Well-Being and Suicidality Among Transgender Youth After Gender-Affirming Hormones

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Abstract

Objective: This study is a longitudinal evaluation of the effectiveness of gender-affirming hormones for improving psychological well-being and decreasing suicidality among transgender youth referred to a transgender health specialty clinic at a large Midwest children's hospital. *Method*: Forty-seven youth (13.73 to 19.04 years; $M = 16.59$, $SD = 1.19$) who received gender-affirming hormones were assessed at least 2 times: before the start of treatment and at least 3 months after treatment. *Results*: After gender-affirming hormones, a significant increase in levels of general well-being and a significant decrease in levels of suicidality were observed. *Conclusion*: These findings suggest that gender-affirming hormones are a valuable medical intervention with promising psychosocial outcomes for transgender youth.

Keywords: transgender, gender-affirming hormones, suicidality, well-being, youth

Implications for Impact Statement: This study suggests that gender-affirming hormones are a helpful medical intervention for transgender youth. Gender-affirming hormones were found to be associated with decreases in suicidality and improvements in general well-being.

Well-Being and Suicidality Among Transgender Youth After Gender-Affirming Hormones

Over the past few decades, the number of young people presenting to specialty clinics for gender dysphoria (GD) treatment has increased worldwide (Chen, Fuqua, & Eugster, 2016; Olson-Kennedy et al., 2016). GD refers to the distress a person may experience when an incongruence exists between one's sex assigned at birth and one's experienced gender identity. Transgender people have varying degrees of GD; some have none at all. For peri-pubertal children and adolescents with GD, clinical practice guidelines recommend the administration of puberty suppression medication (gonadotropin-releasing hormone agonists [GnRHa]). Later, gender-affirming hormones (GAH; estrogen or testosterone) are administered to help alleviate the distress associated with GD (Coleman et al., 2012; Hembree et al., 2017).

Overall, the evidence suggests that youth who received GAH and gender confirmation surgery (GCS) for gender dysphoria experience a corresponding alleviation of the dysphoria and overall improved well-being and mental health outcomes (Hembree et al., 2017; Olson-Kennedy, Warus, Okonta, Belzer, & Clark, 2018). However, further research is needed to develop and refine best practices for serving transgender youth and alleviate GD and associated co-occurring conditions (e.g., anxiety, depression, suicidality). De Vries and colleagues (2014) examined psychological outcomes in youth while on GnRHa and then again at least one year after GCS. The authors found that psychological functioning had improved over time, gender dysphoria resolved, body image difficulties remitted, and quality of life, life satisfaction, and subjective happiness were comparable to those of same-age peers. Among adults, receiving gender-affirming medical interventions is associated with lower body-related uneasiness (Fisher et al., 2014; Davis & Meier, 2014), improved psychological functioning (Keo-Meier et al., 2015),

reduction in anxiety, depression, and anger (Davis & Meier, 2014), and better quality of life (Ainsworth & Spiegel, 2010).

Emerging evidence suggest that transgender youth might exhibit differential responses to GAH, directly and indirectly, across several domains depending upon sex assigned at birth. Some research suggests there may be differences in emotionality in response to testosterone versus estrogen. One study of transgender adults demonstrated that testosterone treatment was associated with increased mood stability, whereas estrogen treatment was associated with increased mood lability (Slabbekoorn, Van Goozen, Gooren, & Cohen-Kettenis, 2001). Mood instability, in turn, is associated with suicidal ideation (Bowen, Balbuena, Peters, Leuschen-Mewis, & Baetz, 2015) as well as decreased perceptions of well-being (Houben, Van Den Noortgate, & Kuppens, 2015). There may also be sex differences related to the social aspect of medical transition. For instance, compared to transgender girls/women, it may be easier for transgender boys/men to integrate socially due to clear vocal changes (i.e., voice deepening) and facial hair growth, which are traditionally seen as indicators of one's gender. Conversely, the physical changes of a testosterone-mediated puberty may make it harder for transgender girls and women who start estrogen after their endogenous puberty to "pass" in their affirmed gender, putting them at risk for increased minority stress, which may result in increased suicidal ideation (Testa et al., 2017). In one study, de Vries and colleagues (2014) compared functioning prior to starting GAH and after GCS and found that transgender men reported greater reduction in anger, anxiety, and externalizing symptoms (e.g., rule-breaking or aggressive behavior) than transgender women, who had demonstrated either stability or a slight increase in these symptoms.

Research examining mental health outcomes among transgender youth is a priority

(Chew et al., 2018; Olson-Kennedy et al., 2016). At this time, there is limited research supporting the use of GAH in transgender adolescents (Hembree et al., 2017). Of the studies that do exist, the majority of outcome research has been from European clinical samples, and these studies did not utilize measures of suicidality and well-being. This is a gap as there has been a call to focus on positive aspects of functioning (such as well-being), and low levels of perceived well-being has been linked to suicidality (Lopez et al., 2006; Smith et al., 2018).

