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## **Predicting Future Well-Being Among United States Youth Who Attempted Suicide and Survived**

Bingjie Tong

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Predicting Future Well-Being Among United States Youth Who Attempted Suicide and Survived

by

Bingjie Tong

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Master of Arts  
Department of Psychology  
College of Arts and Sciences  
University of South Florida

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## **DEDICATION**

I dedicate this thesis to my grandparents, parents, and younger siblings for their unconditional love and endless support. I would also like to extend special thanks to my orange tabby cat, Miaomiao, for the companionship.

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## ABSTRACT

After a non-fatal suicide attempt, survivors commonly endorse the goal of building a life worth living; however, there have been few investigations of good outcomes after non-fatal suicide attempts. Our prior study of a national sample of United States youth found that 7 years after a non-fatal suicide attempt, approximately 13% of adolescents (75 out of 574) achieved a well-being profile at or above the top quartile of non-suicidal peers, a status which we term as good future well-being (FWB). The present investigation focused on potential predictors of FWB, including self-esteem, positive mood, family connectedness, and school belongingness, drawn from Wave I and Wave III data from the National Longitudinal Study of Adolescent to Adult Health (Add Health). Wave I self-esteem (OR = 3.49, 95% CI [2.01, 6.08],  $p < 0.001$ ), positive mood (OR = 1.81, 95% CI: [1.08, 3.03],  $p < 0.05$ ), family connectedness (OR = 1.82, 95% CI [1.14, 2.90],  $p < 0.05$ ), and school belongingness (OR = 1.69, 95% CI [1.14, 2.52],  $p < 0.05$ ) respectively predicted a higher likelihood of FWB at Wave III. After controlling Wave I self-esteem, positive mood, family connectedness, and school belongingness were no longer significant predictors of FWB ( $p > 0.05$ ). By contrast, Wave I self-esteem remained a robust predictive factor of Wave III FWB (OR = 4.97, 95% CI: 2.53 - 9.76],  $p < 0.001$ ), after controlling for demographic (e.g., biological sex) and clinical variables (e.g., depression, suicide attempt severity, positive mood). The current findings suggest the value of incorporating self-esteem into routine assessment and treatment-outcome studies of suicide-related phenomena.



## **CHAPTER ONE:**

### **INTRODUCTION**

Suicide remains the top 10th leading cause of death across all age groups. In 2019 over 1.4 million American adults reported at least one suicide attempt over the past year (Stone et al., 2021). Previous investigations focused predominantly on risk factors and prolonged adverse outcomes post-attempt (Bertolote, 2004). While many survivors endorse the goal of building a meaningful and happy life after a non-fatal suicide attempt, little evidence exists regarding the prevalence of such relatively healthy outcomes or protective factors that predict healthy outcomes (Tong, Kashdan, et al., 2021).

We recently provided one of the first estimates of the prevalence of psychological well-being among young suicide attempt survivors. In a nationally representative sample of youth drawn from the National Longitudinal Study of Adolescent to Adult Health (Add Health), 75 out of 574 (13%) participants who reported at least one suicide attempt exhibited a high level of psychological well-being, or what we termed good future well-being (FWB) 7 years after (Tong, Devendorf, et al., 2021). The current project builds upon this finding by examining factors that may predict the likelihood of obtaining good FWB after a non-fatal suicide attempt. Using information available in the Add Health dataset, the current investigation focused on four variables, selected for their empirical relevance related to suicide risks, including self-esteem (Emler, 2001), positive mood (Joiner et al., 2001), family connectedness (Randell et al., 2006), and school belongingness (Mata et al., 2012). In the general population, these variables were also found to maintain and restore good psychological well-being (Freire & Ferreira, 2020; Jose et al.,

2012; Pernice-Duca, 2010; Tugade et al., 2004). The current study investigated whether these factors predict psychological well-being among people who attempted suicide and survived.

### **Suicide Attempts Among Adolescents**

In recent years (2016-2018), despite efforts invested into suicide prevention, suicide rates among young people (age:10-24) increased (Curtin, 2020). Unfortunately, a large group of teenagers has a lived experience of a suicide attempt. In 2019, approximately 9% of high school-aged youths reported at least one suicide attempt over the past year (Ivey-Stephenson et al., 2020).

Investigations of long-term psychosocial outcomes after non-fatal suicide attempts often find that these survivors experience a range of adverse outcomes (Fridell et al., 1996; Goldman-Mellor et al., 2014; Spirito et al., 1992; Suokas et al., 2001). Relative to the general population, people with a history of suicide attempts are at a substantially increased risk for future death by suicide (Hawton & Fagg, 1988; Jenkins et al., 2002; Tidemalm et al., 2008). Among adolescents, approximately 42% of reattempts occur within 2 years after the initial attempt (Bridge et al., 2006). Compared to non-attempters, young people who attempted suicide and survived were more likely to develop mental health problems (e.g., depression), physical health problems (e.g., metabolic syndrome), interpersonal relationship issues (e.g., intimate partner abuse, violence), and future unemployment (Goldman-Mellor et al., 2014). These findings underscore the often problematic aftermath of suicidal behaviors.

As suicide risk rises during adolescence (Czyz & King, 2015; Nock et al., 2013), many studies demonstrated heterogeneity in developmental trajectories of suicide-related behaviors, including that a high percentage of the survivors experienced low or reduced suicide risk from adolescence through adulthood. A 14-year longitudinal study with 180 adolescents who were

once suicidal revealed that 77% of participants experienced dramatically lower suicidal risks or sustained low suicide risk from adolescence to young adulthood (Goldston et al., 2016). An 11-year study with 2,233 Canadian youth revealed decreases in the percentage of people who attempted suicide over the past year from 5.6% during adolescence to 1.0% during the transition to adulthood (Geoffroy et al., 2020).

Preliminary data document the presence of salutary outcomes and healthy functioning among people who were once suicidal. In a cross-sectional study with military personnel, the majority of those recovering from suicidal thoughts reported a comparable level of happiness and meaning in life within a year as the non-suicidal participants (Bryan et al., 2021). Analyzing a nationally representative sample of youth in a longitudinal design, we found that approximately 13% of participants who survived a suicide attempt during adolescence achieved a high level of psychological well-being 7 years after, compared to the 26% of their non-suicidal peers (Tong, Devendorf, et al., 2021). In other words, it is evident that a history of a suicide attempt reduces but does not preclude the likelihood of future good psychological well-being. One key unresolved issue concerns the mechanisms that predict or enhance the likelihood of good psychological well-being among suicide attempt survivors.

### **Importance of Investigating Well-Being as an Outcome**

Broadly in psychology and psychiatry research, traditional clinical endpoints refer to the presence or absence of disorders and symptoms (Suldo & Shaffer, 2008), typically with symptom reduction considered as the primary outcome (Keller, 2003). However, evidence suggests that many factors that drive mental health symptoms are not always the same as factors that predict well-being (Huppert, 2009). For example, women are more likely to be diagnosed with depression than men (Albert, 2015), but the impact of gender on psychological well-being is

unclear (Huppert, 2009). In clinical practice, interventions such as Cognitive Behavior Therapy (CBT) are effective in reducing depressive symptoms yet show less efficacy at enhancing well-being (Widnall et al., 2020). These findings suggest that optimal mental health is not simply the absence of mental health symptoms, indicating that psychological well-being is worthy of investigation in its own right (Keyes, 2005). Finally, when clients seeking mental health treatment are surveyed, their priorities are not only to achieve a symptom-free state but also to obtain good well-being and achieve a life that is fulfilling, with improved social relationships and increased health behaviors, such as good coping skills (Battle et al., 2010). Indeed, expanding the research and clinical focus to include well-being indexes as outcome variables may complement and even improve the long-term impact of the current suicide prevention protocols.

