective, peer influence will almost never be a first cause of deviance in a population, and rarely even a primary cause. This does not mean that deviant peer influences don't exist – they

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clearly do – but it should change our view of the pathological processes upon which we should be focusing.

A medical analogy can be instructive: Contagion is a widely recognized process in epidemiology, and the construct has been applied to a wide variety of social phenomena, including peer influence (Reiter et al., 2019). Deviant adolescent behavior can clearly be contagious. Yet, the medical arena recognizes a key distinction: The pathogen and the contagion process are logically distinct entities. The act of breathing, for example, is the primary route by which a person becomes infected with the Covid virus. We recognize, however, that it is the virus, not the act of breathing, that is the core pathology. The same logic applies to peer influence processes in adolescence: The core problem in understanding adolescent deviant behavior is likely not peer influence but a broader adolescent culture that has values that deviate in key respects from those of adult society. Adolescent deviance may be no more a primary function of peer influence, than the problem with Covid is a primary function of breathing. There may be instances where we should try to reduce negative peer influences, of course, just as there are instances where using a mask to restrict our breathing is sensible, but this will be a tertiary approach at best.

We first confronted this issue in our own research when we were examining teens who were desired as companions by their peers at age 13 (Allen et al., 2006). These teens were well-adjusted in numerous respects: they got along well with their parents, they had strong close friendships, and they were psychosocially mature. When we followed them a year later, however, we found that compared to their less well-liked peers, they were also far more likely to begin using alcohol and marijuana, and far more likely to engage in at least minor forms of delinquency, such as shoplifting. Why was this? It was our team of late adolescent undergraduate research assistants who provided the ready answer: This occurred because these behaviors are admired and valued (i.e., considered cool) within adolescent culture. And not just within deviant adolescent culture, but within adolescent culture broadly defined.

Our well-liked teens were well-socialized by all accounts, the problem was that they were being socialized within an adolescent culture with norms that deviated in significant ways from those of adult society. When we see peers encouraging one another to engage in behaviors, such as drinking and minor forms of delinquency, we view these as antisocial and deviant *from an adult-centric* perspective, without always considering that they are often considered socially *normative* within adolescent culture. This culture clash, and not peer influence processes, seems like the true pathogenic process.

The reason for the disconnect between adolescent and adult norms is unclear, although a strong possibility is that over the past century adolescence has come to be structured such that teens in Western society are increasingly disconnected from meaningful interaction with the adult world. We've written extensively about this elsewhere (Allen & Allen, 2009), but here would simply note that as the length of time between puberty and full adult status has lengthened, we've increasingly asked young people at the height of their physical powers, the height of their energy levels, and even at the peak of their of information processing capacity, to do little other than sit at desks, take notes, and answer questions on multiple choice tests, preparing for an adult future that is often many years away. Further, the work required is often done in isolation, and the likelihood of the content learned actually being useful to the vast majority of adolescents in adulthood is often marginal (e.g., mastering operations with imaginary numbers). As a consequence, adolescents are given relatively little direct access to adult roles and responsibilities. Though adolescents naturally desire adult status, they find it largely out of reach in important ways, and this problem appears to be worsening. Even simple adult-like behaviors, such as driving or going out without parents are occurring less frequently for our youth (Twenge & Park, 2019).

The deviant behavior we see in adolescence may well be better explained by this disconnect from the adult world than by an appeal to peer influence. Moffitt (1993) has suggested that we can explain a number of criminal behaviors in adolescence, such as shoplifting, as efforts for adolescents to attain the appearance of economic 'maturity' when other avenues to attaining such maturity are cut off. Supporting this notion, as teenagers enter their twenties, and take on real adult roles, rates of deviant behavior fall by more than half, even though twenty-somethings would arguably be more physically and cognitively able to pull off criminal behavior without getting caught (Moffitt, 1993). Further evidence in support of this proposition comes from anthropologists' observations of primitive tribes, which found a strong correlation between greater integration of adolescents into adult life in a tribe and lower levels of delinquency (Schlegel & Barry, 1991). In tribes that integrate adolescents into the adult world, deviant adolescent values were no longer a significant issue. These findings all suggest that without an adolescent culture supporting deviant behavior, peer influence would be less of a concern, just as without Covid, mask-free breathing is not only fine, its essential.

Peer influence as a positive socializing force

Failure to distinguish the pathogen from contagion processes has led to much research that begins with the *presumption* that most peer influences regarding deviant behaviors are maladaptive in nature. A logical fallacy in this assumption is that peer influence is often symmetric in nature: Finding strong peer influence with regard to substance use, for example, may mean not just that some teens are influenced to higher use by their high using friends but also that others are influenced to relatively *lower* use by abstaining friends. It is logically impossible for beta weights from lagged regression analyses to distinguish between these possibilities and indeed both may well co-exist, as there is little *a priori* reason to expect influences always to be skewed in one direction.