The primary aim of this study was to examine suicidality and general well-being following administration of GAH. Specifically, we hypothesized that (1) suicidality will decrease between pre-test and final assessment with the administration of GAH and that (2) general well-being will improve between pre-test and final assessment with the administration of GAH. A secondary aim of the study was to examine whether the effects of GAH on suicidality and well-being differed based upon birth-assigned sex. Specifically, we hypothesized that (3) individuals assigned female at birth will experience greater increases in general well-being and larger decreases in suicidality at final assessment compared to those assigned male at birth.

Method

Participants

Participants included adolescents and young adults (age range 13 to 20 years) who received services for GD at Children's Mercy Hospital (CMH) Gender Pathway Services (GPS) clinic. Participants were included if they had pre-test and final assessment data points and were treated with GAH for at least three months. A power analysis was conducted to determine the sample size needed to answer the research questions. The α for the mixed repeated-measures analysis of covariance (ANCOVA) was set at .05. To achieve power of .80 and a medium effect size ($f^2 = .25$), a total sample size of 34 was required for each ANCOVA to detect a significant

model (F[1, 33] = 4.15). A total of 47 eligible participants had pre-test and final assessment data. The pre-test for 23 participants occurred at their first contact with the clinic (the other participants' pre-test assessment was completed at a subsequent visits to clinic but prior to starting GAH). At pre-test (Time 0 [T_0]; i.e., before administration of GAH), the age of participants ranged from 13.73 to 19.04 years (M = 16.59, SD = 1.19). The range of treatment length was 113 to 1016 days (M = 349, SD = 193). For most of the sample (90%), duration of treatment was at, or under, 600 days. Thirteen of the participants first presented to our clinic in 2015; 19 in 2016; 14 in 2017; and one in 2018. Of the 47 participants, eight were administered GnRHa in our clinic prior to beginning GAH (we refer to these eight participants elsewhere in the article as the "GnRHa+GAH" subgroup). See Table 1 for additional participant characteristics.

Procedure

The institutional review board (IRB) of the University of Missouri – Kansas City ceded IRB review and continuing oversight duties to the CMH IRB, which approved the study. Data collection occurred as part of ongoing standard clinical care at GPS clinic. GPS clinic follows WPATH Standards of Care, version 7 (Coleman et al., 2012) and the Endocrine Society's Clinical Practice Guidelines for the treatment of gender-dysphoric/gender-incongruent people (Hembree et al., 2017). The services provided in GPS clinic are similar to those provided in other specialty gender clinics (e.g., Chen, Hidalgo, et al., 2016; Edwards-Leeper & Spack, 2012). A multidisciplinary team, including nursing, endocrinology, psychology, and social work professionals, work collaboratively to develop a treatment plan that may include GnRHa and/or GAH. A diagnosis of GD and referral for medical treatment by a mental health professional is required. To avoid unnecessary delays in medical care, our clinic does not require patients to be

seen by one of our clinic's mental health professionals if they have an established GD diagnosis and referral from a community mental health professional. Patients with a referral from a community mental health professional and an established GD diagnosis may be referred directly to endocrinology or multidisciplinary team meetings to begin GnRHa or GAH. Because our team's mental health professionals administer the clinic's questionnaires and screeners themselves (rather than our nurses or endocrinologists), roughly half of the youth who would have been eligible to be included this study did not have a pre-test data point and therefore could not be included in the final sample. Patients are administered questionnaires and screeners at the beginning of their clinic visit, either at the time of the diagnostic evaluation or during a follow-up appointment with the multidisciplinary team. Responses are reviewed by the mental health professional prior to meeting with the patient. For participants already on GnRHa, new baseline assessments were taken before progressing to GAH. For 10 participants in the study, the pre-test data point occurred days before actual administration of GAH (range: 7 to 74 days; $M = 38$ days). Some causes of the delays included, but were not limited to, waiting for laboratory results, fertility preservation procedures, and insurance-related delays. Between multidisciplinary appointments, patients may see clinic endocrinologists and nurses individually for follow-up care.

