Journal of Developmental and Life-Course Criminology (2023) 9:331–352
https://doi.org/10.1007/s40865-023-00224-3

ORIGINAL ARTICLE

Mental and Physical Health, Psychosocial Maturity, and Desistance in Young Adulthood

Jeffrey T. Ward[1] · **Nathan W. Link**[2] · **Megan Forney**[3]

Received: 15 September 2022 / Revised: 25 January 2023 / Accepted: 30 January 2023 /
Published online: 20 February 2023

Abstract

Recent theoretical and empirical work has drawn increased attention to the role that mental and physical health can play in promoting life-course success and desistance from crime. This study integrates literature on youth development with the health-based desistance framework to investigate a key developmental pathway through which health influences desistance among system-involved youth. Using multiple waves of data from the Pathways to Desistance Study, the current study uses generalized structural equation modeling to examine whether and to what extent mental and physical health influence offending and substance use directly and indirectly through psychosocial maturity. Findings indicate that both depression and poor health stall the development of psychosocial maturity, and that those with higher psychosocial maturity are less likely to engage in offending and substance use. The model provides general support for the health-based desistance framework, finding an indirect process linking better health states to normative developmental desistance processes. Results hold important implications for the development of age-graded policies and programs geared toward promoting desistance among serious adolescent offenders both within correctional and community settings.

Keywords Health · Depression · Psychosocial Maturity · Young Adulthood · Desistance · Crime · Substance Use

Introduction

Young adulthood, the period from 18 to 25 in which individuals are freed from childhood dependencies but have not yet fully entrenched themselves with normative responsibilities of adulthood, is a crucial developmental period in the life course (Bonnie et al., 2015) where greater attention should be paid to desistance processes (e.g., see Laub & Sampson, 2001, p. 55). This life stage is especially critical in cultures that enable long periods of

✉ Jeffrey T. Ward
jeffrey.ward@temple.edu

Extended author information available on the last page of the article

role exploration (Arnett, 2000). While youth transition to adulthood with effectively full cognitive capacities, their psychosocial capacities are still developing well into their twenties (Icenogle et al., 2019), and have a direct relationship with desistance (Monahan et al., 2009, 2013; Steinberg, 2014). Although psychosocial maturity may be part of a complex maturation process (Rocque, 2015), it is evident that the ability to make rational decisions is compromised by immaturity. Furthermore, youth who are more immature may be less oriented towards adult roles, such as work (McCuish et al., 2020). Piotrowski et al. (2014) contend that "when undertaking adult roles does not coincide with achieving a certain level of psychosocial maturity, it is not conducive to progressive changes in identity, i.e., an increase in a sense of adulthood, and an increase in the number/strength of commitments and identification with them" (p. 60). Recognizing the importance of normative psychosocial development for aging out of crime, Monahan and colleagues (2013) have called for the identification of "risk factors for delayed development of psychosocial maturity across adolescence and adulthood" (p. 1103). More recently, a similar call has been made by Ozkan and Worrall (2017) who argue for more research on the "forces that shape psychosocial maturity directly" (p. 837).[1]

Mental and physical health issues among young adults are a serious concern and have the potential to adversely affect psychosocial maturity development and offending. For example, recent research suggests that nearly half of young adults struggle with mental health issues and more than one-third report unmet needs (Adams et al., 2022). Regarding physical health, for example, well over half of young adults are either obese or overweight (Ellison-Barnes et al., 2021). Adding to a small body of research on possible sources of stunted psychosocial development, such as incarceration (Dmitrieva et al., 2012), the present research draws on health-related criminological perspectives (Fahmy & Mitchell, 2022; Jackson & Vaughn, 2018; Link et al., 2019; Link et al., 2020; Mallik-Kane & Visher, 2008; Wallace & Wang, 2020) and multidisciplinary research on psychosocial development, health, and health behaviors (Galambos et al., 2008; Kuiper et al., 2018; Reysen et al., 2020; Westenberg et al., 1999; Pailing & Reiners, 2018) to examine whether and to what extent poor mental and physical health stall normative development and contribute to persistence in offending among a sample of justice-involved adolescent offenders. We begin by reviewing core ideas in health-based desistance and then explicate their relevance for the development of psychosocial maturity. We then test these ideas using a sample of young adults who have been convicted of a serious or violent offense.

The Health-based Desistance Framework

Complementing important research examining the role of physical health as a facilitator of crime (Stogner & Gibson, 2010; Stogner et al., 2014), scholars have begun to unpack the effects of both mental and physical health for reentry

[1] Related, there is almost no applied research to date examining whether maturity can be elevated through interventions (Riggs Romaine et al., 2018; see also Mulvey et al., 2014).

and reintegration success and desistance (Fahmy & Mitchell, 2022; Link et al., 2019; Mallik-Kane & Visher, 2008; Wallace & Wang, 2020). For example, drawing widely on research in criminology and other disciplines, Link et al. (2019) advanced a "health-based model of desistance" that draws attention to the roles that mental and physical health may play in a successful exit from crime. The model hypothesizes that the mental and physical health states that returning prisoners have at the time of release affect employment, positive family relations, and financial stability, which, in turn, influence the likelihood of desistance. An initial test of the model using data from US adults indicated several significant indirect pathways through which poor health increased recidivism and reincarceration through problems with employment, family relationships, and/or finances (Link et al., 2019). Focusing on direct (or total) effects of health, Wallace and Wang (2020) found that better in-prison mental health and changes post-release were related to a lower likelihood of recidivism, whereas better in-prison physical health and changes post-release were related to higher recidivism. Thomas and colleagues (2015) also note evidence that poor physical health is associated with lower recidivism risk. It has been suggested that good physical health may be a necessary condition for both engaging in crime and rejoining society (Wallace & Wang, 2020). Therefore, direct and indirect processes linking physical health to recidivism may differ (see Link et al., 2019) and possibly offset.

Compared to studies examining physical health on recidivism, there is a large literature on the association between mental health and offending (Blumenthal & Lavender, 2000; Link et al., 2016; Silver, 2006); studies have documented significant, yet modest, associations between crime and clinical factors including substance abuse (Steadman et al., 1998), treatment non-compliance (Swanson et al., 1997), and psychotic symptoms related to the disorders themselves (Link et al., 1999). At the same time, mental illness as a risk factor for violence and other recidivism is low (Bonta et al., 2014), especially in comparison with basic demographic factors such as age and sex (Link et al., 1992). While much of this research has centered on the relationship between serious mental illnesses such as schizophrenia, schizoaffective, and bipolar disorders, it is also necessary to account for and assess the impact of more ubiquitous mental health conditions such as depression. In one longitudinal analysis of a sample of serious adolescent offenders, depression was found to be a risk factor for aggressive and income-generating offenses (Ozkan et al., 2019). Another recent study examined cross-lagged associations between depression (and anxiety) and offending and found that depression did not significantly influence offending over time; however, it should be noted that this study was unique in that there was more than 10 years between each wave of data collection (Huesmann et al., 2019). Taken together, the effects of depression on offending may operate over shorter developmental time spans, perhaps over the course of months to years. Notably, while Ozkan and colleagues (2019) found depression to be linked to offending in their longitudinal models, they noted more inconsistent results when examining the contemporaneous associations between depression and offending in their

cross-sectional models. These findings hint that a developmental process may connect depression and offending.[2]

It is noteworthy that the concept of "health" is widening to include more holistic considerations (see Fahmy & Mitchell, 2022), which is consistent with arguments that correctional programming for adult offenders with narrow focuses on physical health alone may be insufficient for meeting often complex and multi-faceted health needs (Wallace & Wang, 2020). At a minimum, frameworks for health-based desistance should seek to consider the impact of both physical and mental health (Link et al., 2019; Wallace & Wang, 2020) as well as consider possible indirect developmental processes by which health states may promote desistance (Link et al., 2019). Several recent studies have examined both mental and physical health impacts on reintegration and desistance among adults returning home from prison (Link et al., 2019; Wallace & Wang, 2020) as well as on the ability of adults with mental illness to make progress toward improving their relationship and employment situations (Link et al., 2020). Yet, the health-based desistance framework may be useful for understanding desistance across different periods of the life-course—including during young adulthood. Beyond health's contributions to enabling social forces of desistance (e.g., employment) to take deeper root in adulthood, there is a need to consider whether mental and physical health also affects the more subjective forces of desistance (e.g., positive identity formation) (Link et al., 2019, p. 566), which may be particularly the case during the transitional period to adulthood. To date, left largely unexamined is whether and to what extent poor health states disrupt or slow normative developmental processes.

