

	B) Baseline association between predictor and outcome due to:		
A) Stability in the outcome due to:	Factors with temporary effects	Factors with temporary and factors with stable effects	Factors with stable effects
Underlying liability	Scenario 1 – Non-shared liability, shared baseline momentary effects. <i>See supplemental Figure S1</i> Example: A researcher wants to examine if the pace (slope) of children’s cognitive development after starting school is predicted by infections in the first years of life. Cognitive performance is reported as percentile performance of children of the same age. The researcher makes the following assumptions: A) Stability in cognitive performance (percentile) across childhood is due to a stable underlying liability/potential, and there are no causal effects of cognitive performance from one time point to the next. B) Infections (predictor) and cognitive performance (outcome) do not share underlying liability, but they may be affected by some of the same temporary baseline effects. For example, if a child happens to have an ongoing cold at the time of baseline assessment, the parent may be biased towards reporting more respiratory infections than the parent of a child that happened not to have a cold at the baseline assessment, even if they have the same history of respiratory infections. An ongoing cold at baseline may also affect the child’s baseline cognitive performance, but this effect is not carried forward to later time points.	Scenario 2 – Shared liability and shared momentary effects. <i>See supplemental Figure S2</i> Example: A researcher wants to examine if poor sleep habits predict decreased cognitive performance (negative slope) in people after retirement. The researcher makes the following assumptions: A) Stability in cognitive performance (outcome) in older people is due to an underlying liability/potential, with no causal effects of cognitive performance from one time point to the next. B) Cognitive performance and sleeping habits (predictor) may share some liability (e.g., brain health). Baseline assessment of cognitive performance and sleeping habits may also be affected by some of the same temporary effects. For example, a person who happened to sleep extraordinarily poorly the night before the assessment, may have obtained a lower score than if the cognitive assessment was done a day earlier, and this poor night’s sleep may also have biased the self-reported towards more sleeping problems. The effect on cognitive performance of this extraordinarily poor night’s sleep is not carried forward.	Scenario 3 –Shared liability. <i>See supplemental Figure S3</i> Example: A researcher wants to examine if parental education predicts development (slope) in musical perception in children starting in a day care program with special focus on music. They make the following assumptions: A) Stability in musical perception (outcome) in these selected young children is entirely due to an underlying liability. There are no causal effects of musical perception performance at one time point to the next among these children. B) Parental education (predictor) and children’s musical ability share some underlying liability/potential. Baseline assessment of children’s musical perception and parental education do not share any factors with temporary effects.

Underlying Liability and lagged effects	Scenario 4 - Shared waning residual effects. <i>See supplemental Figure S4</i> Example: A researcher wants to examine if not feeling close to friends predicts increase (slope) in people's alcohol use after retirement and makes the following assumptions: A) Stability in alcohol use (outcome) is due to an underlying liability as well as lagged paths (i.e., heavy drinking at one time point increases tolerance and addiction to alcohol, thus maintaining the risk of drinking heavily at the next time point). B) Not feeling close to friends (predictor) and alcohol use do not share liability, but baseline factors such as a mild depression in response to getting retired, may lead to temporarily more drinking as well as under-reporting of close friends. This effect on drinking is carried forward, but wanes gradually.	Scenario 5 –Shared liability and shared waning residual effects. <i>See supplemental Figure S5</i> Example: A researcher wants to examine if loneliness predicts increase (slope) in depression over time and makes the following assumptions: A) Stability in depression (outcome) is due to an underlying liability as well as lagged effects (i.e., depression at one time point has negative consequences for a person's life, thus maintaining the depressive symptoms). B) Loneliness (predictor) and depression share some liability (e.g., genetic effects). In addition, baseline measures of loneliness and depression are affected by some of the same factors with temporary effects (e.g., a recent serious quarrel with a partner). This effect on depression is carried forward, but wanes gradually.	Scenario 6 – Shared liability, lagged residuals. <i>See supplemental Figure S6</i> Example: A researcher wants to examine if living alone predicts decrease (negative slope) in mental health over time after becoming unemployed. They make the following assumptions: A) Stability in mental health (outcome) is due to an underlying liability as well as lagged effects (i.e., poor mental health has negative consequences that maintain such problems). B) Living alone (predictor) and liability for mental health problems share some causes (e.g., genetics). The baseline mental health measure and report of marital status do not share any factors with temporary effects.
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Lagged effects	Scenario 7 – Shared waning effects. <i>See supplemental Figure S7</i> Example: A researcher wants to examine if self-efficacy predicts increase in athletic performance among young people recently enrolled in an elite football team. They assume the following: A) In this highly selected group of athletes, there are only negligible individual differences in their underlying liability/potential for performance. Stability in performance is entirely due to lagged effects from one time point to the next (e.g., high performance at one time point leads to extra attention from the coach and to being allowed to play important matches for the team, thus maintaining the high performance). B) Baseline measures of self-efficacy (predictor) and athletic performance (outcome) share some causes with temporary effects (e.g., recent stressful events that decrease self-efficacy and disturbs athletic performance). This effect on athletic performance is carried forward, but wanes gradually.		
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Notes: Figures S1 to S7 are Supplemental Figures illustrating the assumed true data in the scenarios.