Measures

Suicidality. The *Ask Suicide-Screening Questions* (ASQ) instrument is a four-item dichotomous (*yes*, *no*) response measure with high sensitivity (i.e., ability to identify "true positives"), designed to identify risk of suicide (Horowitz et al., 2012). A patient is considered to have screened "positive" if they answered yes to any item. A sample item of the ASQ includes "In the past few weeks have you felt that you or your family would be better off if you were

dead?" In our clinic's survey, we have altered the fourth item of the ASQ ("Have you ever tried to kill yourself?") and prefaced it with "In the past few weeks…" such that we no longer ask about lifetime suicidality. For the purposes of this study, a response of "no" was scored as 0 and a response of "yes" was scored as 1; each item was summed, generating an overall score for suicidality on a scale ranging from 0 to 4, with higher scores indicating greater levels of suicidal ideation. The ASQ has a sensitivity of 97.6% and a specificity of 65.6%. The Cronbach's alpha for the current study was .81 at pre-test and at final assessment, after rounding. Prior to March 2017, only three items of the ASQ were administered. No additional data were missing. As opposed to data that may be missing in nonrandom patterns for unknown reasons possibly related to bias in the variable being measured or sampling bias, the reason for the missing data in this study is known (the item was not asked by providers prior to March 2017). Thus, for purposes of statistical analyses, the data for the ASQ item that was missing these data are considered to be *missing at random* as they do not likely introduce unknown bias (McKnight, McKnight, Sidani, & Figuerdo, 2007), and values were imputed with expectation maximization (N = 28 imputations at T_0; N = 10 imputations at Time 1 [T_1], after administration of GAH).

Well-being. The *General Well-Being Scale (GWBS) of the Pediatric Quality of Life Inventory* (Varni, Seid, & Kurtin, 1999) uses a 5-point response scale, contains 7 items, and measures 2 dimensions ("general well-being" and "general health"). The general well-being subscale includes six items. Example items include "I feel happy" and "I think my health will be good in the future." Participants are asked to consider each item and rate how often they have felt that way over the past month from 0 (*never*) to 4 (*almost always*). The general health subscale contains one item ("In general, how is your health?"), with response options ranging from 0 (*Bad*) to 4 (*Excellent*). All items are scored and linearly transformed to a 0 to 100 scale (initial

score of 0 = 0, 1 = 25, 2 = 50, 3 = 75, and 4 = 100) for standardized interpretation. High scores reflect fewer perceived problems and greater well-being. The measure has adequate to good internal consistency (ranging from .70 to .92) and clinical validity (Varni et al., 1999). The Cronbach's alpha for the current study was .81 at pre-test and .82 at final assessment.

Results

Two mixed repeated-measures analyses of covariance (ANCOVAs) were used to ascertain within-subject differences between pre-test (T_0) and final assessment (T_1) suicidality and general well-being scores, with sex assigned at birth as the between-subjects variable. Because there is variability between duration of treatment among participants, the period of time (i.e., duration of treatment) between T_0 and T_1 functioned as a covariate. Schneider, Avivi-Reich, and Mozuraitis (2015) point out that when the between-groups are not randomly assigned in an ANCOVA, the assumption that the covariate is the same for all participants is not valid (as it is for experimental designs). Thus, the covariate should be centered to account for differences. Accordingly, scores on the covariate were centered by subtracting the sample mean.

The first mixed ANCOVA was conducted to ascertain within-subject differences between baseline suicidality scores (T_0) and suicidality after GAH (T_1). All statistical assumptions required to conduct the mixed ANCOVA were met. Duration of treatment was not significantly related to participants' ASQ scores, $F(1, 44) = .09$, $p = .77$, partial $\eta^2 = .002$. The main effect was significant, meaning suicidality scores were significantly lower at T_1 after GAH treatment, $F(1, 44) = 15.09$, $p < .001$, partial $\eta^2 = .26$, demonstrating a large effect size (see Figure 1 and Table 2). Thus, hypothesis 1 was supported. The estimated adjusted mean for suicidality scores decreased by .84 from 1.11 at T_0 to .27 at T_1. Omitting the item for which we had missing data, an *ad hoc* comparison revealed that at T_0, 21 of the 47 participants endorsed at least one of the

ASQ screener items (7 participants endorsed only one item, 10 participants endorsed two items, and 4 participants endorsed three items). At T_1, only 6 of the 47 participants had endorsed at least one of the ASQ screener items (3 participants endorsed one item and 3 participants endorsed two items).

A second mixed ANCOVA was conducted to ascertain within-subject differences between baseline general well-being scores (T_0) and general well-being after administration of GAH (T_1). All statistical assumptions required to conduct the mixed ANCOVA were met. Duration of treatment was not significantly related to participants' general well-being scores, $F(1, 44) = .37$ $p = .54$, partial $\eta^2 = .01$, showing a small effect size. The main effect was significant, meaning general well-being scores were significantly higher at T_1 after GAH, $F(1, 44) = 11.39$, $p < .002$, partial $\eta^2 = .21$, demonstrating a large effect size (see Figure 1 and Table 2). Thus, hypothesis 2 was supported. The estimated adjusted mean for general well-being scores increased by 8.53 from 61.7 at T_0 to 70.23 at T_1. An additional *ad hoc* comparison of pre-test and final assessment scores was made to identify potential differences among the two subgroups (GAH-only and GnRHa+GAH; see Table 3). While each group appears to have equivalent outcomes with regard to general well-being scores and similar baseline suicidality scores, notably no one in the GnRHa+GAH cohort endorsed any items assessing for suicidality at T_1.