Psychosocial Maturity Development and Health

The aggregate relationship between age and crime is curvilinear, with crime increasing through adolescence and declining as youth enter young adulthood (Hirschi & Gottfredson, 1983; Laub & Sampson, 2003; Sampson & Laub, 2005). In viewing desistance as a developmental process (Bushway et al., 2003), psychosocial maturity is associated with a reduction in antisocial behavior (Monahan et al., 2009; Monahan et al., 2013; Ozkan & Worrall, 2017) and substance use (Fischer et al., 2007; Ozkan & Worrall, 2017; Riggs Romaine, 2019). Psychosocial maturation is a crucial developmental process that involves attaining a functional level of autonomy and social responsibility (Greenberger, 1984). Greenberger and Sorensen's (1974) model of psychosocial maturity posits that individuals acquire autonomy when they have feelings of control, take initiative, and lack the need to depend on others (self-reliance); have a stronger clarity of oneself, consider life goals, internalize values, and obtain better self-esteem (identity); and develop work skills and experience more work-related aspirations and joy (work orientation).

[2] There is some evidence to suggest that self-control may explain the association between depression and delinquency (Remster, 2014), but not all studies find support for self-control as a mediator of this relationship (Ozkan et al., 2019).

Psychosocial maturity continues to develop beyond the teenage years—extending through age 25 (Monahan et al., 2013). In other words, this developmental facet continues to influence crime well into young adulthood. As prior research has demonstrated that youth with higher levels of psychosocial maturity are more likely to desist from crime irrespective of race/ethnicity (Rocque et al., 2019) and that psychosocial maturity may be a better predictor of desistance than age (Monahan et al., 2013; Pailing & Reniers, 2018), there is an ongoing need for research to identify factors that may contribute to the development of this capacity (Monahan et al., 2013; Ozkan & Worrall, 2017). Recent research finds that social factors, such as school experiences (Abeling-Judge, 2021) and parent relationships (Abeling-Judge, 2020) are positively associated with psychosocial maturity. These findings echo McConochie et al.'s (1974) contention made decades ago that individual characteristics intersect with socialization experiences and "maturing *mental and physical* capabilities to produce unique individual levels of psychosocial maturity" (p. 3, *emphasis added*).

While research utilizing the health-based desistance framework to understand developmental processes and desistance among troubled youth is scarce, there is some evidence consistent with theoretical expectations. For instance, prior research has demonstrated a correlation between psychosocial maturity and depression (Galambos et al., 2008; Morales-Vives & Dueñas, 2018; Pailing & Reniers, 2018). Galambos and colleagues (2008) found depression to be negatively associated with psychosocial maturity among individuals with and without motor disabilities; they suggest that those who are dealing with depression may have lower energy to complete even basic tasks and thus may have reduced psychosocial maturation given inability to deal with challenges associated with the transition to adulthood. In addition to this potential mechanism, there may be a range of other dynamics that theoretically link the two, including that those with greater depression may, as a result, suffer from lower self-esteem, issues with self-concept and self-worth, and may derive less pleasure from success in conventional activities such as employment or other critical bonds to society. While even less research has examined the potential links between physical health and maturity (for an important exception, see Reysen et al., 2020), it is similarly plausible that poor physical health could also affect psychosocial development. For example, regarding work orientation, youth who are unhealthy may be more likely to miss work, and certain health conditions may hinder the ability to perform the job itself. More generally, being in good physical shape likely confers a range of psychological benefits including an improved self-esteem, a stronger sense of mastery, and internalizing the notion that a goal-focused initiative is a worthwhile pursuit that can achieve real benefits. That is, those in better health are likely to be more self-reliant and to have a stronger sense of identity. In short, we suggest that symptoms associated with health conditions and poor health states likely delay the development of psychosocial maturity.

Despite the limited research, scholars have hinted at the importance of investigating the interconnections of health, psychosocial maturity, and behavior more carefully, including in the absence of direct effects between health and crime. For example, Pailing & Reniers (2018) have suggested that "an effect between depression and risk-taking behavior could be indirect, through psychosocial maturity" (p. 10). As delinquent youth with mental health needs are especially likely to experience

difficulties adjusting to adult roles (Steinberg et al., 2004), it is critical to understand how health states indirectly influence offending during the transition to adulthood. While there is a growing literature on the role of health for life-course achievements and behavior change (e.g., Fahmy & Mitchell, 2022; Link et al., 2019, 2020; Mallik-Kane & Visher, 2008; Wallace & Wang, 2020) and strong evidence linking psychosocial maturity to offending (Monahan et al., 2009; Monahan et al., 2013; Ozkan & Worrall, 2017) and substance use (Fischer et al., 2007; Ozkan & Worrall, 2017; Riggs Romaine, 2019), it remains empirically unclear whether experiencing poor health may diminish individuals' development of psychosocial maturity and thus stall normative desistance processes.

Drawing on the health-based desistance framework and the extant literature, we hypothesize that depression will be inversely related to psychosocial maturity, and that better self-rated physical health will be positively related to psychosocial maturity. Further, we hypothesize that psychosocial maturity will be inversely related to offending and substance use. Finally, as consistent with the aforementioned direct effects, we hypothesize significant indirect effects linking mental and physical health states to behavior outcomes through their effects on the development of psychosocial maturity.

Methodology

Data

Pathways to Desistance is a multi-site prospective 11-wave, 7-year study of 1354 serious juvenile offenders (1180 male, 184 female). Pathways took place in Maricopa County (Phoenix), Arizona ($n = 654$) and Philadelphia County, Pennsylvania ($n = 700$). Participants were between the ages of 14 and 17 years at baseline and adjudicated delinquent (or found guilty in criminal court) of a serious offense. Offenses included felonies and more serious misdemeanor offenses (e.g., sex or weapons offenses). Drug offenses were capped at 15% of the male sample and all youth whose cases were transferred to adult court were considered eligible for the study (Schubert et al., 2004). Pathways had a 67% enrollment rate, and prior investigations with these data have revealed that significant differences exist between youth who did and did not enroll in the study. Non-enrolled youth had fewer prior arrests that led to formal charges than enrolled youth (1.5 vs 2.1, respectively), were older at their first arrest (14.2 vs 13.9, respectively) and adjudication (16.1 vs 15.9, respectively), and were less likely to be non-Hispanic Caucasian (20% vs. 25%, respectively; see Schubert et al., 2004 for further sample description). The present study focuses on young adulthood using data from Waves 7 to 10, along with some baseline (Wave 1) data.[3] In addition to a theoretical focus on youth making the transition to adulthood, pragmatically, as we focus on both multiple health-based factors, the present study uses data from these later waves—when both measures have

[3] For clarity, we refer to the 'baseline' interview as Wave 1, and sixth follow-up interview as Wave 7, and so on.