It is also becoming increasingly clear that peer influence can at times be unambiguously positive (Duell & Steinberg, 2020; Field & Prinstein, in press; Laursen & Veenstra, 2021). Peer influences, for example, can be useful in getting others to attend to environmental issues (Frank, 2021). Indeed the argument has been made that peer influences can be quite useful with regard to any issue where individuals would not otherwise directly feel the consequences of their actions – e.g., in socially sanctioning behaviors such as littering (Mani et al., 2013). Specific efforts to use peer norms to do things like reduce prejudice (Paluck, 2011) have led to the idea that socialization by our peers that may be one of our most effective means of improving our world (Rosenberg, 2011). Little wonder then, that human adolescents would be wired to attend to such socializing influences.

Our own longitudinal research largely confirms this perspective. In the same study that found that well-liked adolescents engaged in more substance use we also found that they were increasingly *less* likely to engage in aggressive behavior over time (Allen et al., 2006) – evidence of likely positive influence effects for these socially attuned young people. Similarly, we've found that young people who were most likely to become more similar to their friends over time (i.e., appear influenced) were characterized by *good* relationships with their mothers and greater likability with peers (Allen et al., 2020). This was true, even though the influence being observed was with regard to subtance abuse. Notably, however, the influence was symmetric in nature: Teens were as

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likely to be influenced to less substance use by abstaining peers as the reverse. These readily influenced young people simply appeared to be well-socialized, as has also been found in other studies of readily influenced teens (Reiter et al., 2019).

Beyond just measures of influence, we also find that "pack behaviors" in adolescence, including traits such as being viewed by peers as more of a follower than a leader and being seen by peers as less assertive are predictive of greater physical health into young adulthood (Allen et al., 2015). Although fierce independence is highly valued in Western society, cross-cultural scholars note that the socializing value of a more harmony-focused approach to group interactions is quite widely recognized in Eastern cultures (Talhelm et al., 2014).

In sum, becoming well-socialized, almost by definition, requires being receptive to influence by others in the social world. This can at times lead to problematic behaviors – not because being influenced is bad, but because of the culture doing the influencing. The Covid/ breathing metaphor above is thus likely even more apt than it might first appear. At a stage in life where learning to connect deeply with others is critical, learning from and being influenced by one's peers may well be as vital to social development as breathing is to physical survival.

Peer pressure is not the same as peer influence

One of the reasons that peer influence has likely garnered a bad reputation, aside from its links to concerning adolescent behaviors, is that it has often been conflated with peer pressure. Yet, despite the popular depictions of peer pressure in teen movies (see e.g., *Heathers, Mean Girls*), our best evidence suggests that most peer influence does not result from actual peer pressure (Field & Prinstein, in press). Rather, youths adopt the behavior of their peers not as a result of pressure, but rather to enhance their social status and personal power (Ungar, 2000).

Peer pressure is nevertheless a real phenomenon and under some circumstances can lead to negative outcomes. Among groups of deviant peers, coercive, deviancy-training behaviors (in which deviant talk and behavior are reinforced coercively) is associated with increases in deviance over time (Dishion et al., 1995; Dishion & Owen, 2002). Similarly, exposure to aggression by peers is also often linked to relative increases in deviant behavior, (Vitaro et al., 2000). Clearly, adolescents can become less functional in the face of coercive behavior from peers, but this is essentially the same finding as has been observed when adolescents display long-term negative effects following coercive behavior by parents (Loeb et al., 2021). Coercive environments can breed psychopathology, whether created by parents or by peers, but peer coercion is not the same as peer influence and most peer influence does not involve coercion. Indeed, in normative samples, higher levels of peer influence are actually predicted by *lower* levels of peer pressuring behavior (Allen et al., 2020).

Implications for peer relationship research

There are several implications for future research based on an increased awareness of the importance of peer relationships and peer influences. First, as we think about factors affecting peer relationships, our focus should be on how they do or do not affect the potential to establish *deep* relationships. For example, social media use is currently an area of tremendous concern, with some having suggested it as key to understanding increasing rates of adolescent depression (Twenge et al., 2020). Yet research linking social media use to psychopathology has typically yielded only quite modest effects (Cunningham et al., 2021; Keles et al., 2020). The analysis in this paper suggests that focus of this research may simply be slightly misplaced: Perhaps it isn't time spent *on* social media, but rather the time *not spent* engaged in in-person interactions that matters. Given that much of "social" media currently involves only minimal or shallow social interaction (e.g., "likes" on an app), and given its highly seductive nature, its most potent feature may simply be its potential to displace time spent in far more important and valuable types of social interaction. This would suggest, for example, different outcomes for social media users who did vs. did not also have significant and meaningful in-person interactions with close peers. Similarly, research that distinguishes among the different qualities and facets of adolescent media use is likely to be far more useful than research simply tallying quantity of use.