In the first mixed ANCOVA, a significant effect was not observed for sex assigned at birth with regard to suicidality scores, after controlling for duration of treatment, $F(1, 44) = .08$, $p = .79$, partial $\eta^2 = .002$ (see Table 2). In the second mixed ANCOVA, the predicted interaction effect of sex assigned at birth with regard to well-being scores was also non-significant, $F(1, 44) = 1.00$, $p = .32$, partial $\eta^2 = .02$, demonstrating a small effect size (see Table 2). Thus, hypothesis 3 was not supported (i.e., the observed differences in suicidality and well-being scores after

GAH treatment did not differ based on birth-assigned sex).

Discussion

Results of the analyses confirmed our primary hypotheses. We found that at final assessment, participants' suicidality scores had significantly decreased following administration of GAH, confirming hypothesis 1. Prior to receiving GAH patients, on average, endorsed at least one item of suicidality. At final assessment after receiving GAH, however, participants endorsed almost no symptoms of suicidality. In addition, we found that at final assessment, participants' general well-being scores significantly increased, supporting hypothesis 2. Despite having roughly equivalent pre-test suicidality scores, an *ad hoc* comparison revealed that, in contrast to the GAH cohort with a T_1 mean ASQ score of .33, the GnRHa+GAH cohort endorsed no suicidality after treatment. The disparity in suicidality outcomes may be due to the initiation of GAH at younger ages among the GnRHa+GAH cohort, contributing to improved psychological and physical outcomes (de Vries et al., 2014). It may also be that participants who had been administered GnRHa prior to GAH have more, or earlier, parental support.

Hypothesis 3 (i.e., those assigned female at birth will experience greater improvements in general well-being and larger decreases in suicidality) was not supported. Although hypothesis 3 was not supported, this finding may have been due to insufficient power as we did observe a small effect size for general well-being scores. Ultimately, we may infer from our findings that GAH is associated with less suicidality and greater well-being for all youth regardless of assigned sex at birth.

Our findings demonstrate that levels of suicidality decrease, while general well-being increases, among adolescents diagnosed with GD after receiving GAH. The findings contribute to a growing literature supporting the hypothesis that transgender adolescents and adults benefit

from GAH in terms of quality of life and psychological functioning (de Vries et al., 2014; Keo-Meier et al., 2015). Clinicians and advocates working with transgender youth and their families can cite these data as support that GAH is associated with improved psychological outcomes among transgender youth. Our study, specifically, speaks to reduced risk for suicidality and improved wellbeing, both of which are prominent worries of parents. Parents often struggle with the decision about whether to provide permission for irreversible steps in medical transition, such as initiation of GAH. Their fears may be alleviated to some extent as the emerging evidence supports use GAH among transgender youth.

Concordant with existing guidelines (APA, 2015, Guideline 11), our findings also support the notion that transgender people tend to have more positive life experiences when they receive gender-affirming care. Affirmative care may help to counteract the wide range of societal, personal, and environmental discrimination that transgender youth often encounter. However, the pathway through which beneficial outcomes arise following affirming care is not entirely clear. GAH facilitate secondary sex characteristics consistent with one's experienced gender. Access to this treatment may reduce GD and lower body-related uneasiness (Fisher et al., 2014), resulting in increased well-being and decreased suicidality. It may also be that the sense of affirmation that comes with receiving care by affirming professionals and a potential increase in parental acceptance lessens distal minority stress factors (i.e., non-affirmation; see Testa, Habarth, Peta, Balsam, & Bockting, 2015), thereby resulting in improved mental health.

Limitations and Directions for Future Research

Confounding variables of this study may include level of familial support, whether a patient is actively receiving psychotherapy, or differences in the specifics of gender-affirming medications (e.g., dosage). Given the protective role of parental support in health and well-being

among transgender youth (Simons, Schrager, Clark, Belzer, & Olson, 2013), it could be argued that such support affected the improvements in well-being and decreases in suicidality observed in this study. However, it should be noted that at baseline, a relatively high level of parental support was required among all participants (compared to youth, for example, who do not have access to gender-affirming medical care due to lack of parental support), as the parents at our clinic must provide permission for their child to receive gender-affirming medical interventions. That is, most participants in this study had some degree of parental support. Consequently, these findings may not be generalizable to transgender youth with unsupportive parents. It may be that GAH, combined with parental support or other types of support (e.g., individual counseling, support groups), are "active ingredients" in producing beneficial outcomes, but our study did not assess these factors. Future research may wish to examine the concomitant roles of parental support and gender-affirming medications on psychological outcomes among transgender youth. Moreover, GD is a clinical diagnosis, and often it is difficult to ascertain the "degree" of GD an individual is experiencing. Future studies may benefit from assessing the severity of gender dysphoria before and after undergoing gender-affirming medical intervention as a means of evaluating the impact of the intervention on GD itself.