Table 1 Descriptive statistics

	Mean (or %)	SD	Min	Max	Wave[a]	N
Outcomes						
Substance use	0.61	0.99	0.00	9.00	10	1169
General delinquency	1.14	2.04	0.00	14.00	10	1169
Theoretical variables						
Health	3.17	0.71	1.00	4.00	8	1213
Depression	0.40	0.62	0.00	3.67	8	846
Psychosocial maturity	3.27	0.45	1.70	4.00	9	1202
Covariates						
Age	19.01	1.14	17.00	22.00	7	1232
Male	86.4%	-	-	-	1	1354
Black	41.4%	-	-	-	1	1354
Hispanic	33.5%	-	-	-	1	1354
Other	4.8%	-	-	-	1	1354
SES	51.41	12.30	11.00	77.00	1	1354
Phoenix	48.30%	-	-	-	1	1354
Expectations of success	3.64	0.91	1.17	5.00	7	1223
Peer delinquency	1.61	0.73	1.00	5.00	7	1197
Street time	0.72	0.39	0.00	1.00	7	1179
Prior substance use	0.56	0.99	0.00	9.00	7	1231
Prior offending	1.09	2.18	0.00	17.00	7	1231
Prior psychosocial maturity	3.20	0.46	1.83	4.00	7	1227

[a]Wave 1 refers to the 'baseline' interview, and Wave 7 refers to the 'Follow-Up 6' interview and so on

sufficiently valid data. Descriptive statistics are available in Table 1, and a bivariate correlation matrix between focal variables is available in Appendix Table 3.

Measures

Offending

The Self-Reported Offending inventory (see Huizinga et al., 1991) is used to create a variety measure of general offending. Respondents were asked whether they had engaged in the following delinquent acts: destroyed or damaged property; set fires; entered building to steal; shoplifted; bought, received, or sold stolen property; used checks or credit cards illegally; stole car or motorcycle; sold marijuana; sold other illegal drugs; carjacked someone; drove drunk or high; been paid for sex; shot someone; shot at someone; robbed someone with a weapon; robbed someone without a weapon; beaten up someone badly; beaten up someone as part of a gang; been in a fight; and carried a gun. Higher scores indicate a greater participation in a variety of delinquent acts. It is measured at both Waves 10 and 7, where it serves as an outcome and covariate, respectively.

Substance Use

The Substance Use/Abuse Inventory (see Chassin et al., 1991) is used to form a variety measure of substance use. Respondents were asked to indicate whether they had used: alcohol; marijuana or hashish; sedative or tranquilizers; stimulants or amphetamines; cocaine; opiates; ecstasy; hallucinogens; inhalants; or nitrates, odorizers, or rush. Higher scores indicate use of a greater variety of substances during the recall period. As with offending variety, substance use variety is measured at Wave 10 and 7, serving as an outcome and covariate, respectively.

Physical Health

Physical health is a subjective indicator of one's overall self-rated health status (see Furstenberg, 2000). Self-rated health measures have been found to correlate with objective health statuses and serve as a proxy for global health (Wu et al., 2013). Respondents reported whether their overall health was "poor", "fair", "good", or "excellent". This question was part of a short healthcare inventory that asked respondents about their health insurance status and where they go when they need to see a doctor. Self-rated health is measured at Wave 8.[4]

Depression

Depression is measured using the depression subscale from the Brief Symptom Inventory (Derogatis & Meslisarots, 1983). The BSI is a 53-item self-report measure assessing the extent that individuals are bothered in the previous week by symptoms related to nine domains of psychological distress such as somatization, anxiety, phobia, and—of central interest here—depression (e.g., "feeling no interest in things", "feeling blue", "feeling lonely", "feelings of worthlessness"). Response options were coded not at all (0), a little bit (1), moderately (2), quite a bit (3), and extremely (4). Items were averaged to obtain the scale score. It should be noted that BSI scoring resulted in some respondents being coded as having an invalid test (see Mulvey, n.d.); the implication is that missing data on this variable is notable. Depression is measured at Wave 8.

Psychosocial Maturity

Psychosocial maturity is measured using the Psychosocial Maturity Inventory (Greenberger et al., 1975), which taps into developmental autonomy. The PSMI is a 30-item measure that assesses three sub-dimensions of psychosocial maturity including identity (e.g., "I change the way I feel and act so often that I sometimes wonder who the 'real' me is"), self-reliance (e.g., "Luck decides most things that happen to me"), and work orientation (e.g., "I hate to admit it, but I give up on my

[4] We repeated the analysis using a dichotomous measure of health where we compared those with the best health (excellent) to all those reporting less than ideal health (good, fair, or poor) and found substantially similar findings.

work when things go wrong").[5] Respondents reported their level of agreement on a four-point Likert scale and all items were coded such that higher scores indicate greater psychosocial maturity, and an average of the items forms the scale. Psychosocial maturity is used at Wave 9 as a mediator and is also assessed at Wave 7 as a covariate.

Covariates

All covariates are measured antecedent to the developmental process under investigation. We control for key demographic factors including age, race, gender, and socio-economic status. Age is a truncated measure of age at Wave 7, and age-squared was included to capture any curvilinear associations.[6] Race is measured using a series of dummy variables (Black, Hispanic, Other), where White serves as the reference group. Sex is a dummy indicator of male. Finally, SES is measured at baseline using the parent index of social position, which is based upon occupational and educational scores (see Hollingshead, 1971); higher scores indicate greater SES. Peer antisocial behavior is measured by asking youth to report the proportion of their friends that engaged in 12 antisocial behaviors on a five-point Likert scale spanning from "none of them" to "all of them" (Thornberry et al., 1994). To measure youth's perceptions of success, a six-item measure of expectations for work, family, and law-abiding behavior adapted from the NYS prediction of adult success scale is used (see Menard & Elliott, 1996); higher scores indicate more predicted success. To control for differences across locations, we include a dummy indicator for site (1 = Maricopa County, AZ; 0 = Philadelphia County, PA). Street time is measured as the proportion of time on the street (i.e., not in a secure facility) and is included as a covariate where appropriate.[7] Finally, as noted above, we account for psychosocial maturity to examine whether health predicts changes in psychosocial maturity. Likewise, we control for substance use and offending when modeling those outcomes as well to examine whether health states and/or psychosocial maturity levels influence changes in behavioral outcomes.

Analytic Strategy

The present study utilizes generalized structural equation models to estimate a path analysis between self-rated health, depression, psychosocial maturity, substance use and general delinquency. Specifically, generalized structural equation modeling permits

[5] We anticipate that health states affect each dimension of individual adequacy of psychosocial maturity from the Greenberger model in largely similar ways, and thus utilize the composite measure. Work orientation, self-reliance, and identity were highly intercorrelated with correlations ranging from 0.70 to 0.80.

[6] We also repeated the analysis using baseline age and age-squared, in which there was no missing data and the results were substantively similar.

[7] McCuish (2020) recently draws attention to the importance of considering exposure time in desistance research (and especially in group-based trajectory modeling that can lead to false desistance conclusions for a nontrivial proportion of the sample). Roughly 55%, 35%, and 10% of respondents were on the street the entire time Wave 10 recall period, some of the recall period, or none of the recall period, respectively.

assessment of direct and indirect pathways among a blend of categorical (i.e., self-rated health), continuous (i.e., depression, psychosocial maturity), and variety count (i.e., substance use and general delinquency) variables. For variety count outcomes, we display incidence rate ratios (IRRs) to improve interpretation of these associations.[8] As structural equation modeling cannot yield causal estimates from associations alone (Bollen & Pearl, 2013), we include covariates in the model to estimate paths while adjusting for prior levels of mediators/outcomes and several potential confounders discussed above.

As both health measures were assessed for all active study participants for the first time in Wave 8, our study assesses the impact of young adults' health states (average age=20) on psychosocial maturity development 1 year later and examines the implications for desistance from offending and substance use 2 years later (average age=22).[9] We follow the approach taken by Link and colleagues (2019) and regress depression on physical health but recognize the possibility that mental and physical health may influence one another over time. Consistent with theoretical expectations, we regress psychosocial maturity on depression and self-rated health, and we regress substance use and general delinquency on psychosocial maturity. We also regress these two outcomes on both health states. To assess whether there are indirect effects of health states on offending and substance use, we first infer mediation through joint significance test procedures (see Taylor et al., 2008); following this preliminary assessment, we then explicitly test whether self-rated health and/or depression indirectly affect desistance through psychosocial maturity uses bootstrapping which has been shown to be the best approach to testing indirect effects (Hayes, 2009; Hayes & Scharkow, 2013; MacKinnon et al., 2004; Preacher & Hayes, 2008); specifically, tests for significant indirect effects employ biased-corrected bootstrap standard errors with 2500 bootstrap replications. Our generalized structural equation model with its blend of count, continuous, and ordered categorical endogenous variables necessitated the use of numerical integration via montecarlo (see Muthen & Muthen, 1998–2021). We used full information robust maximum likelihood estimation to handle missing data.[10]

Results

Table 2 provides comprehensive results from the generalized structural equation model, including all direct effects on the five endogenous variables. Complementing this table, Fig. 1 provides a concise summary of statistically significant direct effects

[8] Scholars have recently recommended using binomial regression for bounded count data such as variety offending variables (see Britt et al., 2018). We estimated bivariate associations between the significant focal predictors from Table 2 of each variety count outcome using both negative binomial and binomial regressions for bounded count data. In sum, associations were substantively similar across model types and thus significant associations of focal variables with the two bounded count outcomes appear robust in this context.

