

Editorial

A Call to Clarify Fuzzy Sets

Alan L. Berman¹ and Morton M. Silverman²

¹Department of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine, Baltimore, MD, USA

²Department of Psychiatry, Medical College of Wisconsin, Milwaukee, WI, USA



U.S. Youth Suicide Rate Increased 56% in Decade, CDC Says

(Wall Street Journal, November 12, 2019; <https://www.wsj.com/articles/youth-suicide-rate-rises-56-in-decade-cdc-says-11571284861>)

Suicide Rates for Young Australians Highest in 10 Years
(<https://www.abc.net.au/news/2016-11-30/system-for-suicide-prevention-rates-highest-10-years/8076780>)

Suicide Rate Rises Among Young People in England and Wales

(The Guardian, September 4, 2018; <https://www.theguardian.com/society/2018/sep/04/suicide-rate-rises-among-young-people-in-england-and-wales>)

Headlines such as these have dominated the consciousness of these three high-income, Westernized nations in recent years and have plagued suicidologists with difficult-to-answer, if not as-yet-unanswerable, questions from the media and the general public, begging an understanding of these alarming increases in rates of death by suicide among the young.

This problem is compounded by our field's lack of uniformity in defining the ages that comprise the focus of these epidemiologic trends. Hence our ability to study homogeneous groups of at-risk youth, to establish epidemiologic trends of same age groups (and over comparable periods of time), and to attribute specific risk factors, behavioral patterns, and environmental influences to those described as youth or young people, no less to effectively tailor interventions, is compromised. Youth comprise a "fuzzy set," for which boundaries established by researchers appear to be arbitrary, vague, and inconsistent.

Terminology and Age Ranges

Categorically, *teen* would rightfully be attributed to those ages that end in *-teen*, that is, 13–19 years, and be bounded on the younger side by those described as *pre-teens* and on the older side by *young adults*; but these boundaries are far from clear. One recent study, reporting on suicide risk screening in the emergency department (Lanzillo et al., 2019), defined pre-teens as 10–12-year-olds, while another study, reporting on suicidal thoughts in pre-teens, defined this group as 11–13-years-old (Voltas, Hernández-Martínez, Arija, & Canals, 2019). At the other end of this spectrum, Wikipedia defines young adult as referencing persons ranging in age from their late teens or early 20s to their 30s ([https://en.wikipedia.org/wiki/Young_adult_\(psychology\)](https://en.wikipedia.org/wiki/Young_adult_(psychology))) and concurrently *young adult fiction* as written for 12- to 18-year-olds (https://en.wikipedia.org/wiki/Young_adult_fiction).

The teenage years would seem to be synonymous with adolescence, but the research literature seems not to agree. Adolescence is typically referred to as the period following the onset of puberty during which a young person develops from a child into an adult; however, the onset of puberty varies by gender, suggesting that this age group would be differentially defined by gender. Moreover, earlier puberty has accelerated the onset of adolescence in nearly all populations, while continued development has extended its endpoint age into the 20s (Parent et al., 2003; Sawyer, Azzopardi, Wickremarathne, & Patton, 2018).

The World Health Organization (WHO; <http://apps.who.int/adolescent/second-decade/section2/page1/recognizing-adolescence.html>) defines adolescence as the period between 10 and 19 years of age. The great majority of adolescents are, therefore, included in the age-based definition of *child*, adopted by the Convention on the Rights of the Child (<https://www.ohchr.org/en/professionalinterest/pages/crc.aspx>) as a person under the age of 18

years. The WHO further notes that, in some countries, adolescence may stretch into one's mid-30s! At that, very few would consider that an 18- or 19-year-old has similar psychological issues and environmental stressors as those affecting a 13-year-old.

This lack of coherence extends to any number of sampled research studies that define adolescence as the set of individuals: (a) between the ages of 10 and 19 (Lee et al., 2019), an age group described by Kølves and De Leo (2017) as "children and adolescents"; (b) between the ages of 10 and 18 (Berk & Asaranow, 2015); (c) between the ages of 13 and 18 (Keyes et al., 2019); or (d) between the ages of 13 and 20 (Bilsen, 2018).