As noted by others (Costa et al., 2015), it may be the case that by virtue of scheduling an appointment with a gender-affirming multidisciplinary treatment team, adolescents have an immediate reduction in distress, knowing they are one step closer to receiving gender-affirming treatment. In this case, the pre-test scores would not have captured any immediate relief resulting from the knowledge that an initial appointment was scheduled. Additionally, it is also unclear whether the beneficial outcomes associated with GAH take effect immediately after administration of the medication, come about after physical changes begin to manifest, or vary

over time. Future studies might examine change over time (e.g., using a time-series design) and age of initiation of treatment while also accounting for level of parental support and outward physical appearance, as these factors may explain or alter the intervention's effect on suicidality and well-being. Future studies would further benefit from including measures that specifically assess symptoms of anxiety and depression to further evaluate the potential role of GAH on emotional functioning. In addition, our longitudinal study lacked a control group, so we cannot infer that GAH are causally responsible for the beneficial outcomes observed. Because withholding potentially life-saving treatment from youth seeking medical care would be unethical, future studies should address this limitation by including data with appropriate comparison groups to strengthen findings. For example, future researchers might compare transgender youth who have received GAH to age- and demographic-matched peers seeking therapy for issues that are also thought to be influenced by gender dysphoria (e.g., depression, anxiety).

In addition, the total sample was primarily White (83%) and thus unrepresentative of the diverse overall population of transgender youth. For transgender youth of color, who experience additional discrimination and societal barriers (James et al., 2016), such discrimination could attenuate the beneficial outcomes observed with gender-affirming medical interventions. Research from other regions of the United States with more racially diverse clinical populations can help answer such a research question. Furthermore, our study did not make any distinction among participants for non-binary gender identities and classified participants based upon sex assigned at birth. To date, no studies have outlined GAH regimens for non-binary individuals (Chen, Edwards-Leeper, Stancin, & Tishelman, 2018). Future studies should explore the trajectory of nonbinary and genderqueer identities over time and describe outcomes associated

with affirming medical interventions, given that nonbinary youth report higher rates of attempted suicide compared to transgender adolescents assigned male at birth and their cisgender peers (Toomey, Syvertsen, & Shramko 2018).

In addition, youth served in our clinic receive comprehensive care by an experienced multidisciplinary team. Thus, these findings may not generalize to all transgender youth prescribed GAH regimens (and not all transgender youth desire medical treatment). However, our findings likely generalize well to other patients in clinics with similar treatment models.

Conclusion

GAH appear to be associated with improvements in general well-being and decreasing suicidality among transgender youth. To our knowledge, this is the first study to demonstrate that levels of suicidality decrease, and general well-being increases, among adolescents diagnosed with GD after receiving GAH. The findings contribute to a growing literature showing that transgender adolescents and adults benefit from GAH in terms of improved quality of life and psychological functioning (e.g., Keo-Meier et al., 2015).

References

Ainsworth, T. A., & Spiegel, J. H. (2010). Quality of life of individuals with and without facial feminization surgery or gender reassignment surgery. *Quality of Life Research*, *19*, 1019–1024. http://dx.doi.org/10.1007/s11136-010-9668-7

American Psychological Association. (2015). Guidelines for psychological practice with transgender and gender nonconforming people. *American Psychologist*, *70*, 832–864. http://dx.doi.org/10.1037%2Fa0039906

Bowen, R., Balbuena, L., Peters, E. M., Leuschen-Mewis, C., & Baetz, M. (2015). The relationship between mood instability and suicidal thoughts. *Archives of Suicide Research, 19*, 161-171. http://dx.doi.org/10.1080/13811118.2015.1004474

Chen, D., Hidalgo, M. A., Leibowitz, S., Leininger, J., Simons, L., Finlayson, C., & Garofalo, R. (2016). Multidisciplinary care for gender-diverse youth: A narrative review and unique model of gender-affirming care. *Transgender Health*, *1.1*, 117–123. http://dx.doi.org/10.1089/trgh.2016.0009

Chen, M., Edwards-Leeper, L., Stancin, T., & Tishelman, A. (2018) Advancing the practice of pediatric psychology with transgender youth: State of the science, ongoing controversies, and future directions. *Clinical Practice in Pediatric Psychology, 6*, 73-83. http://dx.doi.org/10.1037/cpp0000229