### **Conceptualizing Psychological Well-Being**

Well-being is a construct that captures an important aspect of human functioning and experiences (Ryan & Deci, 2001). Traditionally, two types of well-being frameworks have been distinguished: 1) hedonic well-being, which emphasizes pleasurable experiences; 2) eudaimonic well-being, which represents self-actualization. Diener's Subjective Well-Being Model (SWB) assesses hedonic well-being, including life satisfaction, positive and negative mood (Diener, 1984). Ryff's Psychological Well-Being Model (PWB), on the other hand, emphasizes eudaimonic well-being or congruence between people's life activities with their potentials and values, including six functioning domains, such as autonomy, self-acceptance, and positive relationships (Ryff & Keyes, 1995). Based on these two models and the items available in Add Health, we constructed a well-being battery that incorporated the following 5 domains: 1) *self-*

*acceptance, 2) life satisfaction, 3) positive mood, 4) infrequent negative mood, and 5) positive relationships with parents* (Tong, Devendorf, et al., 2021).

### **Working Definition of FWB**

There is no consensus on what constitutes the standard for future well-being (FWB) among suicide attempt survivors. As an initial starting place, we adopted a population norm-based approach, using the psychological well-being profile of the general population (in this case, non-suicidal peers) as the reference point (Tong, Kashdan, et al., 2021). The population norms-based approach has been used to establish criteria for high functioning among people with depression (Rottenberg et al., 2019) and anxiety (Disabato et al., 2021; Turner et al., 1993). Specifically, we proposed a three-step definition of FWB after suicide attempts 1) the individual had a past suicide attempt over the past 12 months at Wave I; 2) evidenced no suicidal ideation over the past year at Wave III; and 3) currently report normatively high levels of psychological well-being, where “normatively-high” is defined as the well-being profile met by the top quartile of the non-suicidal peers in this dataset (Tong, Devendorf, et al., 2021). This norm-based framework helps identify suicide attempt survivors who are reporting well-being that is comparable or greater than most of their non-suicidal peers across the well-being domains (Tong, Kashdan, et al., 2021).

### **Prevalence of FWB After a Non-Fatal Suicide Attempt**

In our prior work with the Add Health dataset ( $n = 15,170$ ), we sought to establish the prevalence of FWB at Wave III after a nonfatal suicide attempt at Wave I. At Wave I, 2,024 participants reported suicidal ideation over the past year. Among them, 574 youth reported at least one suicide attempt over the past 12 months, of which 135 cases received medical treatment. At Wave III, Approximately 7 years after, approximately 26% (3144 out of 12056) of

non-suicidal peers met the criteria of FWB, using the cutoffs of scoring at least 4 out of 5 well-being dimensions above the gender-matched mean and at least 3 out of 5 dimensions 1 SD above the mean. Using the same criteria, approximately 13% (75 out of 574) of youth who survived a suicide attempt at Wave I met the FWB criteria at Wave III (Tong, Devendorf, et al., 2021). The current study is a follow-up investigation designed to explain why some youth achieved good FWB after having survived a suicide attempt. Four predictive factors are the present focus as discussed below.

### **Predictive Factors of Future Well-Being**

For the current project, we selected candidate predictors of FWB to capture both individual attributes (i.e., self-esteem, positive mood) and interpersonal processes (i.e., family connectedness, school belongingness). These items were selected based on their empirical relevance related to suicide risks and psychological well-being. Prior studies have revealed that these predictors, including self-esteem (Soto-Sanz et al., 2019), positive mood (Joiner et al., 2001), family connectedness (Borowsky et al., 2001), and school belongingness (Czyz et al., 2012), influence suicide risks. These variables were also associated with good psychological well-being in the general population (Freire & Ferreira, 2020; Jose et al., 2012; Pernice-Duca, 2010; Tugade et al., 2004). To our knowledge, no study has investigated whether these variables predict future well-being among suicide attempt survivors.

#### ***Self-Esteem***

Self-esteem describes a person's self-evaluation of his/her value or worth (Rosenberg, 1965). According to the Sociometer Theory, self-esteem is an internal monitor that captures the aspects of positive self-regard, reflecting whether people perceive themselves to be accepted, worthy, valued (Leary & Baumeister, 2000). Low self-esteem increases risks of future

depression (Orth et al., 2008), suicidal ideation (Manani & Sharma, 2013), and suicide attempts (Emler, 2001; Kjelsberg et al., 1994; Soto-Sanz et al., 2019). Low self-esteem has been strongly associated with perceived burdensomeness (e.g., “my parents will be better off without me” (Eades et al., 2019), which is a predisposition to severe suicidal urges, according to the Interpersonal-Psychological Theory of Suicide (IPTS) (Joiner, 2005).

By contrast, genuine and stable self-esteem (not to be confused with *narcissism*) is associated with psychological benefits, such as enhanced positive feelings. Among young people (N = 406, age: 14-28), self-esteem was the most dominant and powerful predictor of happiness (Cheng & Furnham, 2003). Among 910 adolescents, self-esteem moderated the relationship between depressive symptoms and subjective happiness (Freire & Ferreira, 2020). Similar benefits were found in other age groups as well. For example, among a sample of 600 older adults (51-95), self-esteem and well-being were highly correlated (Lyubomirsky et al., 2006). Studies have repeatedly found that people with high self-esteem are more resilient to failure than people with low self-esteem (Baumeister & Vohs, 2018). Thus, it may be that high self-esteem functions as a resource that can be used to buffer setbacks and restore good psychological well-being. Whether self-esteem predicts FWB among suicide attempt survivors remains unclear.

### ***Positive Mood***

Anhedonia, or the inability to feel pleasure, is one of the salient features among people with suicidal urges. According to a recent meta-analysis, anhedonia is strongly associated with suicidal ideation, even after controlling for depressive symptoms (Ducasse et al., 2018). Among older primary care patients, infrequent positive mood predicted suicidal ideation, even after controlling for age, medical illness, and depression severity (Hirsch et al., 2007). In contrast, preserved hedonic functioning among suicidal patients might be associated with reduced suicide

risks. While a suicidal crisis is usually characterized by overwhelmingly negative feelings and emotions, it is also time-limited. After a suicidal crisis subsides, positive moods may naturally occur or be enhanced through psychological interventions. According to the broaden-and-build model (Fredrickson, 1998), positive moods, such as joy and happiness, may temporarily broaden people's cognition and behaviors, making room for new ideas and novel skill building, including extending one's repertoire of social resources and problem-solving skills. Consistent with this idea, suicidal people high in positive mood accrued better problem-solving attitudes and exhibited decreased suicidal symptoms (Joiner et al., 2001).

Positive mood is not only protective against suicidal risks but also is strongly linked to better psychosocial functioning. A higher level of positive mood is associated with better relationships (Moore et al., 2018), psychological health (Tugade et al., 2004), resilience when encountering stressors (Folkman & Moskowitz, 2000), and meaning of life (Hicks & King, 2009), which are all elements of good psychological well-being. Whether the beneficial impact of positive mood on long-term FWB can also be found among suicide attempt survivors needs to be investigated.

### ***Family Connectedness***

Family members of suicide attempt survivors often serve as the first line of defense in preventing re-attempts and enhancing future well-being. Navigating life after suicide attempts will involve social activities and interpersonal interactions in various contexts, such as home, school, and community (Frey et al., 2016). Higher family connectedness is associated with a subsequent decline in suicide attempts (Borowsky et al., 1999; Compton et al., 2005; Kerr et al., 2006). For example, among 188 African American college students, close family bonds predicted lower suicidal ideation (Harris & Molock, 2000), and a similar pattern was observed in



a larger group of teenagers (n = 1,083; Randell et al., 2006). According to the Reasons for Living Inventory (Linehan et al., 1983), responsibility to the family is one of the primary deterrents of suicide attempts.

Family connectedness not only buffers against suicidal behaviors but also is associated with other positive outcomes, such as subjective well-being and mental health (Moore et al., 2018). For example, family support predicted help-seeking behaviors and recovery from mental health problems (Pernice-Duca, 2010), evidenced by factors such as personal confidence, hope, and goal orientation. One study interviewed 227 children and their parents and found that family connectedness was positively associated with children's well-being (Scrimin et al., 2018). Among high school students, perceived family cohesion was positively related to psychological well-being indices, such as autonomy (Kocayörük et al., 2015). To our knowledge, no studies have specifically investigated whether family connectedness predicts future well-being among suicide attempt survivors.

### ***School Belongingness***

School contexts and peer relationships serve important developmental functions for adolescents. Peer interactions at school can be weighed heavily by adolescents and therefore are critical in personal identity development (Harter, 1990). School belongingness captures the sense that a person identifies and feels that he/she is a part of the school, and feels accepted, respected, and supported by people at school (Allen et al., 2018).