A second implication of the analysis above is that *all* research on peer influence should explicitly consider the potentially symmetrical nature of such influence. It is logically incorrect to move from finding that a factor predicts peer influence on a maladaptive behavior to concluding that that factor is therefore an explanation for *higher* rates of that behavior. There may be cases where such asymmetry exists, but this must be confirmed by empirical observation, not left as an unquestioned assumption. Indeed, identifying areas where influence is asymmetrical could be a major area of advance: Perhaps peer influence about issues such as participation in extracurriculars, or even excelling in school (among some groups) is primarily in a positive direction. This might identify specific domains where peer influence could be encouraged vs. discouraged. Also, it may be that later in adolescence, as peer cultural norms change, peer influences may largely shift in a positive direction (e.g., it may become *un*cool to get wasted at a party and performing volunteer service in a community may garner many "likes" on social media). We've spent many years mapping the "prison" of adolescent deviancy-training and coercive behavior among peers; maybe it is time to also begin mapping the escape routes (Waters & Lawrence, 1993). Expanding existing research on peer influences toward adaptive behaviors (Leung et al., 2018) would help address this gap.

As we move beyond seeing all peer influence as negative and we recognize the distinction between peer influence and peer pressure, this may also allow more careful and nuanced consideration of just what peer pressure implies for adolescent development. If pressure is not the primary mechanism of influence, then just what role does it serve, and what does it mean for an adolescent to feel pressured, particularly given that the experience of peer pressure has long been identified as one of the single greatest stressors adolescents report facing on a regular basis (Brown, 1982; Gao et al., 2021)?

Finally, recognizing the potentially benign or even positive overall role of peer influence suggests the need to more carefully examine other factors driving adolescent deviance. To the extent that many of the pathological processes leading to adolescent deviance may be seen more productively at the cultural level, as opposed to the individual level, this suggests focusing on just what it is about the larger adult culture and adolescent roles within it that drives these pathological processes.

We are persuaded by the argument that as teens have become cut off from meaningful contact with adult roles, we have created conditions where a subculture with values that have drifted away from those of the larger society can grow, like weeds on an unused plot of land. Notably, adolescents who are given the opportunity to meaningfully engage in volunteer community service (i.e., to take on adult-like roles) have shown nearly 50% decreases in rates of pregnancy and school failure in randomized trials (Allen et al., 1997).

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More generally, late adolescents given opportunities to take on generic adult-like help giving roles display gains across domains ranging from subjective vitality to global self-esteem (Weinstein & Ryan, 2010). Further research examining ways that engaging adolescents in adult roles may alter deviant norms is clearly warranted.

Implications for intervention

Although continued research into the sources and sequelae of stronger peer connections in adolescence is warranted, we are now at a point where a focus on intervention efforts is also likely to be productive. Such interventions need not be expensive or unwieldy. One of the most promising examples to date is Walton and Cohen's (2011) project on social belonging. In this, project, entering college students were exposed to a one-hour intervention that focused on making clear that social belonging did not always come easily to college students, but that with time and a bit of effort and persistence things were likely to work out socially. In essence, the intervention implicitly encouraged students who may have been feeling left out to keep trying to fit in and not give up. Notably, this one-hour intervention produced effects *three years* later, in terms of both physical health and likelihood of college graduation for college first-years who were members of racial/ethnic minority groups.

A similar effect has been observed with a somewhat more intensive intervention designed to directly build stronger bonds among youth. *The Connection Project* is a semester-long intervention, with versions at both the high school and college level, in which students meet for about an hour each week in small groups led by trained facilitators (Allen et al., 2021; Costello, Nagel, Hunt, Rivens, et al., 2022). The intervention seeks to recreate the conditions under which strong peer bonding sometimes happens naturally – but do so in a more replicable fashion. The program focuses on first building a sense of safety and security within a group. Then, through a graduated series of voluntary activities, it gives youths a chance to see just how much they share in common beneath the surface (but may be hesitant to show others). Ultimately, youths learn how to share their unique story with others and learn the value of doing so as they form strong bonds with former strangers. Results from multiple randomized trials suggest that the program not only helps youth rapidly build strong bonds, but also reduces their levels of loneliness and depressive symptoms (Costello et al., 2022; Costello, Nagel, Hunt, Rivens, et al., 2022). For high school students in under-resourced schools, the program also increased academic engagement (Allen et al., 2021). The program has grown rapidly from the pilot stage to now serving a quarter of the incoming students at a major public university and is undergoing replication at both the high school and college levels.

As with the social belonging intervention, effects of *The Connection Project* are strongest for students who might otherwise be marginalized, whether via membership in an ethnic minority group or by virtue of coming from a family with lower levels of parental education or income. Among all of the other obstacles marginalized youth often face, the feelings of estrangement from the larger peer culture are less visible but no less prevalent. Yet as growing findings on the importance of social connection suggest, these experiences of estrangement may also be among the most devastating. Establishing strong peer connections among potentially marginalized youth is something that can happen *within* communities of these youth – it is empowerment in the truest sense of the term. It can also occur in heterogeneous groups, for example, in predominantly white institutions, in which case it provides a means by which potentially marginalized students can come to feel more integrated into the larger social world of the institution (Costello, Nagel, Hunt, Rivens, et al., 2022). Continued efforts to develop these and similar interventions are clearly warranted.