Chew, D., Anderson, J., Williams, K., May, T., & Pang, K. (2018). Hormonal treatment in young people with gender dysphoria: A systematic review. *Pediatrics*, e20173742. http://dx.doi.org/10.1542/peds.2017-3742

Chen, M., Fuqua, J., & Eugster, E. A. (2016). Characteristics of referrals for gender dysphoria

over a 13-year period. *Journal of Adolescent Health*, *58*, 369–371. http://dx.doi.org/10.1016/j.jadohealth.2015.11.010

Coleman, E., Bockting, W., Botzer, M., Cohen-Kettenis, P., DeCuypere, G., Feldman, J., ... & Monstrey, S. (2012). Standards of care for the health of transsexual, transgender, and gender-nonconforming people, version 7. *International Journal of Transgenderism*, *13*, 165–232. http://dx.doi.org/10.1080/15532739.2011.700873

Costa, R., Dunsford, M., Skagerberg, E., Holt, V., Carmichael, P., & Colizzi, M. (2015). Psychological support, puberty suppression, and psychosocial functioning in adolescents with gender dysphoria. *Journal of Sexual Medicine, 12*, 2206–2214. http://dx.doi.org/10.1111/jsm.13034

Davis, S. A., & Meier, S. C. (2014). Effects of testosterone treatment and chest reconstruction surgery on mental health and sexuality in female-to-male transgender people. *International Journal of Sexual Health*, *26*, 113–128. http://dx.doi.org/10.1080/19317611.2013.833152

de Vries, A. L. C., McGuire, J. K., Steensma, T. D., Wagenaar, E. C. F., Doreleijers, T. A. H., & Cohen-Kettenis, P. T. (2014). Young adult psychological outcome after puberty suppression and gender reassignment. *Pediatrics, 134*, 696–704. http://dx.doi.org/10.1542/peds.2013-2958

Edwards-Leeper, L., & Spack, N. P. (2012). Psychological evaluation and medical treatment of transgender youth in an interdisciplinary “gender management service” (GeMS) in a major pediatric center. *Journal of Homosexuality, 59*, 321–336. http://dx.doi.org/10.1080/00918369.2012.653302

Fisher, A. D., Castellini, G., Bandini, E., Casale, H., Fanni, E., Benni, L., ... & Jannini, E. (2014).

Cross-sex hormonal treatment and body uneasiness in individuals with gender dysphoria. *Journal of Sexual Medicine*, *11*, 709–719. http://dx.doi.org/10.1111/jsm.12413

Hembree, W. C., Cohen-Kettenis, P. T., Gooren, L., Hannema, S. E., Meyer, W. J., Murad, M. H., . . . T'Sjoen, G. G. (2017). Endocrine treatment of gender-Dysphoric/Gender-incongruent persons: An endocrine society clinical practice guideline. *The Journal of Clinical Endocrinology & Metabolism, 102*, 3869–3903. http://dx.doi.org/10.1210/jc.2017-01658

Horowitz, L. M., Bridge, J. A., Teach, S. J., Ballard, E., Klima, J., Rosenstein, D. L., ... & Joshi, P. (2012). Ask Suicide-Screening Questions (ASQ): a brief instrument for the pediatric emergency department. *Archives of Pediatrics & Adolescent Medicine*, *166*, 1170–1176. http://dx.doi.org/10.1001/archpediatrics.2012.1276

Houben, M., Van Den Noortgate, W., & Kuppens, P. (2015). The relation between short-term emotion dynamics and psychological well-being: A meta-analysis. *Psychological Bulletin, 141*, 901-930. http://dx.doi.org/10.1037/a0038822

James, S. E., Herman, J. L., Rankin, S., Keisling, M., Mottet, L., & Anafi, M. (2016). *The report of the 2015 U.S. Transgender Survey.* Washington, DC: National Center for Transgender Equality.

Keo-Meier, C. L., Herman, L. I., Reisner, S. L., Pardo, S. T., Sharp, C., & Babcock, J. C. (2015). Testosterone treatment and MMPI-2 improvement in transgender men: A prospective controlled study. *Journal of Consulting and Clinical Psychology*, *83*, 143–156. http://dx.doi.org/10.1037/a0037599

Lopez, S. J., Magyar-Moe, J. L., Petersen, S. E., Ryder, J. A., Krieshok, T. S., O'Byrne, K. K., ... & Fry, N. A. (2006). Counseling psychology's focus on positive aspects of human

functioning. *The Counseling Psychologist*, *34*, 205–227. https://doi.org/10.1177/0011000005283393

McKnight, P. E., McKnight, K. M., Sidani, S., & Figuerdo, A. J. (2007). *Missing data: A gentle introduction.* New York, NY: Guilford.