So, to whom are researchers referring when they present data and epidemiologic trends for suicide mortality regarding *youth suicide* or write about suicide among *the young*? A cursory PubMed review of recently published research on youth suicide offers a wide array of ages studied ranging from those aged 5–17 (Bridge et al., 2018), 10–19 (Knopov, Sherman, Raifman, Larson, & Siegel, 2019; Ruch et al., 2019), 10–24 (McKean, Pabbati, Geske, & Bostwick, 2018), 10–25 (Rhodes et al., 2019), 16–23 (Godoy Garrazza, Walrath, Goldston, Reid, & McKeon, 2015), and those "under the age of 26" (Abdullah, Khalily, Ahmead, & Hallahan, 2018; Keeshin, Gray, Zhang, Presson, & Coon 2018). Similarly, *young people* may refer to those 24 years old or younger (Robinson, Too, Pirkis, & Spittal, 2016) or to a more delimited cohort between the ages of 16 and 24 (Ali & Gibson, 2019). Miron, Yu, Wilf-Miron, and Kohane (2019) refer to *youth* as those aged 15–24 years, and, as if to further confuse matters, in the same report describe those aged 20–24 years as *young adults*, a group defined by the US Food and Drug Administration (USFDA) in one study as being 18–24 years old, given that the USFDA defines adolescents as those aged 12–17! (<https://www.fda.gov/regulatory-information/search-fda-guidance-documents/considerations-inclusion-adolescent-patients-adult-oncology-clinical-trials>).

The leading public health agency in the United States, the Centers for Disease Control and Prevention (CDC), publishes mortality and morbidity data regarding suicide with some frequency, yet refers to youth as either those aged 10–19 (Ertln et al., 2019) or those aged 10–24 (Kann et al., 2018) or, more simply, "persons aged 10–17 years" (Annor et al., 2018).

As if all of the above were not confusing enough, what becomes even more confusing is that labels have been attributed to birth cohorts or *generations*, and the birth parameters of these generations differ. For example, the Millennial Generation, also referred to as *Generation Y*, were born, according to accessible websites, between 1981 and 1996, 1979 and 1997, 1979 and 1995, or 1980 and 2000. Similarly, boundaries on Gen Z (or the "Post-Millennial Gener-

ation") extend from 1996 to 2010 or from 1997 to 2012, 1995 to 2010, and 1998 onward (i.e., not yet ended).

The significance of this labeling is that each birth cohort or generation is characterized differently according to specific preferences, attitudes, beliefs, and behaviors, based on surveys and analyses. Such distinctions would lead to developing and implementing different public health interventions based on the profiles of these generations. To compound this confusion is that a study that covers a broad time span such as 2000–2017, as well as a broad age range, might well capture more than one or two generations, potentially homogenizing different and possibly distinct cohorts of individuals, who place different values and beliefs on different sets of behaviors being measured – in this case, suicidal ideations, thoughts, and behaviors.

The CDC breaks down age groups into 5-year groupings (e.g., 10–14, 15–19, 20–24, etc.) in an attempt to provide a finer-grained analysis. However, even these circumscribed age groups can hide fluctuations in rates and population-specific characteristics. For example, Miron and colleagues (2019) separately examined male and female suicide rates for those aged 15–19 and 20–24 years, calculating time points at which trends changed, expressed as annual percentage changes. However, even these 5-year groupings can hide significant trends at an even more fine-grained level. As one example, during the period 2000–2017 the rate of suicide among US youth between the ages of 15 and 19 increased 47%; but for 15 year olds in particular, the rate was almost double that, at 88% (CDC WISQARS, accessed October 14, 2019, at <https://www.cdc.gov/injury/wisqars/fatal.html>), possibly suggesting something particularly suicidogenic at this age.

Why Is This a Problem and What Might We Do About It?

In the end, statistics and broad population-based rates and comparisons of rates across decades serve no real purpose unless they point us to core issues and risk factors and their determinants, that help us identify, develop, and implement key suicide preventive interventions targeted at the underlying causes for self-injury and self-destruction. No longer is it enough to say that suicide is a major public health problem as defined by observed rates and trends.