Risk taking

Just as peer influence has been consistently tarred with a negative brush, so too has adolescent risk-taking behavior. Recent research has focused on dual systems brain models, noting the uneven maturation of the ventral striatum and the prefrontal cortex (likened to a car with a large gas pedal and weak brakes), and on fuzzy trace theories addressing the different ways adolescent and adult brains process information about risk (Edelson & Reyna, 2021; Strang et al., 2013). Yet, two largely untested assumptions are embedded in many instances of both lines of research. The first assumption is that heightened risk-taking in adolescence is primarily maladaptive. The second is that adolescents' propensities for risk-taking are even substantially heightened relative to those of adults. Although others have previously noted the problematic nature of these assumptions (see e.g., Crone & van Duijvenvoorde, 2021; Duell & Steinberg, 2021) reconsidering them here may be critical to understanding and addressing the changing manifestations of adolescent psychopathology over the past several decades.

The rewards of risk

We begin with a premise recognized in principle by many risk researchers, but given far less attention in practice: *Risk taking in adolescence is not inherently problematic.* Indeed, in some cases it can be argued that a heightened risk preference in adolescence (relative to adulthood) may even be quite adaptive. This need to consider context in assessing the adaptive or maladaptive nature of a behavior is a key principle of developmental psychopathology (Cicchetti, 2016) that is particularly applicable in this case. Consider the following thought experiment: Imagine a typical 50-year-old offered a chance to greatly expand their intellectual and career horizons. The one catch is that this would require moving to a new city for several years, a city they had only briefly visited and where they knew no one. It would require living in a communal situation with complete strangers, with accommodations that were a significant step down from their current housing. And to truly gain the benefits of this opportunity, our 50-year-old would need to substantially increase their effort level, taking on harder and more challenging work than they'd ever experienced previously. In essence, they would be risking giving up the comforts of most all that they had known to that point for the promise of something better in the future. A pretty big risk.

This of course is precisely what a move to a residential college entails for many adolescents. What is striking is that while no doubt *some* adults would, with trepidation, accept the offer described above, the vast majority of adolescents who are given the opportunity eagerly jump into the college process. The level of tolerance of uncertainty required to go from one's high school friends and community and room at home to a new city, new roommate and demanding new challenges is tremendous. The risks – academic failure, isolation and loneliness, social rejection – are huge.

Interestingly, much of adolescents' apparent heightened risk preference relative to adults has been traced to exactly the type of tolerance for ambiguous situations that actions like college transitions require (Blankenstein et al., 2021; Tymula et al., 2012). Openness to this sort of risk can be highly functional as it is closely linked to openness to the possibility of substantial rewards

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(Ellis et al., 2011). The teen willing to try out for a sports team, for example, knowing that they have a decent chance of getting embarrassed by poor performance is an adaptive risk taker (Fischer & Smith, 2004). If adolescents had the level of caution and risk aversion of most adults, many would likely forego some of the most promising opportunities available to them. Being willing to tolerate the possibility of failure appears critical to adolescents' willingness to take on critical developmental challenges they face (Duell & Steinberg, 2021; Meyer & Turner, 2006).

Although this college hypothetical applies primarily to the relatively privileged, adolescents from all strata face enormous uncertainty as they move out on their own. Taking on a first job, establishing intimate relationships, leaving home – these are all situations where the potential rewards are significant, but only if one is willing to run the risk of the punishing experiences that come with potential failures and setbacks. Indeed, much social interaction is likely to appear quite risky for teens who are just finding their way socially and who lack well-developed social skills. From this perspective, an orientation of the adolescent brain toward rewards and opportunities and away from a focus on negative outcomes no longer seems so dysfunctional.

We can also view adolescent risk preference in situations like these as an example of an "explore-exploit" tradeoff (Mehlhorn et al., 2015). This tradeoff involves deciding when it is better to take advantage of known payoffs (i.e., exploit existing knowledge) vs. exploring potentially more lucrative but less certain options that may pay off over time. From an adolescent perspective, taking risks that can potentially open up new opportunities (from better careers to improved social status) can make a great deal of sense, particularly given the long time frame across which knowledge gained from taking such risks can pay off.

Looking more broadly, it is not hard to imagine that adolescent risk-taking may have even had significant survival value across evolutionary time (Duell & Steinberg, 2021). Whether it be long hunting forays, physical combat, or the risks of pregnancy and childbirth, adolescents needed to take significant risks simply to survive and to ensure the survival of their clan (Ellis et al., 2011). The idea that evolution left the human species with a multi-year period where an imbalance in brain development created heightened risk preference with little compensating reward seems unlikely from this perspective (Crone & Dahl, 2012; Duell & Steinberg, 2021).