Theoretically, feeling integrated at school may reduce thwarted belongingness and, therefore, protect people from suicidal urges (Joiner, 2005). School belongingness was indeed found to be a mediating factor that explains the relationship between extracurricular activity and lower suicide attempt rates among young teenagers (Mata et al., 2012). Consistently,

improvement in peer relationships at school was associated with a reduced likelihood of suicide attempts among suicidal patients 1-year after discharge from a psychiatric hospital (Czyz et al., 2012). Although the impact of school belongingness on well-being among suicide attempt survivors has not been investigated, data suggest its positive role in cultivating good well-being in the general population. For example, school belongingness is positively associated with prosocial behaviors (Demant & Van Houtte, 2012) and psychological well-being (Jose et al., 2012).

### **Psychosocial and Symptomatic Covariates**

The current study also addressed other well-known psychosocial and symptomatic factors that may impact suicide risks and well-being among adolescents. For instance, clinical variables, such as depressive symptoms, alcohol and illicit drug use, and somatic symptoms, are predictive of a future suicide attempt (Borowsky et al., 2001; Nanayakkara et al., 2013). Social factors, such as exposure to violence, were also predisposition factors that enhanced suicide risks (Borowsky et al., 2001; Lambert et al., 2008) and reduced well-being (Callahan et al., 2003). In addition, suicide-related variables, such as a past suicide attempt history, were strong predictors of subsequent suicide risks (Borowsky et al., 2001; Nanayakkara et al., 2013). Controlling for these risk factors will enable us to assess the incremental predictive validity of the four target constructs (i.e., self-esteem, positive mood, family connectedness, school belongingness) on psychological well-being after a non-suicidal attempt.

### **Current Study: Goals and Hypotheses**

*Goal 1.* Investigate the impact of self-esteem on psychological well-being 7 years after a non-fatal suicide attempt

*Hypothesis 1.* We hypothesize that youth self-esteem at Wave I, indexed by positive self-regard and self-acceptance, enhances the chance of obtaining FWB 7 years after a nonfatal suicide attempt.

*Goal 2.* Investigate the impact of positive mood on psychological well-being 7 years after a non-fatal suicide attempt

*Hypothesis 2.* We hypothesize that youth positive mood at Wave I enhances the chance of achieving FWB seven years after a non-fatal suicide attempt.

*Goal 3.* Investigate the impact of family connectedness on future psychological well-being 7 years after a non-fatal suicide attempt.

*Hypothesis 3.* We hypothesize that Wave I family connectedness enhances the chance of FWB 7 years after a non-fatal suicide attempt.

*Goal 4.* Investigate the impact of school belongingness on future psychological well-being 7 years after a non-fatal suicide attempt.

*Hypothesis 4.* We hypothesize that youth Wave I school belongingness enhances the chance of FWB seven years after a non-fatal suicide attempt.

*Goal 5.* Investigate the incremental validity of self-esteem, positive mood, family connectedness, and school belongingness on predicting FWB, controlling for Wave I risk-focused clinical correlates and demographic variables.

*Hypothesis 5.* We hypothesize that, in a multivariable logistic regression model, self-esteem, positive mood, family connectedness, and school belongingness will uniquely predict future FWB, after controlling for Wave I risk factors, including depressive symptoms, violence experiences, drug and alcohol use, somatic symptoms, and suicidal symptoms, as well as relevant demographic variables (e.g., biological sex).

## CHAPTER TWO:

### METHOD

#### Participants and Procedure

Add Health followed a nationally representative sample of United States youths from grades 7-12 through adulthood. A total of 15,170 participants completed both Wave I (1993-1994) and Wave III (2001-2002) in-home interviews. The in-home interview lasted for approximately 90 minutes. For sensitive topics, such as suicide-related questions, responses were directly recorded to a computer. Wave II data were not used in the current analyses for two reasons: 1) Wave II did not follow up with the majority of the 12<sup>th</sup> graders at Wave I; 2) Wave II occurred on average less than a year after Wave I (Nanayakkara et al., 2013), which preclude the investigation of identifying individuals with relatively durable well-being and relief from suicidality (for at least one year). By comparison, Wave III data attempted to follow up with all participants interviewed at Wave I and was conducted approximately 7-8 years after Wave I, bridging two critical developmental stages: adolescence and young adulthood.

The response rate at Wave III was 76%. In our prior study, attrition analyses revealed no association between attrition from Wave I to Wave III and baseline suicide-related variables, including suicide attempt frequency, severity, exposure to family members' and friends' suicidal behaviors, and depressive symptoms (Tong, Devendorf, et al., 2021). The current study focused on the 574 adolescents who reported having at least one suicide attempt over the past 12 months at Wave I. With a medium effect size ( $f^2 = 0.15$ ) and a power of 0.8, the G power analysis

revealed that the multivariable logistic regression model would require 131 participants, which was met by the current sample size of 574.

## **Measures**

### ***Suicidal Ideation and Attempts<sup>1</sup>***

At Wave I and III, a single-item assessed suicidal ideation, “*during the past 12 months, did you ever seriously think about committing suicide?*” If participants endorsed suicidal thoughts, they were asked, “*how many times did you actually attempt suicide?*” Previous research has demonstrated that a single-item assessment of suicide history has acceptable validity (Gunn et al., 2018; Thompson et al., 2009). The suicide attempt was coded dichotomously (1- at least one suicide attempt; 0 – no suicide attempt). Non-suicidal peers are participants who reported no suicidal thoughts over the past year at both Waves.

### ***Suicide Attempt Severity***

Participants who attempted suicide were further asked, “*did any suicide attempt result in an injury, poisoning, or overdose that had to be treated by a doctor or nurse?*” This item was dichotomous (0- no, 1- yes).

### ***Baseline Predictors (N= 574, suicide attempt survivors; See Appendix A)***

**Self-Esteem.** The Add Health included a 6-item scale, adopted from the Self-Esteem Inventory (Rosenberg, 1965) at Wave I. This measure was used to assess participants’ positive self-regard and social-acceptance, ranging from 1 (strongly agree) to 5 (strongly disagree) (e.g., “*Do you agree or disagree that you have many good qualities?*” “*You feel socially accepted?*” “*You feel loved and wanted*”). The scale demonstrated good internal consistency ( $\alpha = 0.87$ ).

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<sup>1</sup> we took the questionnaires directly from the original Add Health’s study materials for clarity purposes, but the phrases regarding suicide attempt (i.e., “commit suicide”) are inappropriate as they may imply criminality. It is important to use more contemporary terminology (“attempt suicide”, “died by suicide”).

**Positive Mood.** Four items from the Center for Epidemiologic Studies- Depression (CES-D) scale were used to assess the positive feelings experienced over the past week, including happiness, enjoyment of life, feeling just as good as other people, and hope for the future. The items ranged from 0 (never) to 3 (most of the time). Prior studies have used these items as an index of positive affect (Hoyt et al., 2012; Sheehan et al., 1995). The internal reliability of the items was acceptable ( $\alpha = 0.77$ ).

**Family Connectedness.** We constructed a five-item scale to assess participants' perceived level of family connectedness at baseline (e.g., *how much do you feel that your parents care about you? How much do you feel that you want to leave home?*), ranging from 1 (very much) to 5 (not at all). Some items were reverse coded so that higher scores represent better family connectedness. The internal reliability of the five items was acceptable ( $\alpha = 0.78$ ).

**School Belongingness.** We constructed an 8-item scale to measure participants' sense of belonging at school at baseline (e.g., *you feel like you are part of your school*), ranging from 1 (very much) to 5 (not at all). Certain items were reverse coded so that higher scores represented higher level of school belongingness. The reliability analysis of the scale revealed that one item, "*are students at school prejudiced,*" had negative correlations (- 0.06) with the item "*your friends care about you.*" It is possible that the item measured perceived prejudice rather than directly measuring the perceived school belongingness. Consequently, the item "*are students at school prejudiced*" was removed from the scale, making the final version a 7-item scale and improving reliability from 0.75 to 0.79.