[9] The self-rated health item was phased beginning in Wave 5 but was not fully implemented into the protocol for all subjects until Wave 8. Specifically, there were only 5, 188, and 604 valid cases on the item in Waves 5, 6, and 7, respectively. In Wave 8, there were 1213 valid cases.

[10] It should be noted that Mplus estimates models conditional on covariates and will invoke listwise deletion; exogenous variables must be explicitly brought into the model to estimate their effects using maximum likelihood. To do so for focal variables, we regressed health states on covariates that were measured antecedent to the assessment of mental and physical health.

between mental and physical health, psychosocial maturity, and the two behavioral outcomes that are the focus of the current study. Net of covariates, physical health is significantly associated with depression; those with better self-rated health report less depression ($b = -0.11$, $p = 0.01$).[11] No other variables had a significant partial association with depression under the conventional alpha level of significance. Several covariates significantly predicted physical health states in young adulthood. Specifically, males are significantly more likely to self-report better physical health ($b = 0.35$, $p = 0.001$). Individuals with greater expectations for success ($b = 0.22$, $p < 0.001$) and those with higher psychosocial maturity ($b = 0.19$, $p = 0.03$) reported better physical health. Using a greater variety of substances was associated with lower physical health ($b = -0.10$, $p = 0.01$), whereas those who engaged in a greater variety of offending reported slightly better health ($b = 0.04$, $p = 0.02$). Age had a significant curvilinear association with self-reported physical health ($b_{Age} = 1.78$, $p = 0.04$; $b_{Age}{}^2 = -0.05$, $p = 0.05$).

Youth with better physical and better mental health states reported higher levels of psychosocial maturity. A one unit increase in self-rated physical health is associated with 0.04 unit average increase in psychosocial maturity ($p = 0.02$, $b_{stdy} = 0.10$), whereas a one unit increase in depression is associated with a 0.09 unit average decrease in psychosocial maturity ($p = 0.001$, $b_{stdxy} = -0.12$). The effects of health states on psychosocial maturity development 1 year later are relatively small, though statistically significant and hold when controlling for earlier levels of psychosocial maturity, demographics, and other covariates. Coupled with findings above, this suggests that self-rated health and depression may each directly impede the normative development of psychosocial maturity, but that some of the potential stunting effects of physical health may operate through its impact on worsened mental health (see Fig. 1). Supporting a moderate level of relative stability across development, youth with higher levels of psychosocial maturity at Wave 7 have significantly higher levels of psychosocial maturity at Wave 9 ($b = 0.37$, $p < 0.001$). Notably, controlling for covariates and prior levels of psychosocial maturity, youth who held higher expectations for success reported significantly higher levels of psychosocial maturity ($b = 0.06$, $p < 0.001$).

Net of covariates, psychosocial maturity significantly influences both substance use and offending. Specifically, a one unit increase in psychosocial maturity is associated with a 26% decrease in the expected variety count of substance use ($b = -0.30$, $p = 0.005$, IRR = 0.74) and a 32% decrease in the expected variety count of offending ($b = -0.39$, $p = 0.002$, IRR = 0.68). Physical and mental health states do not have a direct effect on offending; however, while not significant under the conventional two-sided alpha level, depression ($b = 0.17$, $p = 0.08$) did have a direct partial association with substance use that would have reached significance under a one-sided test. Finally, several covariates were significant predictors of behavioral

[11] As previously noted, we followed Link and colleagues' (2019) approach to regress depression on physical health. To assess direction of association here, we regressed Wave 9 physical health (using OLS as well as ordinal logistic regression) on Wave 8 physical health and depression and found only prior physical health to be significant. We also regressed Wave 9 depression on Wave 8 physical health and depression and found both variables to be significant.

Table 2 Direct effects on health, depression, psychosocial maturity, offending, and substance use

	Health		Depression		Psychosocial maturity		Substance use		Offending	
	b	SE	b	SE	b	SE	b	SE	b	SE
Theoretical variables										
Health	-	-	−0.11**	0.04	0.04*	0.02	−0.12	0.07	−0.12	0.08
Depression	-	-	-	-	−0.09***	0.03	0.17+	0.10	0.00	0.12
Psychosocial maturity	-	-	-	-	-	-	−0.30**	0.11	−0.39***	0.13
Covariates										
Age	1.78*	0.88	−0.68	0.71	−0.32	0.31	3.45**	1.34	0.99	1.38
Age^2	−0.05*	0.02	0.02	0.02	0.01	0.01	−0.09**	0.04	−0.03	0.04
Male	0.35**	0.10	−0.08	0.06	0.04	0.03	0.51***	0.14	1.08***	0.20
Race										
Black	0.03	0.12	−0.01	0.07	0.01	0.04	−0.40**	0.14	−0.15	0.17
Hispanic	−0.04	0.10	0.08	0.07	−0.04	0.03	−0.34*	0.15	−0.06	0.17
Other	0.08	0.17	0.21+	0.12	−0.01	0.06	−0.16	0.26	−0.06	0.29
SES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Phoenix	0.07	0.10	−0.00	0.07	0.04	0.03	−0.13	0.12	−0.02	0.15
Expectations of success	0.22***	0.05	−0.01	0.03	0.06***	0.02	−0.00	0.06	−0.04	0.07
Peer delinquency	−0.10+	0.06	0.06	0.04	−0.02	0.02	0.11+	0.06	0.16+	0.08
Street time	-	-	-	-	-	-	0.41**	0.13	−0.00	0.15
Prior substance use	−0.10*	0.04	−0.00	0.03	-	-	0.29***	0.05	-	-
Prior offending	0.04*	0.02	0.03+	0.02	-	-	-	-	0.16***	0.03
Prior psychosocial maturity	0.20*	0.09	−0.09	0.07	0.37***	0.03	-	-	-	-

*** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.05$, + $p \leq 0.10$. Unstandardized effects. $n = 1084$

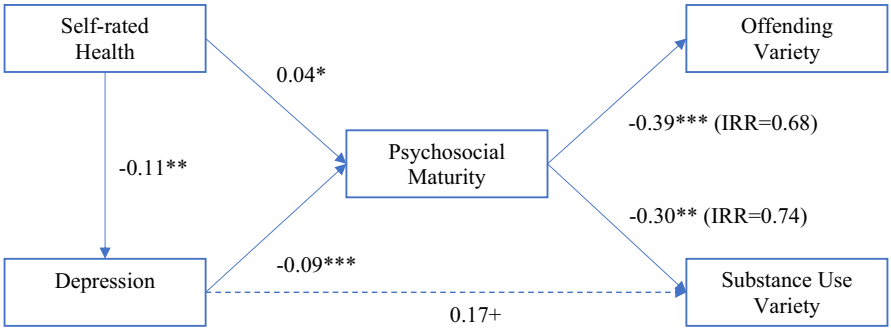

Fig. 1 Summary of significant direct effects. Unstandardized effects. Solid lines (*** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.05$); Dashed lines ($^{+}$ $p \leq 0.10$). IRR = Incidence rate ratio

outcomes. On average, males engaged in 67% greater variety of substance use ($b = 0.51$, $p < 0.001$, IRR = 1.67) and a nearly two-hundred percent greater variety of offending ($b = 1.08$, $p < 0.001$, IRR = 2.95). Compared to White individuals, Black ($b = -0.40$, $p = 0.003$, IRR = 0.67) and Hispanic ($b = $-0.34, $p = 0.02$, IRR = 0.71) young adults report a lower variety of substance use. Not surprisingly, individuals with a higher variety of substance use earlier in adolescence report a higher variety of substance use in young adulthood ($b = 0.29$, $p < 0.001$), and a similar pattern holds for offending ($b = 0.16$, $p < 0.001$). Age exhibits a significant curvilinear partial association with substance use ($b_{Age} = 3.45$, $p = 0.01$; $b_{Age}{}^2 = -0.09$, $p = 0.01$). The proportion of time on the street is significantly associated with substance use variety ($b = 0.40$, $p = 0.002$) but not offending. Finally, while only reaching significance under a one-sided test in these models, those with a greater proportion of delinquent peers in Wave 7 have higher general offending variety ($b = 0.16$, $p = 0.06$) and substance use variety ($b = 0.11$, $p = 0.07$) roughly 3 years later.