Learning how to thoughtfully take risks requires experience taking risks

Adolescence may also require some degree of risk taking simply to learn to develop competence in judging when risks do and do not make sense. Even risks that lead to substantial losses may provide information that is quite useful going forward. The adolescent who decides to ditch studying for an important test and then fails, or who decides to argue with a boss and then gets fired experiences highly informative (albeit painful) consequences. These consequences are likely far *less* detrimental, however, than the consequences of similar behaviors enacted later in life. Adolescence appears to be an optimal time to take these kinds of risks and learn from them (e.g., perhaps by finding a better way to motivate oneself to study or to more skillfully address conflict in future workplaces).

Yet, a legitimate question remains: Don't adolescents engage in dangerous, even deadly behaviors because of their risk-taking propensities? Clearly adolescents do engage in such behaviors (Duell et al., 2018), yet it is not always clear if this reflects a greater risk-taking propensity. A corollary to the idea of adolescents needing to gain risk-taking competence is that adolescents may make poor decisions regarding risks at times not because they are excessive risk takers, but simply due to ignorance and lack of risk-taking skill. Adolescence opens up immense new venues of potential risk and reward, from driving an automobile to engaging in romantic behavior (Mehlhorn et al., 2015). Adolescents may, due to inexperience, simply be poor at perceiving the risks in certain situations.

Not being fully cognizant of some risks after just learning to drive, for example, such as the existence of "black ice" on otherwise snowless roads, may lead to driving too fast for given conditions and possibly to an accident. Adolescent drivers *do* have high accident rates, but these decline dramatically after the first year of driving – a decline that is unlikely to be attributable to brain development over such a short span. Declining accident rates are no doubt partly due to skill improvements, but also to adolescents *learning* just what is and is not a substantial risk. For example, driving four miles per hour over the speed limit, though illegal, may be minimally risky on dry pavement with no traffic on a clear day, whereas driving even at or just below the speed limit on a snowy road at night may be quite risky. Having an accident because of failure to recognize this sort of distinction is unfortunate, but has little to do with risk-taking propensity.

Inaccurate *perception* of risk is thus likely to be quite important in understanding dangerous behaviors in adolescence, but it is conceptually distinct from a heightened risk preference (Edelson & Reyna, 2021). Adolescents may engage in quite dangerous behaviors, not out of a willingness to take risks, but rather out of simple ignorance. Notably, adult history is littered with examples of behaviors that look quite risky only *in retrospect*, ranging from Marie Curie's early (and deadly) research on radioactivity to the hundreds of mishaps of adults' first attempts to deep-fry a Thanksgiving turkey. All of these are situations where the dangerous behavior primarily reflects lack of comprehension of the risks faced.

In sum, adaptive risk taking is a skill (Blair et al., 2018) and there are likely few eras better than adolescence to learn it. A significant degree of risk taking may thus be viewed as critical to learning and growing. Although our field at times does note that risk taking can be adaptive (Duell & Steinberg, 2021), we have made virtually no effort to study it from this vantage point. This oversight becomes particularly problematic as we look at the problems associated with the *opposite* of risk-taking preference: risk aversion, to which we now turn.

The problem of risk aversion

In modern society, evidence suggests that if anything our brain wiring is such that adult humans tend to be overly loss *averse*. In a wide variety of risk-reward studies, evidence suggests that adults value avoiding a loss to a greater extent than gaining an equivalent level of reward, even when logically this makes little sense. Identified as prospect theory, the finding is that losses matter more than equivalent gains when adults are making many types of decisions (Kahneman & Tversky, 2013). As adolescents move into adulthood, this bias if anything may grow stronger (Reyna & Farley, 2006).

Given the classic behavioral economics paradigm, for example, of being offered a 50% chance to win $100, but with a 50% chance to lose $80, a rational, expected-value analysis would suggest taking the bet. Most adults would not, however, and this risk averse bias can be observed even at the neural level (Barkley-Levenson et al., 2013).

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Perhaps somewhat surprisingly, adolescents do not differ from adults in this task. Both groups are overly loss sensitive. It has been suggested that it may be only in more arousing situations (e.g., around peers) that adolescent risk taking propensities increase (Figner et al., 2009; Gardner & Steinberg, 2005). Moving into these "hot" situations doesn't necessarily turn adolescents into excessive risk takers; it may simply move them from being overly loss sensitive farther along a continuum toward a more neutral stance.

All of the examples above, both hypothetical and real, should also make clear that although adolescent risk taking is often equated with antisocial behavior, the two phenomena are quite distinct. Conversely, avoiding risks can often be problematic: The teen who starts smoking for fear that not to do so will seem uncool and risk rejection, or who rejects going to sleep-away camp because it seems too unfamiliar, or who never raises a hand in class for fear of looking dumb, is a maladaptive risk *avoider*. This risk avoider may even engage in highly antisocial behaviors, for example damaging a disliked peer's possessions, though only when they are certain not to be caught. The implication of these examples is that we need to recognize dangerous and antisocial behaviors as such, and not just assume they are a manifestation of excessive risk preference. Similarly, we need to recognize that the positive risk taking we admire in both adolescence and adulthood may not be readily separable from a more general propensity toward risk-taking behavior that may at times also lead to problematic risks (Duell & Steinberg, 2020, 2021).