***Covariates (N= 574, suicide attempt survivors; See Appendix B)***

**Depressive Symptoms.** A 14-item scale adapted from the CES-D assessed participants' depressive symptoms and psychological distress at Wave I. Each item ranged from 0 (never) to 3 (almost always). The internal reliability of the 14 items was good ( $\alpha = 0.85$ ).

**Violence Experience.** We constructed a 6-item scale to assess participants' violence exposure over the past 12 months at Wave I (e.g., *you saw someone shoot or stab another person; someone shot or stabbed you*). The items ranged from 0 (never) to 3 (2 or more times) ( $\alpha = 0.73$ ). The items were added up to form a composite score for the baseline violence exposure.

**Problematic Alcohol Use.** A 7-item scale assessed participants' problematic drinking behaviors over the past 12 months, as well as impaired consequences due to drinking (e.g., *how many times has each of the following things happened: got into trouble with parents because you had been drinking*). Each item ranged from 0 (never) to 4 (5 or more times). The youth who answered "twice or greater" to any item or "once or greater" to two or more items were coded as engaging in problematic drinking behaviors at Wave I. This approach was used in a prior study using Add Health data (Peña et al., 2008).

**Problematic Non-Alcoholic Substance Use.** A 4-item scale was used to investigate substance (e.g., marijuana, cocaine, etc.) use among the participants (e.g., "during your life, how many times have you used cocaine"). Each item ranges from 0-900 times. The four items were summed to form an index representing the frequency of lifetime substance use. This approach was used in a prior study using Add Health Data (Borowsky et al., 2001).

**Somatic Symptoms.** We constructed an 8-item scale to measure participants' complaints about somatic symptoms at Wave I (e.g., *In the past 12 months, how often have you felt really*

*sick*). Each item ranges from 0 (never) to 4 (everyday). The internal consistency of this scale was acceptable ( $\alpha = 0.73$ ).

**Parental Education.** At Wave I, participants were asked the highest degree obtained by either parent. The item was dichotomous (low (0) = high school or less; high (1) = some college or above), which was consistent with prior studies using this dataset (Rowe et al., 1999; Wu et al., 2018).

***Wave III Well-Being Battery (N = 15,170, full sample; See Appendix C)***

**Self-Acceptance.** Positive self-regard was measured by a 4-item scale adopted from the Self-Esteem Inventory (Rosenberg, 1965), ranging from 1 (strongly agree) to 5 (strongly disagree) (e.g., “*you have many good qualities?*”). Items in the scale were reverse coded so that a higher score always represents more self-acceptance. The internal consistency of this scale was acceptable ( $\alpha = 0.78$ ).

**Life Satisfaction.** One item measured participants’ life satisfaction (“*How satisfied are you with your life as a whole?*”), ranging from 1 (very satisfied) to 5 (very dissatisfied). Prior studies supported the validity of this measurement (Erlandsson et al., 2009; Veenhoven, 2000).

**Positive Mood.** Two items were used to assess positive emotions over the past week (e.g., “*you enjoyed life over the past 7 days?*”).

**Negative Mood.** Three items (depression, unhappiness, and sadness) were used to assess negative mood ( $\alpha = 0.82$ ). Previous studies using Add Health used similar to the four-item scale that was used to assess participants’ negative affect at Wave II (depressed, unhappy, lonely, sad) (Stogner & Gibson, 2010).

**Parental Relationships.** At Wave III, relationship quality with both parents was measured by a 6-item scale (three questions for each parent) (e.g., “*You enjoy doing things with*



*your mother; "Most of the time, your mother is warm and loving toward you"*), ranging from 1 (strongly agree/extremely close) to 5 (strongly disagree/not close at all). Items were reverse coded so that a higher score represents better a parental relationship. The internal consistency of this scale was good ( $\alpha = 0.85$ ).

**Future Well-Being (FWB) Status.** Using the above items, we constructed a well-being battery that incorporated the following dimensions: 1) *self-acceptance*, 2) *life satisfaction*, 3) *positive mood*, 4) *infrequent negative mood*, and 5) *positive relationships with parents* (Tong, Devendorf, et al., 2021). Items were coded so higher scores always represent better psychological well-being. To be counted as a suicide attempt survivor with good FWB, a youth was required to have 1) at least one suicide attempt over the past 12-months at Wave I; 2) no suicidal ideation or attempts over the past 12-months at Wave III; and 3) a reported FWB profile that was equal to or better than the top quartile of their non-suicidal peers across the five dimensions at Wave III. Specifically, the high FWB threshold required the participants to 1) score above the gender-matched sample means from the full Add Health sample on at least 4 out of 5 of the well-being domains; 2) score at least 1 SD above the gender-matched sample means on at least 3 out of 5 well-being domains. The 4 out of 5 and 3 out of 5 thresholds reflect a well-being profile obtained by the top quartile (in this case, approximately 26%) of the peers who reported no suicidal ideation across two Waves. Using this threshold, 75 out of 574 (13%) adolescents who survived a suicide attempt at Wave I met FWB criteria at Wave III.

## **Data Analytic Plan**

### ***Data Cleaning***

The psychometric properties of each scale were investigated using Cronbach's Alpha. Missing data were examined before conducting the main analyses. There are different thresholds

of missing data to avoid bias in results, such as 10% (Bennett, 2001) and 20% (Peng et al., 2006). The current study used Schafer's conservative convention of 5% (Schafer, 1999). If the missing data pattern were below 5%, it would be unlikely to bias the current results.

Data were evaluated for normal distribution, using skewness (considered normal if between -2 to 2) and kurtosis (considered normal if between -7 to 7) cutoffs (Curran et al., 1996). Multicollinearity between baseline predictors was investigated. Multicollinearity occurs when there is linear relation among two or more variables, producing large standard errors in predictor variables and impairing the reliability of the model parameter estimates (Alin, 2010; Midi et al., 2010). The typical cutoff for multicollinearity is correlation coefficients above 0.7. There is no consensus on greater than 5 or 10 variance inflation factors (VIF) for indicating multicollinearity, but studies suggest that even VIF less than 5 could impact findings in epidemiologic studies, suggesting that VIF needs to be interpreted with caution (Vatcheva & Lee, 2016). If multicollinearity is detected (correlation coefficients larger than 0.7, VIF greater than 5), the relevant items will be dropped; or they will be added together if there is theoretical grounding for combining the variables.

### ***Main Analyses***

For descriptive purposes, zero-order correlations were reported using the variables at Wave I, including self-esteem, positive mood, family connectedness, school belongingness, as well as the control variables (e.g., depressive symptoms, suicidal behavior severity).

To test hypotheses 1, 2, 3, and 4, we conducted four univariate logistic regression analyses, using self-esteem, positive mood, family connectedness, and school belongingness as independent variables, and FWB status at Wave III as the dependent variable. To test hypothesis 5, we conducted a multivariable logistic regression analysis to examine the effect of these four

Wave I predictors on the status of FWB at Wave III, while controlling for Wave I covariates (e.g., depression, suicidal symptoms, violence experience, drug and alcohol problematic use, somatic symptoms).

Add Health provided weight variables to adjust for data loss across subgroups and over-sampling of under-represented social groups, such as Asian students and African American youth from high SES families. We followed the instructions in the *Guidelines for Analyzing Add Health Data* when applying weights adjustment (Appendix D), in order to provide representative and relatively unbiased findings of a nationally-representative U.S. adolescent sample (Chen & Chantala, 2014).

## CHAPTER THREE:

### RESULTS

#### Missing Data

Among the youth who reported a suicide attempt at Wave I (N = 574), the missing data percentage was low, ranging from 0% to 3.1% among the relevant variables across waves (Table 1). These rates are below Schafer's conservative convention of 5% (Schafer, 1999), suggesting that missing data are unlikely to bias current results. Consequently, listwise deletion was used.

**Table 1.** Missing Data Pattern Across Wave I and III (N = 574)

	Missing N	Missing Percentage	Valid N
<b>W3 Well-being Battery</b>			
W3 Self-Acceptance	1	0.2	573
W3 Life Satisfaction	0	0.0	574
W3 Positive Mood	4	0.7	570
W3 Negative Mood	3	0.5	571
W3 Parental Relationship Qualities	4	0.7	570
<b>W1 Main Predictors</b>			
W1 Self-Esteem	2	0.3	572
W1 Positive Mood	0	0.0	574
W1 Family Connectedness	18	3.1	556
W1 School Belongingness	18	3.1	556

#### Participants

The 574 suicide attempt survivors were on average 16 years old (SD = 1.61) at Wave I and 22 years old at Wave III (SD = 1.66). These survivors were predominantly female (n = 421, 73%). The majority identified themselves as White (74%). The family socioeconomic status indexed by parental highest education received at baseline was about equal: ~56% of survivors

were from families where one parent received at least some college education or higher or other equivalent degrees (Table 2).