The joint significance test—a method of inferring significant indirect effects from pathways where each direct effect along the pathway of interest is significant—supports several significant indirect avenues linking health to changes in behavioral outcomes years later (see Fig. 1). Regarding theorized pathways, the joint significance test identifies four significant two-path indirect effects including (1) *Health → Psychosocial Maturity → Substance Use*, (2) *Health → Psychosocial Maturity → Offending*, (3) *Depression → Psychosocial Maturity → Substance Use*, and (4) *Depression → Psychosocial Maturity → Offending* and two significant three-path indirect effects including (1) *Health → Depression → Psychosocial Maturity → Substance Use*, and (2) *Health → Depression → Pyschosocial Maturity → Offending*. Importantly, bias-corrected and accelerated bootstrapped confidence intervals with 2500 replications support these conclusions, finding relatively modest but statistically significant indirect effects (Appendix Table 4). In sum, findings from these analyses suggest that poor health states—including depression and self-rated health—contribute to a delay in normal desistance processes in young adulthood through the stunting of psychosocial maturity development.

Discussion and Conclusions

Criminological scholarship has little considered the role of physical and mental health states in the life course and how these may interact with or influence the stages in a criminal career. Mental health issues are a major concern among juveniles and emerging adults (World Health Organization, 2021) and recent data suggests that the COVID-19 global pandemic has exacerbated adolescent depression (Barendse et al., 2022). In terms of physical health, well over half of young adults have an unhealthy weight (Ellison-Barnes et al., 2021). How health states shape normative development is an important area of study. Utilizing a developmental and life-course perspective focused on persons making the transition to adulthood, we applied a health-focused model of desistance only previously applied to older adults and asked specifically how health influence offending and substance abuse over time. To do so, we took an age-graded approach to the health-based desistance framework by considering multiple theoretical literatures, speculating that health conditions would have an adverse impact on the achievement of psychosocial maturity. Furthermore, we advance recent work (e.g., see Pailing & Reniers, 2018) by modeling psychosocial maturity explicitly as a mediator between mental health (depression) and offending. And because physical health is linked indirectly with desistance among adults (Link et al., 2019), we simultaneously assess whether self-rated health affects offending via psychosocial maturity. Findings revealed support for both pathways. In this way, the results provide insight as to how health can affect criminal behavior through an indirect, developmental process.

Psychosocial maturity is a critical part of development and strongly predicts adolescent offending (Monahan et al., 2009; Monahan et al., 2013; Ozkan & Worrall, 2017) and other analogous behaviors (Fischer et al., 2007; Ozkan & Worrall, 2017; Riggs Romaine, 2019). While there exists some literature on the correlates of developing psychosocial maturity, only a small amount of studies have examined whether health states impact this achievement, often focusing on general psychosocial factors such as feelings of control over health behaviors (Cotter & Lachman, 2010), perceptions of physical activity (Kaasalainen et al., 2013), and general emotions and behavior (Kuiper et al., 2018), rather than psychosocial maturity as defined in developmental psychology (Greenberger & Sorensen, 1974; Steinberg & Cauffman, 1996). The current findings address this gap in the literature by establishing that health problems correlate with lower levels of psychosocial maturity later in time, and by linking health states with desistance outcomes indirectly through psychosocial maturity. With a potential exception being the direct pathway from depression to substance use 2 years later, it is noteworthy that health states were not directly associated with behavioral outcomes. It is possible that any effect of health on offending/substance use that would be direct would manifest itself in a more contemporaneous fashion.

Symptoms of mental disorders, such as depression, can interact with family problems (Sheeber et al., 2001), peers, and other factors, and can lead to poor attendance and performance in schools (Finning et al., 2019). Likewise, physical health problems may impede one's ability to be self-reliant and lower one's self-perception that they

are oriented toward prosocial activities, such as work. In these ways among others, poor health states stall the natural progression of this critical psychosocial construct, in turn increasing the likelihood that they will succumb to pressures toward deviance. Moreover, poor health states increase substance abuse via less-developed psychosocial maturity. This finding complements existing literature that establishes the reverse: elevated use of alcohol and marijuana suppresses growth in psychosocial maturity (Chassin et al., 2010). Taken together, this implies a potentially complex web of development; damaged health may indirectly lead to offending and substance abuse, which consequently further suppresses the growth of core psychological and social traits and characteristics. Delayed or stunted growth in psychosocial maturity can also lead to further depression (Benson, 2014). Our findings point to the role that mental and physical health plays in these complex developmental processes among youth who have been involved in serious offending behaviors as adolescents. For both system-involved and general populations, how health and psychosocial maturity influence one another across adolescence and young adulthood, and the potential consequences of these developmental processes for entry into and success of life-course trajectories, is an area ripe for research.

Alongside interventions aimed at increasing psychosocial maturity (Riggs Romaine et al., 2018), the findings presented here point to the importance of improving health and well-being as a precursor to healthy maturation. In terms of psychological care, increased resources and effort should be diverted into attending to the mental health needs of young adults. This is paramount given the prevalence of mental health problems among these populations and the current level of unmet needs (Adams et al., 2022).

In terms of physical health, enhanced community-based recreational programs that incorporate physical activity provide a range of both physical and developmental benefits for adolescence and young adults (Piko & Keresztes, 2006), in addition to potential benefits related to structuring routine activities in prosocial ways. Decades of research now support this notion (Kapsal et al., 2019). Moreover, research demonstrates that physical activity reduces depression (Cooney et al., 2014). As a result, exercise interventions may sever at least two pathways in which stalled psychosocial maturity can lead to crime and substance abuse. A complementary angle is to support healthy nutrition in communities, which may be especially critical in certain urban and rural areas that lack supermarkets with fresh produce. Good nutrition has obvious benefits to physical health, but newer findings suggest that it also has salubrious impacts on mental health via the microbiome, specifically for depression (Winter et al., 2019). These core ideas related to promoting better health relevance for policies and programming in correctional settings (see Link et al. 2019).

Health insurance is another critical aspect to this equation, as having access to health care allows trained professionals to intervene in both psychological and physical care. Unfortunately, many Americans remain uninsured; for example, 4.3 million children under the age of 19 did not have health coverage for the entire year (Bunch & Bandekar, 2021) but it is young adults who have the highest rates of being uninsured (Centers for Medicare and Medicaid Services, n.d.). Reforms as part of the Affordable Care Act (ACA) hold the capacity to in part ameliorate insurance undercoverage for young adults through the provision that allows individuals to stay under their parent(s)' insurance coverage until age 26. Still, access to quality health insurance and care could be improved.