The example of the antisocial low risk teen also suggests another point: The true opposite of risk is not necessarily safety, it may be anxiety and avoidance. Notably, risk *aversion* has been identified as a central element of anxious and depressive symptoms (Chandrasekhar Pammi et al., 2015; Maner & Schmidt, 2006). Given soaring levels of anxiety and depression among adolescents, it seems quite plausible that adolescents' increased risk aversion may be an important causal factor.

Over the past 25 years, adolescents in the United States have decreased their likelihood of engaging in multiple forms of risky behavior: They have fewer auto accidents, are less likely to get pregnant, less likely to use hard drugs, and less likely to engage in violent behavior. But, as already noted, they are also less likely to be driving, working for pay, or going out without parents (Twenge & Park, 2019). If these behavioral changes are indeed linked to adolescents as a group becoming more risk averse and thus more anxious, and depressed, this would suggest the need for a shift in our approach to understanding risk taking during this period. Interestingly, risk aversion has been linked to precisely the same brain areas (the ventral striatum, and prefrontal cortex) as risk preference, though of course in opposite directions (Tom et al., 2007). This suggests the adolescent brain may not be badly imbalanced toward risk (an evolutionarily implausible outcome) but may rather be somewhat precariously balanced between risk and avoidance.

The changing manifestations of adolescent psychopathology over the past 25 years may reflect a shift in this precarious balance. Although cell phones and social media provide easy targets for those seeking to explain increases in adolescent depression, a broader shift toward risk aversion may more parsimoniously explain *both* increases in internalizing symptoms *and* decreases in externalizing symptoms over this period. A range of broad societal changes across this period could well account for this shift: Recent generations of adolescents have grown up in the wake of the terror attacks of 9/11, the worst financial crisis in almost a century, numerous breathlessly reported school shootings, and the recognition that climate change may make future life increasingly challenging. As the idea fades that each generation can simply expect to do better than the one that came before and the world looks increasingly dangerous and inhospitable, the need for caution so as not to fall off a narrow and precarious path to adulthood may take hold. Increasing risk aversion may thus be a natural and expectable response for many adolescents. It may even be a response which has some benefits in reducing dangerous adolescent behavior. Yet when carried to extremes it can also clearly become a source of significant internalizing psychopathology.

Do adolescents even take more risks?

Although the concept of adolescents as overly risk *averse* may seem counterintuitive given the stereotype of the risk-taking teen, there is actually good reason to question just how accurate this stereotype of the risk-taking teen has really ever been. There is, of course, no question that adolescents engage in certain types of self-destructive behavior more often than adults, though, as noted above, this is only weak evidence regarding their risk-taking propensities. Research has been surprisingly inconclusive about the extent to which adolescents actually do seek out more risk overall than adults across a variety of situations (Defoe et al., 2015). For example, the presumed risk-taking bias of adolescents in the larger world tends to be not so easy to replicate under a broad range of more controlled conditions (Crone & van Duijvenvoorde, 2021). If adolescents are not actually more risk seeking than adults, and if their risk aversion underlies some of their internalizing symptomatology, than seeking to increase that risk aversion may be exactly the wrong prescription for their well-being.

The idea that adolescents engage in more risk-taking behavior may partly reflect lack of recognition of the unique, adolescent-related risk-benefit tradeoffs that teens must typically make. Undoubtedly, much of the concern about adolescent risk-taking stems from observation of the sometimes devastating consequences of adolescent decisions that appear risky or irrational from an adult perspective. In thinking about whether these behaviors reflect a greater preference for risk, the key question is one of context: Are we fully recognizing the real risk and reward matrix that adolescents actually face? Without fully appreciating context, real-world risk is impossible to evaluate: Soldiers in a war zone likely engage in more risky behavior than office workers. This is not, however, because they prefer more risk but because the context forces them to make tradeoffs among highly risky options (e.g., attack vs. stay put).

One reason adolescent behavior may appear overly risky is that the costs and benefits of the various options open to the adolescent are often viewed only from an adult-centric vantage point. Peer relationships provide the clearest example of the type of unique cost benefit tradeoff teens must make. We know that in many situations the presence of peers increases an adolescent's likelihood of taking risks (Crone & van Duijvenvoorde, 2021). To date, this has largely been understood in terms of the presence of peers acting as an amplifier of an irrational adolescent preference for risk. The alternative perspective – that the presence of peers adds *new* risks and rewards, linked to peer approval and rejection, and that this does not imply dysfunction – has received far less attention. From an adolescent perspective, the teen considering using a drug or driving aggressively so as to maintain peer approval may *not* be making the decision that risk taking is worthwhile; rather that teen may be *choosing* which of two types of risks – peer rejection vs. auto accident – is most important to minimize in a given situation.