**Table 2.** Demographics of Wave I Suicide Attempt Survivors (N = 574)

Suicide Attempt (N = 574)	N (Unweighted %)	Weighted %
Male	153 (26.7%)	26.1%
Female	421 (73.3%)	73.9%
White	334 (58.2%)	73.7%
African American	105 (18.3%)	12.0%
American Indian	10 (1.7%)	1.2%
Asian American	41 (7.1%)	3.2%
Multi-racial	46 (8.0%)	6.4%
Other race categories	37 (6.4%)	3.5%
Missing	1 (0.2%)	0.0%
Hispanic Origin		
No	475 (82.8%)	77.3%
Yes	97 (16.9%)	22.7%
Missing	2 (0.3%)	0.0%
Parental Highest Education Level		
Some College or above	326 (56.8%)	55.7%
High School or less	232 (40.4%)	41.2%
Missing	16 (2.8%)	3.1%
Medical Treatment due to Suicide Attempt		
No	438 (76.4%)	77.3%
Yes	135 (23.6%)	22.7%
Missing	1 (0.0%)	0.0%

Among the 574 survivors, 23 (4%) had missing data on the suicidal ideation variable at Wave III, due to several reasons, such as being in a correction facility (n = 16) or declining to answer (n = 7). Nine had missing data on one of the well-being battery domains at Wave III. Therefore, these cases were removed from the current analyses. Among the 542 remaining participants, 75 met the criteria for FWB at Wave III. Among those who met FWB status, the majority were women (64%), self-identified as white (70.5%), and had parents who had at least some college-level or above degree (64.5%). Among the remaining 467 who did not achieve FWB at Wave III, the majority were women (74%), self-identified as white (73%). Their

parents' highest education level at baseline was about equal: 54.3% of survivors' parents had some college or above level degree (Table 3). Survivors who did and did not achieve FWB at Wave III did not differ across demographic variables, all  $p > 0.05$ .

**Table 3.** Demographics Of Survivors Who Did and Did not Achieve FWB

	FWB (N = 75)	Weighted %	Non-FWB (N = 467)	Weighted %
Male	18 (24%)	36%	123 (26.3%)	26%
Female	57 (76%)	64%	344 (73.7%)	74%
White	41 (54.7%)	70.5%	275 (58.9%)	73.1%
African American	17 (22.7%)	21.7%	79 (16.9%)	11.4%
American Indians	1 (1.3%)	1.0%	9 (1.9%)	1.4%
Asian	6 (8%)	0.3%	35 (7.5%)	4.0%
Multi-races	5 (6.7%)	3.3%	36 (7.7%)	5.9%
Other Race	5 (6.7%)	3.2%	32 (6.9%)	4.2%
Missing	0 (0%)	0%	1 (0%)	0.0%
Hispanic Origin				
Yes	12 (16%)	10.5%	79 (16.9%)	9.9%
No	63 (84%)	89.5%	387 (82.9%)	90.1%
Missing	0 (0.0%)	0.0%	1 (0.2%)	0%
Parental Highest Education Level				
Some College or above	42 (56%)	64.5%	270 (57.8%)	54.3%
High School or less	29 (38.7%)	31.4%	187 (40%)	43.7%
Missing	4 (5.3%)	4.1%	10 (2.1%)	2.1%
Medical Treatment due to attempt				
Yes	17 (22.7%)	26.7%	110 (23.6%)	22.1%
No	57 (76%)	73.3%	357 (76.4%)	77.9%
Missing	1 (1.3%)	0.1%	0 (0%)	0%

### Logistic Regression Assumption Check

The skewness of Wave I predictor variables, as well as the control variables, ranged from -1.06 to 1.64; the kurtosis of the variables ranged from -1.94 to 2.51. All were within the range of normality, except for the Substance Problematic Use variable, which was right-skewed. Since the frequency of drug use was not the main focus of the current project, this variable was

dichotomized to reflect lifetime exposure to illicit drugs (1- at least one occurrence, 0- never used), similar to another prior study using Add Health Data (Fettes et al., 2013).

The correlations of Wave I variables were all well below  $< 0.7$ , the cutoff for multicollinearity (Table 4). All the VIFs were less than 2.5 and below the 5 cutoff point (Table 5). The Mahalanobis Distances across the four baseline predictors and nine covariates were computed to detect multivariate outliers ( $\chi^2$  (df=13),  $\alpha < .001$ ). Three participants were suspected of having multivariate outlier issues, but removing these participants did not impact the results. Therefore, the authors decided to keep them in the final analysis.

### **Primary Outcomes**

*To test hypothesis 1*, a logistic regression analysis examined the impact of self-esteem at Wave I on the likelihood of achieving FWB 7 years after having survived a suicide attempt. Consistent with the hypothesis, higher self-esteem was associated with a higher chance of FWB ( $\chi^2 = 19.96$ ,  $df = 1$ ,  $p < 0.001$ , OR = 3.49, 95% CI: 2.01, 6.08). A 1-unit increase in the person's level of self-esteem at baseline predicted increased log odds of FWB at Wave III by 3.49 (Table 6).

*To test hypothesis 2*, a logistic regression analysis examined the impact of positive mood at Wave I on the likelihood of achieving FWB 7 years after having survived a suicide attempt. Consistent with the hypothesis, higher baseline positive mood was associated with a higher chance of FWB 7 years after a non-fatal suicide attempt ( $\chi^2 = 5.15$ ,  $df = 1$ ,  $p < 0.05$ , OR = 1.81, 95% CI: 1.08, 3.03). A 1-unit increase in the person's level of positive mood at Wave I predicted increased log odds of FWB at Wave III by 1.81.

**Table 4.** Correlations Among Baseline Predictors (unweighted)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Self-Esteem	1												
2. Positive Mood	<b>.55**</b>	1											
3. Family Connectedness	<b>.44**</b>	<b>.31**</b>	1										
4. School Belongingness	<b>.33**</b>	<b>.30**</b>	<b>.36**</b>	1									
5. Depressive symptoms	<b>-.46**</b>	<b>-.49**</b>	<b>-.39**</b>	<b>-.35**</b>	1								
6. Alcohol use	-.06	<b>-.10*</b>	<b>-.12**</b>	<b>-.15*</b>	<b>.19**</b>	1							
7. Somatic Symptoms	<b>-.27**</b>	<b>-.17**</b>	<b>-.22**</b>	<b>-.16**</b>	<b>.51**</b>	<b>.18**</b>	1						
8. Violence Experience	.00	-.07	<b>-.12**</b>	<b>-.24**</b>	<b>.22**</b>	<b>.29**</b>	<b>.12**</b>	1					
9. Substance Use	<b>-.10*</b>	-.08	<b>-.14**</b>	<b>-.20**</b>	<b>.14**</b>	<b>.43**</b>	<b>.19**</b>	<b>.26**</b>	1				
10. Suicide Attempt Severity	.01	.01	-.03	-.08	.05	<b>.15**</b>	<b>.10*</b>	<b>.15**</b>	<b>.15**</b>	1			
11. Suicide Attempt Frequency	<b>-.10*</b>	-.03	<b>-.15**</b>	<b>-.17**</b>	<b>.20**</b>	.07	<b>.15**</b>	<b>.20**</b>	<b>.09*</b>	<b>.10*</b>	1		
12. Biological Sex	<b>-.16**</b>	<b>-.14**</b>	<b>-.17**</b>	.04	<b>.13**</b>	-.05	<b>.20**</b>	<b>-.19**</b>	.00	.00	.01	1	
13. Parental Highest Education	0.02	.04	-.02	.03	-.07	-.04	.03	<b>-.13**</b>	-.03	-.02	-.01	.05	1

\*\* p < 0.01 level (2-tailed). \* p < 0.05 (2-tailed).