While we focused on depression as it is a common mental health issue troubling young adults, some have contended that the BSI is best used in its entirety as a global psychological distress measure (see Skeem et al., 2006 for a brief discussion of this issue). We repeated the analysis (not shown) using the global index comprised of all nine domains (somatization, obsessive–compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobia, paranoia, psychoticism) and the results were substantively similar. This supplemental finding is important for two reasons. It reinforces the importance of having strong global mental health for promoting development of psychosocial maturity. In addition, it also supports the importance of self-rated physical health for promoting psychosocial maturity—as it remained significant even when controlling for this more comprehensive, global indicator of psychological distress. A second possible limitation related to measurement is the fact that an alternative global "maturity of judgment" construct has been advanced by Steinberg and Cauffman (1996), which considers three components (temperance, perspective, and responsibility) formed by six subscales, of which our measure of psychosocial maturity is one of these subscales.[12] More research is needed to improve understanding of when and how different forms of health contribute to alternative dimensions of mature judgment.[13] Data limitations precluded us from assessing specific aspects of physical health, and investigating self-rated health over longer periods of time, including in adolescence. We hope future research will consider these and other fundamental measurement problems when advancing work in this area.

While the present study was able to assess the relationships between health, psychosocial maturity, and offending and substance abuse over nearly 3 years during young adulthood, there are several critical avenues for future research examining health-based desistance processes during the early life course. First, future work should determine whether these findings replicate in other samples of serious youth offending populations outside of Philadelphia and Phoenix. Further, as most delinquents may engage in relatively minor deviance (Moffitt, 1993), research should clarify the degree to which mental and physical health matter for psychosocial maturation in the general population. Second,

[12] Ozkan and Worrall (2017) note that the Steinberg and Cauffman (1996) definition of psychosocial maturity includes temperance and efforts should be made to distinguish between 'self-control' (see Gottfredson and Hirschi, 1990) and psychosocial maturity.

[13] Supplemental analyses (not shown) found that physical health and depression had significant effects on responsibility net of covariates—which is not surprising as the same psychosocial maturity inventory makes up part of this responsibility component (alongside resistance to peer influence). Both health states only had a marginally significant effect on temperance ($p < 0.10$) and no significant effect on perspective. Furthermore, when both outcomes were regressed on health states alongside all three of these dimensions from the Steinberg and Cauffman (1996) model and covariates, temperance (a composite measure of impulse control and suppression of aggression) was the only component that significantly predicted both substance use and offending. Thus, when temperance and perspective are controlled, responsibility did not independently contribute to desistance processes at this developmental period. In sum, direct health effects may be confined to the responsibility component of psychosocial maturity and possible indirect links from health to offending may be more complex with the Steinberg and Cauffman model. Future research should assess how physical and mental health, responsibility, temperance, perspective, and offending each exhibit within-individual change processes over time.

there is a need to understand dynamic within-individual change processes and possible reciprocal effects from early adolescence through late adulthood. It is also important to identify whether there are combined influences of multiple sources of health problems on psychosocial maturity. Third, although the present research identified connections between health and psychosocial maturity, future work should empirically examine *why* exactly physical assnd mental health problems stall psychosocial maturation. For instance, health problems could stall psychosocial development because of a lack of energy to engage in basic tasks (e.g., see Galambos et al., 2008), thereby reducing opportunities to become self-reliant and form a strong sense of self. More research is needed to understand the specific mechanisms at play—a mix of quantitative and qualitative research would be especially informative—as a better understanding of these processes would hold much value for policy and programming. Finally, there is some evidence that certain types of experiences might only induce temporary delays in psychosocial maturity development (see Dmitrieva et al., 2012). Future research should seek to examine the implications of both acute and chronic poor health in young adulthood (and adolescence) on psychosocial maturity development and attainment, documenting any adverse developmental consequences on life successes and criminal behavior as individuals complete the transition to adulthood and beyond.

Appendix

Table 3 Bivariate correlations between focal variables

	SU	O	PM	SH	D
Substance Use (W10)	1	0.52^{***}	-0.13^{***}	-0.12^{***}	0.11^{**}
Offending (W10)	0.52^{***}	1	-0.14^{***}	-0.07^{*}	0.04
Psychosocial Maturity (W9)	-0.10^{***}	-0.10^{***}	1	0.16^{***}	-0.18^{***}
Self-rated Health (W8)	-0.10^{**}	-0.06^{*}	0.16^{***}	1	-0.10^{**}
Depression (W8)	0.11^{**}	0.04	-0.20^{***}	-0.14^{***}	1

Pairwise Pearson Correlations (bottom left); Pairwise Spearman Correlations (top right).

$^{***}p \leq 0.001$, $^{**}p \leq 0.01$, $^{*}p \leq 0.05$.

Table 4 Specific indirect effects of health and depression on offending and substance use

Theoretical pathways	Estimate	95% CI
Two-Path Specific Indirect Effects		
Health→Psychosocial Maturity→Substance Use	−0.013	[−0.033, −0.002]
Health→Psychosocial Maturity→Offending	−0.017	[−0.043, −0.003]
Depression→Psychosocial Maturity→Substance Use	0.027	[0.007, 0.056]
Depression→Psychosocial Maturity→Offending	0.035	[0.011, 0.072]
Three-Path Specific Indirect Effects		
Health→Depression→Psychosocial Maturity→Substance Use	−0.003	[−0.009, −0.001]
Health→Depression→Psychosocial Maturity→Offending	−0.004	[−0.011, −0.001]

Unstandardized coefficients. Bootstrapped standard errors with 2500 replications. All specific indirect effects significant ($p < 0.05$). $n = 1084$.

Declarations

Conflict of interest The authors declare no competing interests.

References

Abeling-Judge, D. (2020). Facilitating maturation through social bonds among delinquent youth in the transition to adulthood. *Journal of Developmental and Life-Course Criminology, 6*(4), 448–476.

Abeling-Judge, D. (2021). The value of school: Educational experiences and maturational growth among delinquent youth. *Journal of Developmental and Life-Course Criminology, 7*(3), 385–419.

Adams, S. H., Schaub, J. P., Nagata, J. M., Park, M. J., Brindis, C. D., & Irwin, C. E., Jr. (2022). Young adult anxiety or depressive symptoms and mental health service utilization during the COVID-19 pandemic. *Journal of Adolescent Health, 70*(6), 985–988.

Arnett, J. J. (2000). A theory of development from the late teens through the twenties. *American Psychologist, 55*, 469–480.

Barendse, M., Flannery, J., Cavanagh, C., Aristizabal, M., Becker, S. P., Berger, E., ... & Pfeifer, J. (2022). Longitudinal change in adolescent depression and anxiety symptoms from before to during the COVID-19 pandemic: A collaborative of 12 samples from 3 countries. *Journal of Research on Adolescence*. https://doi.org/10.1111/jora.12781

Benson, J. E. (2014). Reevaluating the "subjective weathering" hypothesis: Subjective aging, coping resources, and the stress process. *Journal of Health and Social Behavior, 55*(1), 73–90.

Blumenthal, S., & Lavender, T. (2000). Violence and mental disorder. London, England: The Zito Trust.

Bollen, K. A., & Pearl, J. (2013). Eight myths about causality and structural equation models. In S. L. Morgan (Ed.), *Handbook of causal analysis for social research* (pp. 301–328). New York, NY: Springer.

Bonnie, R. J., Stroud, C., & Breiner, H. (Eds.). (2015). *Investing in the health and well-being of young adults*. National Academies Press.

Bonta, J., Blais, J., & Wilson, H. A. (2014). A theoretically informed meta-analysis of the risk for general and violent recidivism for mentally disordered offenders. *Aggression and Violent Behavior, 19*, 278–287.

Britt, C. L., Rocque, M., & Zimmerman, G. M. (2018). The analysis of bounded count data in criminology. *Journal of Quantitative Criminology, 34*, 591–607.

Bunch, L. N., & Bandekar, A. U. (2021). Changes in children's health coverage varied by poverty status from 2018 to 2020. U.S. Census Bureau. Retrieved from: https://www.census.gov/library/stories/2021/09/uninsured-rates-for-children-in-poverty-increased-2018-2020.html. Accessed 1 Sept 2022.

Bushway, S. D., Thornberry, T. P., & Krohn, M. D. (2003). Desistance as a developmental process: A comparison of static and dynamic approaches. *Journal of Quantitative Criminology, 19*, 129–153.