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This might still seem like it should be a clear choice from an adult perspective. Yet, once we recognize that going against the norms of popular and influential peers has significant potential to undermine a teen's school-wide reputation (Dijkstra & Gest, 2015; Field et al., 2024) and that this is balanced against the low probability of an accident in any given instance, the equation becomes more complicated. As noted above, social rejection, exclusion, and loneliness create tremendous risks for adolescents, both physical and mental. Although an established adult with longstanding relationships may see the effects of potential embarrassment in front of peers as relatively minor, for an adolescent just beginning to establish intense relationships outside of the family, the possibility of losing face in front of a substantial portion of one's peers is potentially devastating. Social rejection by peers and/or romantic partners is one of the leading potential causes of adolescent suicide (Cheek et al., 2020; Oppenheimer et al., 2020; Yadegarfard et al., 2014), and a clear driver of adolescent anxiety and depression. In recent years, adolescent suicide rates have risen such that they are now on a par with adolescent deaths due to auto accidents (National Centers for Injury Prevention and Control, 2022). Given this, where the greatest risks lie in the above scenario becomes less clear and unless we account for this sort of tradeoff, our analysis of the adolescent decision-making process will be invariably flawed.

Decisions about risk also do not just involve trading off between risks, they involve considering t he accompanying benefits that may follow risky decisions. In some cases, taking great risks can be highly rational: The investor pursuing a risky stock may take on the chance of losing their entire investment for the chance of quadrupling that investment. Such risky behavior undergirds much of American entrepreneurship and is highly valued in this context. The behavior involves risk but is also often highly functional. To the extent adolescents expect a net positive outcome from a risky behavior, pursuing that behavior is no longer a pure measure of risk-taking propensity (Edelson & Reyna, 2021). In adolescence and adulthood, for example, building esteem among one's peers as someone brave and bold has clear short- and long-term value, both mentally and physically. The high levels of activation of the limbic system in adolescence, which have been linked to greater risk taking, may well largely reflect sensitivity to precisely this kind of positive social feedback from peers (Crone & Dahl, 2012; Somerville, 2013). The point here is simply that the value of *succeeding* with peers in adolescence creates substantial expected value which can rationally justify significant risk to achieve it, even among adolescents who have only modest levels of risk preference.

Implications for risk research

There are several implications of this analysis for future research on adolescent risk taking. First, we should stop assuming that the dangerous and destructive behaviors in which adolescents engage automatically reflect a heightened propensity to take risks. In some cases (e.g., ingesting a substance when told by a peer that everyone uses it and its fine), such behavior may primarily reflect ignorance of the actual risks involved and a desire for peer approval. The behavior is clearly problematic, but it may not reflect propensity toward risk taking. Until we stop reflexively conflating antisocial and/or dangerous behaviors with risk taking, it will be impossible to consider the ways in which high levels of risk taking can be good and low levels potentially problematic.

Recognizing that certain antisocial behaviors may not primarily reflect risk-taking propensities then also opens up avenues to study other drivers of these behaviors, such as alienation or impaired moral development (Malti et al., 2021). Relatedly, expanding our efforts to understand *positive* risk taking may help both in identifying new avenues to promoting adolescent development as well as understanding the pathologies of anxious or depressed youth who maladaptively avoid taking even moderate positive risks, such as joining a club or trying a new sport (Duell & Steinberg, 2021)

This paper also suggests that a largely overlooked factor in the adolescent risk calculus is the importance of establishing and maintaining status with one's peers. Simply considering the very real risks that peer interactions pose to the teen, both short- and long-term, will helpfully inform our understanding of the risk-benefit equation most teens must solve. Doing the careful work to understand and measure how adolescents perceive actual peer risks in various situations would be a good first step in this direction. In addition, if adolescents are rationally choosing to take physical risks because of the threat of losing peer approval, recognizing these peer risks as legitimate suggests a promising avenue for developing preventive interventions. We already know that simply educating adolescents about the risks of certain behaviors is often ineffective (e.g., teens already *over*estimate the risks of certain outcomes, such as acquiring HIV (Reyna & Farley, 2006)). If teens are trading off peer risks vs. physical-safety risks, then one way to alter this calculus is to invest effort helping teens solidify key peer relationships such that they seem less tenuous.

Finally, we need to recognize that being a risk taker as a teen is not the same as being an *excessive* risk taker. Comfort with some degree of risk appears essential to surviving and thriving in adolescence. One way of understanding *both* the dramatic decreases in behaviors such as delinquent activity, drug use and unprotected sex, and the simultaneous increases in anxiety and depressive symptoms among youth over the past 25 years is to posit that as a cohort, adolescents have become far more risk averse.

This would imply that we consider studying risk aversion in adolescence with the same tenacity that we've studied risk preference thus far. We might ask whether failure to be open to moderate risks of discomfort (e.g., avoiding in-person get togethers with peers in favor of the safety of more circumscribed online interactions) is linked to the increase in internalizing behavior seen over the past several decades. Although it remains possible that a high degree of risk preference is in fact detrimental, this is an empirical question that cannot be answered if our measures of risk preference in real-world situations are always confounded with measures of antisocial behavior. We are making a fundamental error when we only measure risk in relation to dangerous behaviors and thus treat the risk averse teen as "healthy" without also considering the role of risk aversion and internalizing symptoms in our research.