**Table 5** Multicollinearity Check

	Tolerance	VIF
Esteem	.60	1.66
Positive Mood	.61	1.64
Family Connectedness	.71	1.42
School Belongingness	.71	1.40
Depressive symptoms	.49	2.05
Alcohol use	.77	1.31
Somatic Symptom	.66	1.51
Violence Experience	.76	1.31
Substance Use	.76	1.32
Suicide Attempt Severity	.93	1.08
Suicide Attempt Frequency	.89	1.13
Biological Sex	.89	1.13
Parental Highest Education	.97	1.04

To test hypothesis 3, a logistic regression analysis examined the impact of family connectedness at Wave I on the likelihood of achieving FWB 7 years after having survived a suicide attempt. Consistent with the hypothesis, higher baseline family connectedness was associated with a higher chance of FWB 7 years after a non-fatal suicide attempt ( $\chi^2 = 6.33$ ,  $df = 1$ ,  $p < 0.05$ , OR = 1.82, 95% CI: 1.14, 2.90). A 1-unit increase in the person's level of family connectedness at baseline predicted increased log odds of FWB at Wave III by 1.82.

To test hypothesis 4, a logistic regression analysis examined the impact of school belongingness at Wave I on the likelihood of achieving FWB 7 years after having survived a suicide attempt. Consistent with the hypothesis, higher baseline positive mood was associated with a higher chance of FWB 7 years after a non-fatal suicide attempt ( $\chi^2 = 6.87$ ,  $df = 1$ ,  $p < 0.05$ , OR = 1.69, 95% CI: 1.14, 2.52). A 1-unit increase in the person's level of school belongingness at baseline predicted increased log odds of FWB at Wave III by 1.69.

**Table 6.** Univariate Logistic Regressions Predicting FWB at Wave III

	$\beta$	SE	$P$	OR	95% CI Low	95% CI High
Self-esteem	1.25	0.28	< 0.001	3.49	2.01	6.08
Positive mood	0.59	0.26	0.03	1.81	1.08	3.03
Family connectedness	0.60	0.24	0.01	1.82	1.14	2.90
School belongingness	0.53	0.20	0.01	1.69	1.14	2.52

A multivariable logistic regression model was conducted to investigate the conjoint impact of these four Wave I predictors on FWB. When Wave I self-esteem, positive mood, family connectedness, and school belongingness were entered as predictors, only self-esteem remained significant ( $\chi^2 = 10.43$ ,  $df = 1$ ,  $p < 0.001$ , OR = 3.27, 95% CI: 1.58, 6.76), and the other predictors were no longer significant in the model ( $P_s > 0.05$ ). Wave I self-esteem was

significantly lower among suicide attempt survivors ( $M = 3.63$ ,  $SD = 0.77$ ) than peers who did not attempt suicide over the past 12 months at Wave I ( $M = 4.12$ ,  $SD = 0.58$ ),  $p < 0.001$ .

To test hypothesis 5, a multivariable logistic regression analysis was conducted. In this final multivariable logistic regression model, self-esteem, positive mood, family connectedness, and school belongingness were entered as the predictors, with Wave III FWB as the outcome variable, while controlling the demographic and clinical covariates. In this model, only baseline self-esteem was significantly associated with FWB ( $\chi^2 = 22.07$ ,  $df = 1$ ,  $p < 0.001$ ,  $OR = 4.97$ , 95% CI: 2.53, 9.76). None of the covariates were significant predictors of FWB, except for baseline somatic complaints ( $\chi^2 = 10.05$ ,  $df = 1$ ,  $p < 0.05$ ,  $OR = 0.27$ , 95% CI: 0.12, 0.61). In this final multivariable logistic regression model, a 1-unit increase in participants' level of self-esteem at baseline predicted increased log odds of good psychological well-being at Wave III by 4.97 (Table 7).

**Table 7.** Final Multivariable Logistic Regression Table

	$\beta$	SE	$P$	OR	95% CI Low	95% CI High
<b>Self-esteem</b>	<b>1.60</b>	<b>0.34</b>	<b>&lt;0.001</b>	<b>4.97</b>	<b>2.53</b>	<b>9.76</b>
Positive mood	-.12	0.38	0.76	0.89	0.42	1.91
Family connectedness	.21	0.31	0.50	1.23	0.67	2.25
School belongingness	-.44	0.37	0.23	0.65	0.31	1.33
Depressive Symptoms	-.81	0.62	0.19	.44	.13	1.52
Alcohol use (0)	-.65	0.67	0.33	0.52	0.14	1.98
<b>Somatic Complaints</b>	<b>-1.31</b>	<b>0.41</b>	<b>&lt;0.05</b>	<b>0.27</b>	<b>0.12</b>	<b>0.61</b>
Violence Experience	-.09	0.27	0.74	0.91	0.53	1.57
Substance Use (0)	-.50	0.43	0.24	0.61	0.26	1.41
Suicide Attempt Severity (0)	.31	0.55	0.58	0.74	0.25	2.19
Suicide Attempt Frequency	-.11	0.19	0.57	0.90	.62	1.31
Biological Sex (male)	-.28	0.42	0.50	0.76	.33	1.73
Parental Highest Education (0)	-.38	0.40	0.35	0.68	0.31	1.52

As an additional follow-up test, we ran multivariable logistic regression model by removing the self-acceptance subscale from the Wave III well-being battery because of its potential overlap with the Wave I self-esteem predictor. Results were unchanged, such that baseline self-esteem continued to be associated with a higher chance of achieving FWB at Wave III ( $\chi^2 = 8.29$ ,  $df = 1$ ,  $p < 0.05$ , OR = 2.47, 95% CI: 1.33, 4.60).

## **CHAPTER FOUR:**

### **DISCUSSION**

The public perception of the long-term prognosis of a non-fatal suicide attempt is grim (Rudd et al., 2013; L. Sheehan, Dubke, et al., 2017), based in part on demonstrations that suicide attempts are associated with a higher likelihood of future re-attempt and mental health problems (Franklin et al., 2017). Our prior research suggests the value of a more balanced view of prognosis, as the prevalence of high levels of future well-being among youth who survived a suicide attempt was far from negligible (Tong, Devendorf, et al., 2021). In fact, approximately 1 in 7 youth (~ 13%) who were once suicidal met the criteria of FWB seven years later, as compared to about 1 in 4 non-suicidal peers who met the same well-being standard (Tong, Devendorf, et al., 2021). The current longitudinal investigation built upon this research effort and is one of the first studies to systematically evaluate the factors that enhance the likelihood of future psychological well-being among suicide attempt survivors. The results have implications for our appreciation of how healthy outcomes unfold after a suicidal crisis.

Consistent with our predictions in univariate models, Wave I self-esteem, positive mood, family belongingness, and school connectedness all predicted a higher chance of FWB among suicide attempt survivors. These findings corroborate with previous studies. For example, baseline positive mood (Panaite et al., 2021) was predictive of long-term psychological well-being 10 years after an MDD diagnosis. In addition, other studies also reported that family and

school environments are important ecological factors that impact youth's psychological well-being in general (Oberle et al., 2011; Scrimin et al., 2018).

That said, in multivariable models, self-esteem remained a significant predictor, whereas positive mood, family belongingness, and school connectedness were no longer significant. This finding suggests that high levels of self-esteem might be a particularly robust predictor of FWB. It has been well-documented that higher self-esteem is associated with lower suicide risk. The current study adds to these prior studies, underscoring the importance of self-esteem not only in reducing suicide risks but also in enhancing psychological well-being among young suicide attempt survivors.

According to Erikson (1993), adolescence is a critical developmental stage for identity formation, which may shed light on the protective effect of self-esteem on future well-being. Cast and Burke (2002) suggested that self-esteem may be a moderator and/or a direct consequence of identity verification processes. Identity verification (e.g., genuine positive feedback from supportive peers, family members) leads to the maintenance or enhancement of an individual's self-esteem, which may play an important role in buffering psychological distress (e.g., a sense of unworthiness) when the process of self-verification fails.