Olson-Kennedy, J., Cohen-Kettenis, P. T., Kreukels, B. P., Meyer-Bahlburg, H. F., Garofalo, R., Meyer, W., & Rosenthal, S. M. (2016). Research priorities for gender nonconforming/transgender youth: gender identity development and biopsychosocial outcomes. *Current Opinion in Endocrinology, Diabetes, and Obesity*, *23*, 172–179. http://dx.doi.org/10.1097/MED.0000000000000236

Olson-Kennedy, J., Warus, J., Okonta, V., Belzer, M., & Clark, L. F. (2018). Chest Reconstruction and Chest Dysphoria in Transmasculine Minors and Young Adults: Comparisons of Nonsurgical and Postsurgical Cohorts. *JAMA Pediatrics, 172*, 431-436. doi:10.1001/jamapediatrics.2017.5440

Schneider, B. A., Avivi-Reich, M., & Mozuraitis, M. (2015). A cautionary note on the use of the analysis of covariance (ANCOVA) in classification designs with and without within-subject factors. *Frontiers in Psychology, 6,* 474. http://dx.doi.org/10.3389/fpsyg.2015.00474

Simons, L., Schrager, S. M., Clark, L. F., Belzer, M., & Olson, J. (2013). Parental support and mental health among transgender adolescents. *Journal of Adolescent Health*, *53*, 791–793. http://dx.doi.org/10.1016/j.jadohealth.2013.07.019

Slabbekoorn, D., Van Goozen, S. H. M., Gooren, L. J., & Cohen-Kettenis, P. T. (2001). Effects of cross-sex hormone treatment on emotionality in transsexuals. *International Journal of Transgenderism*, *5*(3), 2–18.

Smith, A. J., Hallum-Montes, R., Nevin, K., Zenker, R., Sutherland, B., Reagor, S., ... & Oost, K. M. (2018). Determinants of transgender individuals' well-being, mental health, and suicidality in a rural state. *Journal of Rural Mental Health, 42*, 116–132. http://dx.doi.org/10.1037/rmh0000089

Testa, R. J., Habarth, J., Peta, J., Balsam, K., & Bockting, W. (2015). Development of the gender minority stress and resilience measure. *Psychology of Sexual Orientation and Gender Diversity*, *2,* 65–77. http://dx.doi.org/10.1037/sgd0000081

Testa, R. J., Michaels, M. S., Bliss, W., Rogers, M. L., Balsam, K. F., & Joiner, T. (2017). Suicidal ideation in transgender people: Gender minority stress and interpersonal theory factors. *Journal of Abnormal Psychology, 126*, 125–136. http://dx.doi.org/10.1037/abn0000234

Toomey, R. B., Syvertsen, A. K., & Shramko, M. (2018). Transgender adolescent suicide behavior. *Pediatrics*, *142*(4), e20174218.

Varni, J. W., Seid, M., & Kurtin, P. S. (1999). Pediatric health-related quality of life measurement technology: A guide for health care decision makers. *Journal of Clinical Outcomes Management*, *6*, 33–44.

Table 1

Demographic Characteristics for Participants for the Entire Cohort (N = 47), and each subgroup: GAH with previous GnRHa (n = 8), and GAH only (n = 39).

Demographic characteristics	Entire Cohort *N* (%)	*GAH-only* Subgroup *n* (%)	*GAH+GnRHa* Subgroup *n* (%)
Mean age at administration	16.50 years	16.72 years	15.43 years
Mean duration of treatment	349 days	366 days	328 days
Birth assignment			
Assigned female at birth	33 (70.2)	27 (69.2)	6 (75)
Assigned male at birth	14 (29.8)	12 (30.8)	2 (25)
Race/Ethnicity			
White	39 (83)	33 (84.6)	6 (75)
Biracial or multiracial	2 (4.3)	2 (5.1)	0 (0)
Latinx / Hispanic	3 (6.4)	3 (7.7)	0 (0)
Black / African American	1 (2.1)	0 (0)	1 (12.5)
American Indian / Alaska Native	1 (2.1)	1 (2.6)	0 (0)
Asian	1 (2.1)	1 (2.1)	1 (12.5)
ZIP code median income	$57,355	$61,168	$53,520
Insurance type			
Self-pay	1 (2.1)	1 (2.6)	0 (0)
Private	36 (76.6)	32 (82.1)	4 (50)
Medicaid	10 (21.3)	6 (15.4)	4 (50)

Note: *Note. GAH-only* refers to participant who did not received gonadotropin-releasing hormone agonists (GnRHa) prior to being administered gender-affirming hormones (GAH). *GnRHa+GAH* refers to participants who had received GnRHa prior to being administered GAH.

Table 2

Estimated Marginal Means and Standard Errors of the Analysis of Covariance for each DV.