Overarching recommendations for the field: toward a strengths-based approach

Understanding the adaptive functions of adolescent peer connections, peer influence, and risk taking is essential to beginning to understand the dramatic changes we've seen in the nature and expression of adolescent psychopathology in the past twenty-five years. This is consistent with the idea that a central focus of developmental psychopathology lies in understanding the boundary between normal and abnormal development (Cicchetti & Toth, 2009).

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As strong peer connections and peer influences have decreased, along with certain risky behaviors, the result has been not an increase in overall functioning, but a shift toward more internalizing symptomatology. Youths now take fewer risks and are less likely to engage in less externalizing behavior, but they are also much more likely to be lonely, anxious, and depressed. Rather than getting into trouble with friends and romantic partners, adolescents appear to be more likely to be sitting in their rooms and engaging with peers mainly via the relatively shallow channels available on most social media. This is safer in the very short-term, but not at all an obvious improvement in long-term health and development.

The emphasis of this article has been on where our research needs to move as a field to keep up with these changes, providing several overarching suggestions:

First, we need to recognize the value in adolescents connecting with and being socialized (i.e., influenced) by one's peers. By doing so, we can more readily understand that while relative social isolation may reduce problem behaviors that often occur in the company of peers, it also sets adolescents up for anxiety and depression. We also need to recognize and explore more fully the potential value of thoughtful adolescent risk taking – and what leads some adolescents to pathologically avoid risk. This exploration will open up new avenues to understanding the internalizing pathologies that have become predominant in Western society. In sum, in recognizing that the most prevalent current manifestations of psychopathology in adolescence appear linked to *lack* of strong peer bonds and to risk aversion, we open up recognition of the need to address and enhance those bonds and encourage adaptive attitudes toward risk.

Before leaving this topic, it should be noted that although this paper has focused on adolescence at the population level, *each* of the principles discussed above applies particularly strongly and to the detriment of adolescents who are marginalized as a result of their race, ethnicity, social class, gender, sexuality or other factors. These teens are more likely to face rejection, more likely to end up depressed, more likely to face higher risks that they must choose between, and least likely to have easy, safe access to venues allowing them to experience strong social connections. Nonetheless, it is clear that these youth also have great, if often untapped, potential to thrive. Indeed, social connections may be one of the clearest routes to empowerment for these groups. Thus, it is also not surprising that the interventions which have successfully targeted social connection among youth have consistently found the strongest effects for youth who would otherwise be marginalized (Allen et al., 2021; Costello, 2021; Walton & Cohen, 2011). Research is now clearly needed to explore the ways that marginalization both limits opportunities for meaningful social connection and enhances potential consequences of risky behavior. At the same time, however, a strengths-based approach suggests the potential value of both connection and exploration (even if it entails some risk) for marginalized populations of adolescents.

Overall, adopting a strengths-based perspective is recommended as a way to understand the developmental psychopathology that exists in adolescence as a result of perturbations in otherwise normal and adaptive processes (Cicchetti & Rogosch, 1996). Such an approach leads repeatedly to the same overarching observation: Many of the behaviors that appear dysfunctional and concerning in adolescence are actually linked to characteristics that also have strong, indeed critical import for *adaptive* development.

A critical unanswered question is why the field so often fails to recognize this, instead searching primarily for ways that typical adolescent behaviors and developmental progressions are maladaptive. It is hard to escape the conclusion that this failure may reflect a bias in how as a society we think about adolescents and thus in how we approach research on adolescent behavior. When the behavior of a group with relatively low social power, such as adolescents, is disturbing to the larger society, there is a strong human tendency to attribute its behavior to structural, even biological deficits inherent to membership in the group. The history of the search for such deficiencies in disfavored groups, whether disfavored due to race, ethnicity, gender, or sexuality is a long and unsavory one, yet it seems likely to also apply to adolescents in relation to the larger adult society. We make the ultimate correlation/causation error in attributing pathology or deficit to qualities of the adolescent era simply because adolescents as a group engage in behaviors that the larger society finds concerning.

Understanding adolescence from a strengths-based perspective means being particularly careful to pay attention to aspects of this stage of development that, even though sometimes leading to problematic outcomes, may be highly adaptive overall. Intense peer connections, peer influence, and risk taking provide some of the clearest examples of the way this perspective applies, but a little thought suggests other likely candidates also exist (e.g., rebellion, challenging social conventions, etc.). There is a common thread running through each of these points: Although our field has moved well beyond G. Stanley Hall's conception of adolescents as hapless victims of their "raging hormones," we still have work to do in moving from a deficit focus on adolescence, to fully recognizing and capitalizing upon the immense potential of this developmental stage

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