Centers for Medicare and Medicaid Services. (n.d.). *Young adults and the affordable care act: Protecting young adults and eliminating burdens on families and businesses* [Fact Sheet]. https://www.cms.gov/CCIIO/Resources/Files/adult_child_fact_sheet. Accessed 1 Sept 2022.

Chassin, L., Rogosch, F., & Barrera, M. (1991). Substance use and symptomatology among adolescent children of alcoholics. *Journal of Abnormal Psychology, 100*(4), 449–463.

Chassin, L., Dmitrieva, J., Modecki, K., Steinberg, L., Cauffman, E., Piquero, A. R., Knight, G. P., & Losoya, S. H. (2010). Does adolescent alcohol and marijuana use predict suppressed growth in psychosocial maturity among male juvenile offenders? *Psychology of Addictive Behaviors, 24*(1), 48–60.

Cooney, G., Dwan, K., & Mead, G. (2014). Exercise for depression. *Journal of the American Medical Association, 311*, 2432–2433.

Cotter, K. A., & Lachman, M. E. (2010). Psychosocial and behavioural contributors to health: Age-related increases in physical disability are reduced by physical fitness. *Psychology & Health, 25*(7), 805–820.

Derogatis, L., & Melisaratos, N. (1983). The Brief Symptom Inventory: An introductory report. *Psychological Medicine, 13*, 595–605.

Dmitrieva, J., Monahan, K. C., Cauffman, E., & Steinberg, L. (2012). Arrested development: The effects of incarceration on the development of psychosocial maturity. *Development and Psychopathology, 34*, 1073–1090.

Ellison-Barnes, A., Johnson, S., & Gudzune, K. (2021). Trends in obesity prevalence among adults aged 18 through 25 years, 1976–2018. *Journal of the American Medical Association, 326*(20), 2073–2074.

Fahmy, C., & Mitchell, M. M. (2022). Examining recidivism during reentry: Proposing a holistic model of health and wellbeing. *Journal of Criminal Justice*. https://doi.org/10.1016/j.jcrimjus.2022.101958

Finning, K., Ukoumunne, O. C., Ford, T., Danielsson-Waters, E., Shaw, L., De Jager, I. R., ... & Moore, D. A. (2019). The association between child and adolescent depression and poor attendance at school: A systematic review and meta-analysis. *Journal of Affective Disorders*, *245*, 928–938

Fischer, J. L., Forthun, L. F., Pidcock, B. W., & Dowd, D. A. (2007). Parent relationships, emotion regulation, psychosocial maturity and college student alcohol use problems. *Journal of Youth Adolescence, 36*, 912–926.

Furstenberg, Frank F. (2000) Selected items from ongoing research from the MacArthur Network on Transitions to Adulthood.

Galambos, N. L., Magill-Evans, J., & Darrah, J. (2008). Psychosocial maturity in the transition to adulthood for people with and without motor disabilities. *Rehabilitation Psychology, 53*(4), 498–504.

Greenberger, E. (1984). Defining psychosocial maturity in adolescence. *Advances in Child Behavioral Analysis and Therapy, 3*, 1–37.

Greenberger, E., & Sorensen, A. B. (1974). Toward a concept of psychosocial maturity. *Journal of Youth and Adolescence, 3*(4), 329–358.

Greenberger, E., Josselson, R., Knerr, C., & Knerr, B. (1975). The measurement and structure of psychosocial maturity. *Journal of Youth and Adolescence, 4*, 127–143.

Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs, 76*, 408–420.

Hayes, A. F., & Scharkow, M. (2013). The relative trustworthiness of inferential tests of the indirect effect in statistical mediation analysis: Does method really matter? *Psychological Science, 24*, 1918–1927.

Hirschi, T., & Gottfredson, M. (1983). Age and the explanation of crime. *American Journal of Sociology, 89*(3), 552–584.

Hollingshead, A. B. (1971). Commentary on the indiscriminate state of social class measurement. *Social Forces, 49*, 563–567.

Huesmann, L. R., Boxer, P., Dubow, E. F., & Smith, C. (2019). Anxiety, depression, and offending in the Columbia County longitudinal study: A prospective analysis from late adolescence to middle adulthood. *Journal of Criminal Justice, 62*, 35–41.

Huizinga, D., Esbensen, F. A., & Weiher, A. W. (1991). Are there multiple paths to delinquency? *The Journal of Criminal Law and Criminology, 82*, 83–118.

Icenogle, G., Steinberg, L., Duell, N., Chein, J., Chang, L., Chaudhary, N., … Bacchini, D. (2019). Adolescents' cognitive capacity reaches adult levels prior to their psychosocial maturity: Evidence for a "maturity gap" in a multinational, cross-sectional sample. *Law and Human Behavior*, *43*, 69–85.

Jackson, D. B., & Vaughn, M. G. (2018). Promoting health equity to prevent crime. *Preventive Medicine, 113*, 91–94.

Kaasalainen, K. S., Kasila, K., Villberg, J., Komulainen, J., & Poskiparta, M. (2013). A cross-sectional study of low physical fitness, self-rated fitness and psychosocial factors in a sample of Finnish 18- to 64-year-old men. *BMC Public Health, 13*, 1–10.

Kapsal, N. J., Dicke, T., Morin, A. J., Vasconcellos, D., Maïano, C., Lee, J., & Lonsdale, C. (2019). Effects of physical activity on the physical and psychosocial health of youth with intellectual disabilities: A systematic review and meta-analysis. *Journal of Physical Activity and Health, 16*(12), 1187–2119.

Kuiper, J., Broer, J., & van der Wouden, J. C. (2018). Association between physical exercise and psychosocial problems in 96617 Dutch adolescents in secondary education: A cross-sectional study. *European Journal of Public Health, 28*(3), 468–473.

Laub, J. H., & Sampson, R. J. (2001). Understanding desistance from crime. *Crime and Justice, 28*, 1–69.

Laub, J. H., & Sampson, R. J. (2003). *Shared beginnings, divergent lives: Delinquent boys to age 70*. Harvard University Press.

Link, B. G., Andrews, H., & Cullen, F. T. (1992). The violent and illegal behavior of mental patients reconsidered. *American Sociological Review, 57*, 275–292.

Link, B. G., Monahan, J., Stueve, A., & Cullen, F. (1999). Real in their consequences: A sociological approach to understanding the association between psychotic symptoms and violence. *American Sociological Review, 64*(2), 316–332. https://doi.org/10.2307/2657535

Link, N. W., Cullen, F. T., Agnew, R., & Link, B. G. (2016). Can general strain theory help us understand violent behaviors among people with mental illnesses? *Justice Quarterly, 33*(4), 729–754.

Link, N. W., Ward, J. T., & Stansfield, R. (2019). Consequences of mental and physical health for reentry and recidivism: Toward a health-based model of desistance. *Criminology, 57*(3), 544–573.

Link, N. W., Ward, J. T., & Link, B. G. (2020). Getting people with serious mental illnesses on track: Insights from the health-based model of desistance. *Canadian Journal of Criminology and Criminal Justice, 62*(3), 71–95.

MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research, 39*, 99.

Mallik-Kane, K., & Visher, C. A. (2008). *Health and prisoner reentry: How physical, mental, and substance abuse conditions shape the process of reintegration*. The Urban Institute.

McConochie, D. (1974). An exploratory examination of individual, family, and school influences on psychosocial maturity. Center for Social Organization of Schools.

McCuish, E. C. (2020). Seductions of exposure time: The mismeasurement of desistance among persons involved in frequent and serious offending. *Canadian Journal of Criminology and Criminal Justice, 62*, 29–50.

McCuish, E., Lussier, P., & Rocque, M. (2020). Maturation beyond age: Interrelationships among psychosocial, adult role, and identity maturation and their implications for desistance from crime. *Journal of Youth and Adolescence, 49*, 479–493.

Menard, S. and Elliott, D. S. (1996). Prediction of adult success using stepwise logistic regression analysis. A report prepared for the MacArthur Foundation by the MacArthur Chicago-Denver Neighborhood Project.

Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review, 100*, 674–701.