	T_0			T_1		
	All	AFAB	AMAB	All	AFAB	AMAB
Scale	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)
ASQ	1.11 (.22)	1.01 (.23)	1.21 (.36)	.27 (.12)	.29 (.13)	.24 (.19)
GWBS	61.7	64.95	58.44	70.23	70.94	69.52
	(2.43)	(2.66)	(4.09)	(2.15)	(2.35)	(3.62)

Note. Results from each ANCOVA. The assessment point is the repeated measure, covarying duration of treatment. $N = 47$. GWBS = General Well-Being Scale; ASQ = Ask Suicide-Screening Questions; AFAB = Assigned Female at Birth; AMAB = Assigned Male at Birth.

Table 3

Suicidality and General Well-Being Score Means and Standard Deviations for the GAH-only (n = 39) and GAH+GnRHa (n = 8) subgroups at T_0 and T_1.

	T_0		T_1	
	GAH-only	GnRHa+GAH	GAH-only	GnRHa+GAH
Scale	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
ASQ	1.06 (1.3)	1.08 (1.49)	.33 (.77)*	.01 (.02)[a, *]
GWBS	62.75 (16.43)	64.29 (8.32)	70.79 (13.46)	69.2 (12.8)

Note. GAH-only refers to participant who did not received gonadotropin-releasing hormone agonists (GnRHa) prior to being administered gender-affirming hormones (GAH). *GnRHa+GAH* refers to participants who had received GnRHa prior to being administered GAH. ASQ = Ask Suicide-Screening Questions; GWBS = General Well-Being Scale.

[a] The mean value of .01 is an artifact of the imputations conducted for the item omitted from the ASQ prior to March 2017. Participants in the GnRHa+GAH subgroup did not endorse any suicidality items at T_1.

* Statistically significant difference between GAH-only and GnRHa+GAH mean values at T1 ($p < .05$).

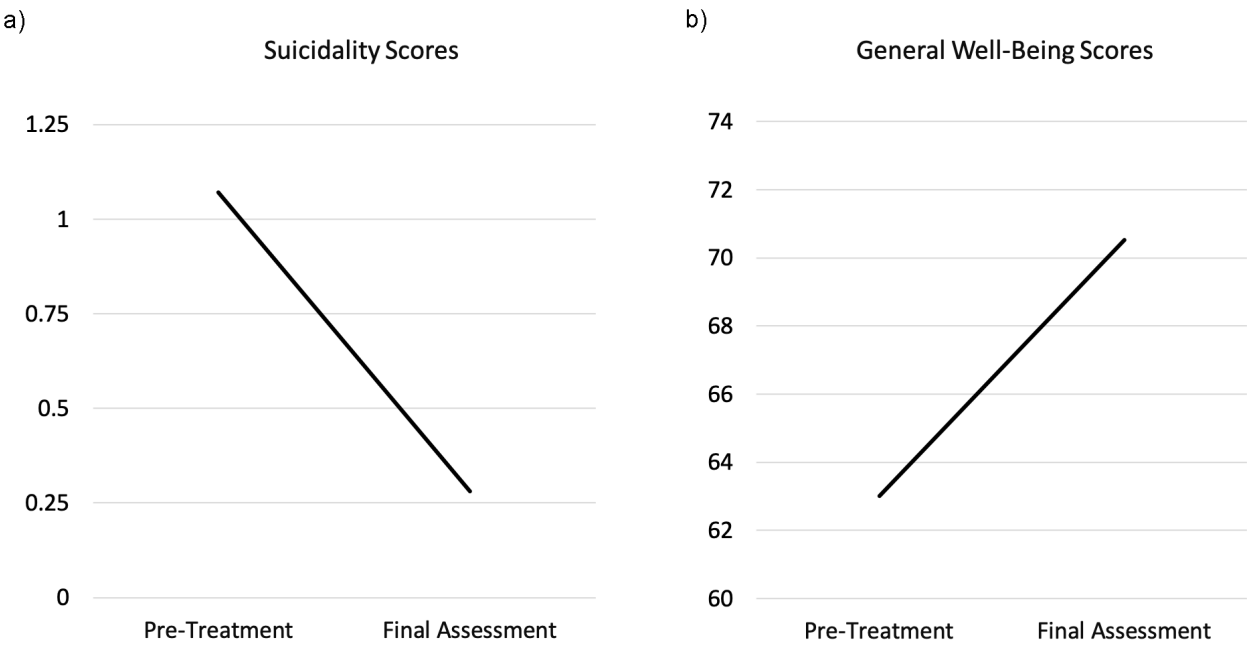

Figure 1. a) Estimated marginal means of suicidality (ASQ) scores adjusted for the covariate, duration of treatment, at pre-test and final assessment; b) Estimated marginal means of general well-being scores (GWBS) adjusted for the covariate, duration of treatment, at pre-test and final assessment. ASQ = Ask Suicide-Screening Questions. GWBS = General Well-Being Scale.