By defining youth as ages 10–19, 10–24, or 15–24, the influences and effects of social settings and life experiences (not to mention psychological and biological developmental influences) can be lost or distorted, for these different groupings include individuals in elementary school, middle school, high school, college, the military, and the workplace.

When determining and/or reporting on rates of suicide and suicide-related behaviors, researchers often study cohorts, or groups of people of similar age who have similar experiences and concerns, mortalities, and morbidities. If we are truly to accomplish a lowering of suicide rates among the young, we need to better understand causes and associated risk factors that are specific to different groups of young people. To group 14-year-olds with 10-year-olds or 19-year-olds with 15-year-olds, no less to treat all youth or young people as a single entity for purposes of chronicling suicidal thoughts and behaviors, is insufficient for such purposes when lives are at stake and preventive efforts have to date failed to accomplish our goals of lives saved. As in surgery, research needs to be more laser-focused on understanding the targets of our interventions and their associated pathologies if our preventive interventions are to be remedial.

Counting heads and simply pointing out that things are not changing over time is no longer sufficient. If we are to reduce the burden of suicide, new approaches, new directions, new collaborations are needed (see Reidenberg & Berman, 2017). How we look at and report data and their implications is central to accomplishing these ends.

From our perspectives, a number of recommendations seem evident. As researchers, we must speak the same language if we ever hope to communicate better with each other and to have our findings effectively translated for public consumption and understanding.

1. In order to compare research and epidemiological findings we must agree on and use the same age ranges or groupings. These groupings should reasonably reflect the developmental, psychosocial, and biological markers that distinguish homogeneous sets of young people.
2. In recognition of significant developmental differences, these groupings might be reconsidered to allow for more finely grained data (and their correlates). For example, we might propose a developmental perspective that designates those aged 10–12 as pre-teens, those aged 13–14 as early adolescents, those aged 15–16 as mid-adolescents, those aged 17–19 as late adolescents, and those aged 20–24 as young adults. Others might well argue for a different categorization.
 - a. Of course, we recognize that certain federally collected and published datasets do not allow researchers to easily disaggregate 5- or 10-year age groupings. Nevertheless, data in more delimited age groupings are or can be made accessible and would assist in better understanding and intervening in the developmental trajectories of suicidal behavior.

No matter what age groupings we define, we must also pay careful attention to the time frames we use to examine trends. Reporting markedly increased rates from a start

date X to the present among those aged 15–16 is more meaningful if date X is consistently referenced, for example, 2000, as a baseline, versus variably referenced, for example, 1999 or 2000, or 2005 (Curtin & Heron, 2019; Ruch et al. 2019; Twenge, Cooper, Joiner, Duffy, & Binau, 2019), as well as end dates (Mercado, Holland, Leemis, Stone, & Wang, 2017).

Clarifying the age ranges of groupings would allow for developmentally appropriate preventive interventions, policies, and service systems (Sawyer et al., 2018). Implementing these recommendations would allow studies to be easily and evenly compared and contrasted, no less for research findings to be translated into more finely targeted interventions and preventive programs.

We simply do not believe that making broad statements about broad groups labeled as *adolescents*, *youth*, *young adults*, etc., helps to advance our field and those to whom we communicate to develop and implement preventive interventions that will lower suicide behaviors in these individuals.

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Alan L. Berman

Department of Psychiatry and Behavioral Sciences
Johns Hopkins University
School of Medicine
Baltimore, MD
USA
dr.lannyberman@gmail.com

Alan L. Berman, PhD, is Adjunct Professor of Psychiatry, Department of Psychiatry and Behavioral Sciences, Johns Hopkins School of Medicine, USA. He is Past-President of the International Association for Suicide Prevention (2009–2013) and served as Executive Director of the American Association of Suicidology between 1995 and 2014.

Morton M. Silverman, MD, is Assistant Adjunct Professor of Psychiatry, Medical College of Wisconsin, Milwaukee, WI, USA, and Distinguished Life Fellow of the American Psychiatric Association. From 2004 to 2017 he served as Senior Science Advisor to the Suicide Prevention Resource Center. He was Editor-in-Chief of *Suicide and Life-Threatening Behavior* between 1996 and 2009.