Self-esteem fluctuates across the lifespan (Robins & Trzesniewski, 2005). Due to issues such as body image disturbance and transition issues at school, self-esteem levels drop during adolescence (Robins & Trzesniewski, 2005). In addition to the challenges brought by development, survivors' self-esteem may be further negatively impacted by the suicide attempt itself due to reasons such as suicide-related social stigma (Pompili et al., 2005; Sheehan et al., 2017). This was indeed what was observed in the current dataset, such that baseline self-esteem among the survivors was significantly lower than the non-attempters. As teenagers approach

adulthood, self-esteem generally seems to bounce back. Transitioning from adolescence to adulthood is usually accompanied by greater autonomy (e.g., financial independence, choosing a major in college) and new social roles (e.g., initiating a romantic relationship, starting a job) (Arnett et al., 2014). For example, for some adolescents, moving away from the dysfunctional family structure or school environment may facilitate the growth of self-esteem in adulthood. Further growth and development of coping and regulation skills (e.g., effective interpersonal skills, a flexible mindset) could also play important roles in enhancing perceived self-worth. It will be valuable to investigate whether these skills mediate the relationship between self-esteem and good psychological well-being among survivors.

Interestingly, the current findings revealed youth self-esteem seemed to be a more robust predictor of FWB, than several commonly considered clinical risk factors, such as depressive symptoms, suicide attempt frequency, and suicide attempt severity. Out of all the risk-focused control variables, only somatic symptoms were significantly associated with lower FWB. This somatic symptom finding could be fortuitous, or it may be due to the fact that the majority of the survivors (>70%) in the current study were women. Previous studies found that compared to men, young women had more somatic complaints (Gestsdottir et al., 2015), which seemed to predict suicide risk only among girls, not boys (Borowsky et al., 2001). Future studies need to further investigate the gender difference in moderating the impact of somatic symptoms on psychological well-being among suicide attempt survivors. Overall, the current observation on the robust predictive power of self-esteem on FWB adds to prior indications that protective factors may provide incremental validity predicting good functioning and mental health outcomes (Keyes & Simoes, 2012; Rottenberg et al., 2019), indicating the value of integrating

protective factors, such as youth self-esteem, into routine assessment and treatment-outcome studies.

Currently, there are empirically-supported treatments that operate on self-esteem, such as Cognitive Behavioral Therapy (CBT) and Competitive Memory Training (COMET), that focus on cognitive restructuring (Korrelboom et al., 2011; Taylor & Montgomery, 2007). Collaborative Assessment and Management of Suicidality (CAMS) is another evidence-based treatment that emphasizes developing strong clinical alliance (e.g., making suicidal clients feel respected, understood, and heard) and incorporates elements such as self-empowerment and reducing self-hatred (Jobes, 2012; Jobes et al., 2009). Future studies are needed, as no direct empirical evidence is yet available to demonstrate the efficacy of these treatments on enhancing future well-being among survivors of a suicide attempt by improving their self-esteem.

### **Strengths and Limitations**

This study has clear strengths that add to the efforts investigating the mechanisms predicting future psychological well-being among young suicide attempt survivors. First, the current study examined a large-scale nationally representative sample of youth. Research on suicide attempts predominantly used clinical samples, such as the medical records of suicide patients who were admitted to the hospital (Kuo et al., 2004). There is no doubt that these studies are valuable, but these findings may be biased towards more severe cases with compromised well-being (Tong, Kashdan, et al., 2021). Second, the current longitudinal design captures two critically developmental stages: adolescence and young adulthood, which are impacted by the rising suicidal urges and behaviors. Third, the current framework is one of the first research efforts to systematically expand the scope of the prognostic outcomes after a non-fatal suicide attempt, investigating predictors that enhance future well-being among suicide attempt survivors.



This line of work has the potential of providing important insights on how relatively good outcomes may unfold after a suicidal crisis.

This study has limitations. Some well-being domains exhibited modest internal consistency, and some constructs, such as life satisfaction, were measured by a single-item question. Second, the FWB status captured the last 12 months rather than the full 7 year follow-up period. The current findings should be regarded as providing a snapshot of psychological well-being among survivors, but it does not establish the duration or durability of FWB. Similarly, the suicide-related items assessed the past 12 months. It is possible that some respondents experienced suicidal thoughts or attempted suicide between the two Waves. That said, previous longitudinal findings suggested that suicide risk decreases within two years after an indexed suicide attempt (Chu et al., 2015), which enhanced our confidence that we have identified a lower risk group.

## **Conclusion**

Building a fulfilling life is a common quest endorsed by many stakeholders who are impacted by suicide, including individuals who grapple with a suicidal crisis, their loved ones, and mental health providers. Although a desired therapeutic goal endorsed by many survivors of a suicide attempt, research on systematically investigating future psychological well-being has just begun. Risk-focused intervention remains an essential route to reduce imminent danger and adverse outcomes. In addition to the risk-control step, it will be valuable to assess and develop interventions that go beyond symptoms by identifying and enhancing protective factors, such as self-esteem. We hope this project can spur further scholarly discussion on the possibility of achieving future salutary outcomes, as well as research on identifying the mechanisms to well-being among suicide attempt survivors.

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## APPENDICES

## **Appendix A: Baseline predictor Variables**

### ***Self-Esteem***

- 1) You have a lot of good qualities
- 2) You have a lot to be proud of
- 3) You like yourself just the way you are
- 4) You feel like you are doing everything just about right
- 5) You feel socially accepted
- 6) You feel loved and wanted

### ***Positive Mood***

1. You felt you were just as good as other people
2. You felt hopeful about the future.
3. You were happy.
4. You enjoyed life.

### ***Family Connectedness***

1. how much do you feel that your parents care about you?
2. how much do you feel that people in your family understand you?
3. how much do you feel that you want to leave home?
4. How much do you feel that you and your family have fun together?
5. How much do you feel that your family pays attention to you?

### ***School Belongingness***

1. You feel close to people at your school
2. You feel like you are part of your school
3. Students at your school are prejudiced (deleted after consideration)

4. You are happy to be at your school
5. The teachers at your school treated students fairly
6. You feel safe in your school
7. How do you feel that your teachers care about you?
8. How much do you feel that your friends care about you?

## **Appendix B: Covariates**

### ***Problematic Alcohol Use***

Over the past 12 months, how many times has each of the following things happened:

- 1) Got into trouble with parents because you had been drinking;
- 2) had problems at school or with school work because you had been drinking;
- 3) had problems with friends because you had been drinking;
- 4) had problems with someone you were dating because you had been drinking;
- 5) did something you later regretted because you had been drinking;
- 6) got into a sexual situation that you later regretted because you had been drinking; or
- 7) got into a physical fight because you had been drinking?

### ***Substance Use***

- 1) During your life, how many times have you used marijuana?
- 2) During your life, how many times have you used cocaine
- 3) During your life, how many times have you used inhalants (such as glue or solvents)
- 4) During your life, how many times have you used illegal drugs such as LSD, PCP, ecstasy, mushrooms, speed, ice, and heroin, or pills without a doctor's prescription?

### ***Somatic symptoms***

- 1) In the past 12 months, how often have you had a headache?
- 2) During the past 12 months, how often have you had a stomachache or upset stomach?
- 3) In the past 12 months, how often have you felt hot all over suddenly, for no reason?
- 4) During the past 12 months, how often have you felt physically weak for no reason?
- 5) During the past 12 months, how often have you felt very tired for no reason?
- 6) In the past 12 months, how often have you felt really sick?

7) In the past 12 months, how often have you woken up feeling tired?

8) In the past 12 months, how often have you been dizzy?

### ***Violence Exposure***

During the past 12 months, how often did the following happen?

1. You saw someone shoot or stab another person.
2. Someone pulled a knife or gun on you.
3. Someone shot or stabbed you.
4. Someone cut or stabbed you.
5. You got into a physical fight.
6. You were jumped.

### ***Depressive Symptoms***

1. You were bothered by things that don't usually bother you.
2. You didn't feel like eating, your appetite was poor.
3. You felt that you could not shake off the blues, even with help from your family and your friends.
4. You had trouble keeping your mind on what you were doing.
5. You felt depressed.
6. You felt that you were too tired to do things.
7. You thought your life had been a failure.
8. You felt fearful.
9. You talked less than usual.
10. You felt lonely.
11. People were unfriendly to you.