Monahan, K. C., Steinberg, L., Cauffman, E., & Mulvey, E. (2009). Trajectories of antisocial behavior and psychosocial maturity from adolescence to young adulthood. *Developmental Psychology, 45*, 1654–1668.

Monahan, K. C., Steinberg, L., Cauffman, E., & Mulvey, E. P. (2013). Psychosocial (im)maturity from adolescence to early adulthood: Distinguishing between adolescence-limited and persisting antisocial behavior. *Development and Psychopathology, 25*, 1093–1105.

Morales-Vives, F., & Dueñas, J. M. (2018). Predicting suicidal ideation in adolescent boys and girls: The role of psychosocial maturity, personality traits, depression and life satisfaction. *The Spanish Journal of Psychology, 21*(10), 1–12.

Mulvey, E.P., Schubert, C.A., & Piquero, A. (2014). Pathways to desistance—Final technical report. Retrieved from: https://www.ojp.gov/pdffiles1/nij/grants/244689.pdf. Accessed 1 Sept 2022.
Ozkan, T., Rocque, M., & Posick, C. (2019). Reconsidering the link between depression and crime: A longitudinal assessment. *Criminal Justice and Behavior, 46*(7), 961–979.
Ozkan, T., & Worrall, J. L. (2017). A psychosocial test of the maturity gap thesis. *Criminal Justice and Behavior, 44*(6), 815–842.
Pailing, A. N., & Reniers, R. L. E. P. (2018). Depressive and socially anxious symptoms, psychosocial maturity, and risk perception: Associations with risk-taking behaviour. *PLoS One, 13*(8), 1–16.
Piko, B. F., & Keresztes, N. (2006). Physical activity, psychosocial health and life goals among youth. *Journal of Community Health, 31*(2), 136–145.
Piotrowski, K., Brzezińska, A. I., & Pietrzak, J. (2014). Four statuses of adulthood: Adult roles, psychosocial maturity and identity formation in emerging adulthood. *Health Psychology Report, 1*, 52–62.
Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*, 879–891.
Remster, B. (2014). Self-control and the depression–delinquency link. *Deviant Behavior, 35*, 66–84.
Reysen, S., Plante, C. N., Lam, T. Q., Kamble, S. V., Katzarska-Miller, I., Assis, N., Packard, G., & Moretti, E. G. (2020). Maturity and well-being: Consistent associations across samples and measures. *Journal of Wellness, 2*(2), 1–8.
Riggs Romaine, C. L. (2019). Psychosocial maturity and risk-taking in emerging adults: Extending our understanding beyond delinquency. *Emerging Adulthood, 7*(4), 243–257.
Riggs Romaine, C. L., Kemp, K., Giallella, C. L., Goldstein, N. E. S., Serico, J., & Kelley, S. (2018). Can we hasten development? Effects of treatment on psychosocial maturity. *International Journal of Offender Therapy and Comparative Criminology, 62*(9), 2857–2876.
Rocque, M. (2015). The lost concept: The (re)emerging link between maturation and desistance from crime. *Criminology & Criminal Justice, 15*, 340–360.
Rocque, M., Beckley, A. L., & Piquero, A. R. (2019). Psychosocial maturation, race, and desistance from crime. *Journal of Youth and Adolescence, 48*, 1403–1417.
Sampson, R. J., & Laub, J. H. (2005). A life-course view of the development of crime. *Annals of the American Academy of Political and Social Science, 602*(12), 12–45.
Schubert, C. A., Mulvey, E. P., Steinberg, L., Cauffman, E., Losoya, S. H., Hecker, T., Chassin, L., & Knight, G. P. (2004). Operational lessons from the pathways to desistance project. *Youth Violence and Juvenile Justice, 2*(3), 237–255.
Sheeber, L., Hops, H., & Davis, B. (2001). Family processes in adolescent depression. *Clinical Child and Family Psychology Review, 4*(1), 19–35.
Silver, E. (2006). Understanding the relationship between mental disorder and violence: The need for a criminological perspective. *Law and Human Behavior, 30*, 685–706.
Skeem, J. L., Schubert, C., Odgers, C., Mulvey, E. P., Gardner, W., & Lidz, C. (2006). Psychiatric symptoms and community violence among high-risk patients: A test of the relationship at the weekly level. *Journal of Consulting and Clinical Psychology, 74*(5), 967.
Steadman, H. J., Mulvey, E. P., Monahan, J., Robbins, P. C., Appelbaum, P. S., Grisso, T., Roth, L., & Silver, E. (1998). Violence by people discharged from acute psychiatric inpatient facilities and by others in the same neighborhoods. *Archives of General Psychiatry, 55*, 393–401.
Steinberg, L. (2014). *Age of opportunity. Lessons from the new science of adolescence*. Houghton Mifflin Harcourt.
Steinberg, L., & Cauffman, L. (1996). Maturity of judgment in adolescence: Psychosocial factors in adolescent decision making. *Law and Human Behavior, 20*(3), 249–272.
Steinberg, L., Chung, H. L., & Little, M. (2004). Reentry of young offenders from the justice system: A developmental perspective. *Youth Violence and Juvenile Justice, 2*, 21–38.
Stogner, J., & Gibson, C. L. (2010). Healthy, wealthy, and wise: Incorporating health issues as a source of strain in Agnew's general strain theory. *Journal of Criminal Justice, 38*, 1150–1159.
Stogner, J., Gibson, C. L., & Miller, J. M. (2014). Examining the reciprocal nature of the health-violence relationship: Results from a nationally representative sample. *Justice Quarterly, 31*, 473–499.
Swanson, J. W., Estroff, S., Swartz, M., Borum, R., Lachicotte, W., Zimmer, C., & Wagner, R. (1997). Violence and severe mental disorder in clinical and community populations: The effects of psychotic symptoms, comorbidity, and lack of treatment. *Psychiatry, 60*, 1–22.
Taylor, A. B., MacKinnon, D. P., & Tein, J.-Y. (2008). Tests of the three-path mediated effect. *Organizational Research Methods, 11*, 241–269.

Thomas, E. G., Spittal, M. J., Taxman, F. S., & Kinner, S. A. (2015). Health-related factors predict return to custody in a large cohort of ex-prisoners: New approaches to predicting re-incarceration. *Health & Justice, 3*(10), 1–13.

Thornberry, T. P., Lizotte, A. J., Krohn, M. D., Farnworth, M., & Jang, S. J. (1994). Delinquent peers, beliefs, and delinquent behavior: A longitudinal test of interactional theory. *Criminology, 32*, 47–83.

Wallace, D., & Wang, X. (2020). Does in-prison physical and mental health impact recidivism? *SSM-Population Health, 11*, 100569.

Westenberg, P. M., Siebelink, B. M., Warmenhoven, N. J. C., & Treffers, P. D. A. (1999). Separation anxiety and overanxious disorders: Relations to age and level of psychosocial maturity. *Journal of the American Academy of Child Adolescent Psychology, 38*(8), 1000–1007.

Winter, G., Hart, R. A., Charlesworth, R. P., & Sharpley, C. F. (2019). Gut microbiome and depression: What we know and what we need to know. *Reviews in the Neurosciences, 29*(6), 629–643.

World Health Organization (2021). *Adolescent mental health* [Fact Sheet]. Retrieved from, https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health. Accessed 1 Sept 2022.

Wu, S., Wang, R., Zhao, Y., Ma, X., Wu, M., Yan, X., & He, J. (2013). The relationship between self-rated health and objective health status: A population-based study. *BMC Public Health, 13*, 1–9.

Authors and Affiliations

Jeffrey T. Ward[1] · Nathan W. Link[2] · Megan Forney[3]

Nathan W. Link
nathan.link@rutgers.edu

Megan Forney
mforney@monmouth.edu

[1] Department of Criminal Justice, Temple University, 1115 Polett Walk, Philadelphia, PA 19122, USA

[2] Department of Sociology, Anthropology, & Criminal Justice, Rutgers University-Camden, 405-07 Cooper St, Camden, NJ 08102, USA

[3] Department of Criminal Justice, Monmouth University, 400 Cedar Avenue, West Long Branch, NJ 07764, USA