12. You felt sad.
13. You felt that people disliked you.
14. It was hard to get started doing things.

## **Appendix C: Wave III Wellbeing Battery**

### ***Self-Acceptance***

- Do you agree or disagree that you have many good qualities?
- Do you agree or disagree that you have a lot to be proud of?
- Do you agree or disagree that you like yourself just the way you are?
- Do you agree or disagree that you feel you are doing things just about right?

### ***Positive Mood***

- You felt that you were just as good as other people, during the past seven days.
- You enjoyed life, during the past seven days

### ***Negative Mood***

- You were depressed, during the past seven days
- You could not shake off the blues, even with help from your family and your friends, during the past seven days.
- You were sad, during the past seven days

### ***Life Satisfaction***

- How satisfied are you with your life as a whole?

### ***Parental Relationship***

- You enjoy doing things with your mother
- Most of the time, your mother is warm and loving toward you
- How close do you feel to your mother
- You enjoy doing things with your father
- Most of the time, your father is warm and loving toward you
- How close do you feel to your father

### ***Justification for using the updated 5-domain well-being battery at Wave III***

We proposed a 7-domain well-being battery (self-acceptance, positive mood, negative mood, hopefulness, parental relationships, autonomy, life satisfaction). As we further worked on this current project and our prior work (Tong et al., under review), we re-examined our entire batteries at Wave I and III (Wave I well-being battery was not used in the current study). After re-examining the two batteries, we identified the following potential problems:

- 1) Inconsistency of the time frame of the positive and negative mood, and life satisfaction items used across waves. At Wave III, positive and negative mood, as well as life satisfaction, were assessed with a timeframe of the past 12 months. At Wave I, the positive mood and life satisfaction were assessed with a timeframe of the past 7 days, while negative mood was assessed for the past 12 months.
- 2) The reliability of the autonomy subscale in the original well-being battery was lower than we expected,  $\alpha = 0.6$  and  $0.45$  at Wave I and III, respectively.
- 3) The face validity of the hopefulness domain (“what do you think are the chances that you will live to age 35?”) in the original well-being battery could be questioned.
- 4) Overall reliability of the original 7-domain battery was lower than we expected,  $\alpha = 0.62$  and  $0.53$  at Wave I and III, respectively.

To address these issues, we made several changes to the well-being battery while still closely following our original well-being theories and intent.

- 1) To increase the consistency of the time frame of assessment, we a) replaced the single-item measurement of positive mood at Wave III with two items that used the same time frame (*during the past seven days, you felt that you were just as good as other people, you enjoyed life*); b) replaced the single-item measurement of negative mood at Wave III



with three items (*during the past seven days, you were depressed; you could not shake off the blues; You were sad*); c) replaced the single-item measurement of positive mood at Wave I with four items (*during the past seven days, You felt you were just as good as other people; You felt hopeful about the future; You were happy; You enjoyed life*); d) replaced the single-item measurement of negative mood at Wave I with five items (*during the past seven days, You felt that you could not shake off the blues; You felt depressed; You felt fearful; You felt lonely; You felt sad*); e) replaced the single-item measurement of life satisfaction at Wave I with two items (*On the whole, how happy are you with living in your neighborhood; You are happy to be at your school*).

- 2) Because of the low reliability, we decided not to retain the autonomy subscale.
- 3) Because face validity was questionable, we decided not to retain the hopefulness subscale.

All changes are summarized in the table below (Table 8):

**Table 8.** Changes in the 5-Domain and 7-Domain Well-Being Batteries

Original 7-Domain Well-Being Battery at Wave III			Current 5-Domain Well-Being Battery at Wave III	
	Items	$\alpha$	Items	$\alpha$
Autonomy	3-item; e.g., “Do you agree or disagree that your behavior often depends on how you think other people want you to behave?”	0.45	Deleted	/
Self-acceptance	4-item; e.g., Do you agree or disagree with the following statement? You like yourself just the way you are.”	0.78	Original retained	0.78
Positive Mood	1-item; “In the past 12 months, how often have you laughed a lot?”	/	Original replaced with 2-item; “During the past 7 days, you felt you were just as good as other people;” “You enjoyed life.”	0.58
Negative Mood	1-item; “In the past 12 months, how often have you cried a lot?”	/	3-item; e.g., “During the past 7 days, you were depressed;” “You were sad.”	0.82

Table 8 (continued)

<b>Original 7-Domain Well-Being Battery at Wave III</b>			<b>Current 5-Domain Well-Being Battery at Wave III</b>	
	Items	$\alpha$	Items	$\alpha$
Hopefulness	1-item; “what do you think are the chances that you will live to age 35?”	/	Deleted	/
Life satisfaction	1-item; “How satisfied are you with your life as a whole?”	/	Original retained	/
Parental relationship	6-item; e.g., “Most of the time, your father (mother) is warm and loving toward you.”	0.85	Original retained	0.85
Total Scale	7 domains	0.53	5 domains	0.71
<b>Original 7-Domain Well-Being Battery at Wave I (not used in the current study)</b>			<b>5-Domain Well-Being Battery at Wave I (not used in the current study)</b>	
	Items	$\alpha$	Items	$\alpha$
Autonomy	7-item, e.g., “Do your parents let you make your own decisions about the people you hang around with?”	0.62	Deleted	/
Self-acceptance	4-item, e.g., “Do you agree or disagree with the following statement? You like yourself just the way you are.”	0.79	Original Retained	0.79
Positive Mood	1-item, “You were happy in the past 7 days.”	/	Original replaced with 4-item, e.g., “During the past 7 days, you were happy;” “You enjoyed life.”	0.72
Negative Mood	1-item, “In the past 12 months, how often have you cried a lot.”	/	Original replaced with 5-items e.g., “During the past 7 days, you felt depressed;” “You felt sad.”	0.82
Hopefulness	1-item, “what do you think are the chances that you will live to age 35?”	/	Deleted	/
Life satisfaction	1-item; “You enjoyed life in the past 7 days”	/	Original replaced with 2-item: “On the whole, how happy are you with living in your neighborhood?” Last year, you were happy to be at your school.	0.45
Parental relationship	10-item; e.g., “most of the time, your father (mother) is warm and loving toward you.”	0.88	Original retained	0.88
Total Scale	7 domains	0.6	5 domains	0.72

These changes improved the well-being batteries by:

- 1) Making the timeframe of each construct consistent across two waves. For the positive and negative mood, the timeframe was the past 7 days. For the rest of the domains, the past

12-month timeframe was used. Within each wave, different timeframes assessing different well-being domains are commonly used in the field (Greenfield & Marks, 2007; Rottenberg et al., 2018; Gruhn et al., 2008).

- 2) Reliability of the well-being battery was improved ( $\alpha = 0.72, 0.71$  for Waves I and III) and is compatible with other published studies on well-being (Booker et al., 2008; Jose et al., 2012; Harker, 2001).

Importantly, our major results held when we repeated our analyses using the revised well-being battery. Critically, the estimates of future well-being among suicide attempt survivors were virtually identical. In the original battery, we found that about 23% non-suicidal peers met well-being criteria at Wave III, and 12% of suicide attempt survivors met the same well-being threshold at Wave III. With the revised well-being battery, the corresponding figures were, ~26% for non-suicidal peers and ~13% of suicide attempt survivors. The updated battery captured most (~70%) survivors with high well-being identified with the original battery. Moreover, longitudinal findings from our multivariable logistic analysis also remain unchanged. For example, in the current study, Wave I self-esteem continued to be most robust predictor of future high well-being at Wave III among suicide attempt survivors, with the same control variables in our analysis (e.g., demographic variables, suicide attempt frequency and severity). The manuscript now reports findings using the stronger updated battery. We are reassured to see that findings are consistent across iterations of the assessment battery.

## **Appendix D: Weight Variables**

According to the *Guidelines for Analyzing Add Health Data*, when providing population estimates, the cross-sectional weight is recommended. Therefore, when providing demographic information and internal reliability of the subscales at Wave I, we used GSWGT1; when providing estimations of future high well-being status at Wave III, we used GSWGT3\_2. In longitudinal analysis, when outcome variable is from one wave of data (i.e., Wave III), and the predictors (and covariates) are from a previous wave (i.e., Wave I), the correct weight would be the cross-sectional weight for the wave from where the outcome variable comes, which is also GSWGT3\_2.