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Biocultural Perspectives on Gender, Transitions, Stress, and Immune Function

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BIOCULTURAL PERSPECTIVES ON GENDER, TRANSITIONS, STRESS, AND IMMUNE FUNCTION

A Dissertation Presented

by

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DEDICATION

Dedicated to the memory of my Uncle, Gerald Bennett and to my lovely partner, Judith Moman.

ACKNOWLEDGMENTS

This research would not have been possible without the help and support of a great many people. The trans men who participated in this project are truly inspiring. I am first and foremost grateful for their dedication and patience while collecting samples and maintaining diaries for this research and for generously sharing their time and unique history with me.

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While this dissertation focuses on stress experience during transition, I must thank my family, and particularly my mother and father, for standing by me and continuing to support and encourage me during the numerous transitions I have gone through over the years while working on this project. Most of all, I wish to thank Judith Moman who has supported me in every way possible throughout this process. Her love, confidence, and companionship have imbued this entire journey with an amazing sense of possibility.

ABSTRACT

BIOCULTURAL PERSPECTIVES ON GENDER, TRANSITIONS, STRESS, AND IMMUNE FUNCTION

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Health disparities, including higher rates of mental or physical illness, are found among members of minority or marginalized groups including people who identify as lesbian, gay, bisexual or transgender. However, there is a paucity of research incorporating both experiential components and measures of physical health, particularly among trans men during their transition from female to male. Trans men transition through the use of testosterone therapy (T) and surgical procedures in order to align their internal male gender identities with their physical presentation. This study combines the analysis of qualitative and quantitative data in order to understand trans men's experience of their changing bodies, identify the primary stressors faced during different stages of transition, and measure the biological manifestation of psychosocial stress during transition.

Sixty-five trans men who were utilizing testosterone (T), participated in this cross-sectional study of stress experience during transition. The study involved in-depth, in-person interviews and multiple biological measures including: 24-hours of blood pressure monitoring, three consecutive days of salivary sampling for measures of cortisol and

testosterone, a blood-spot for measures of C-reactive protein (CRP), and anthropometric measures. The general hypothesis for this study was that men in earlier, more liminal stages of transition would experience more transition and gender-related stress than men later in the process and that this stress would manifest experientially, psychologically, and physiologically.

As expected, transition-specific psychosocial stress was associated with physiological measures, and was more pronounced among trans men in the liminal stages of transition. Moreover, comparisons of stress experience during different stages of transition uncovered variation in how trans men perceived and experienced changes in their bodies and social identity. A number of experiential aspects of transition were identified from the qualitative interviews and found to be linked to physiological stress measures including decreased nocturnal decline in blood pressure, increased cortisol levels, and increased C-reactive protein (CRP). In particular, issues related to transitioning identity stress (TIS), challenges linked to "passing" and being "out" as transgender, and specific acute stressors including the use of gender-specific public restrooms were each found to be independently associated with biological measures of stress.

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CHAPTER 1

INTRODUCTION

Trans men are people who deliberately induce changes to their bodies so as to align their internal male gender identities with their physical presentation through a process referred to as "transition" or "transitioning." Transitioning from female to male takes place over time through the administration of testosterone (T) therapy and surgical procedures. Due to the fact that transition is a transformative process through which individual's bodies change over time, the early stages of transition represent a liminal period as trans men's bodies may elude gender categorization. Within a society that views gender as dichotomous and immutable, this liminal gender experience can present challenges that trans men must navigate. This project thus acknowledges that transition is itself a stressful process and aims to document as well as measure the effects of stress associated with this experience.

Chapter 2, "Methods," details the pilot study that contributed to the research design and development of instruments used in the present study. This chapter also includes a presentation of the recruitment strategies employed to reach this relatively hard to reach population, presents the hypotheses of the study, describes the methods used to measure physiological responses to stress, and outlines the questionnaire that was used in the in-person interviews.

Chapter 3, titled "Gendered Bodies in Transition," provides a literature review situating this project within the body of scholarship on gender and the body. It also includes both qualitative and quantitative results pertaining to trans men's experiences of

physical transition, draws comparison between trans men in different stages of transition, and proposes a link between the changes of the body and sex identity for trans men.

Chapter 4 is titled "Associations between transition-specific stress experience, nocturnal decline in ambulatory blood pressure, and C-reactive protein levels among transgender men." This chapter presents results linking transition-specific stress experience including stress associated with having a transitioning social identity, stress associated with being "out" as transgender, and stress associated with "passing" to physiological measures including ambulatory blood-pressure and levels of C-reactive protein.

Chapter 5 is titled, "Associations between transition-specific stress experience and activation of the HPA axis." This chapter presents results linking transition-specific stress experience including stress associated with having a transitioning social identity, stress associated with being "out" as transgender, and stress associated with the use of gender-specific public restrooms to activation of the hypothalamic-pituitary-adrenal axis (HPA) as measured through salivary cortisol.

Chapter 6, "Summary and Conclusions" provides an overview of the results of this study and describes the significance of this research for scholars interested in liminal experiences, the gendered body, and physiological responses to psychosocial stress.

A note on terminology

The participants in this study were all interviewed during their transition from female to male; they were all utilizing testosterone therapy as part of their transition. I refer to the participants in this study as *trans men* instead of simply using the term *men,* in order to maintain a focus on the experience of transition that they share. However, it

should be noted that in general usage, the prefix *trans* does not always signify that a person either desires or is in the process of medical transition. In fact, the term *transgender* is often used to refer to a range of identities and lives; the term transgender is employed in reference both to people who medically transition through hormones and surgical procedures and those who embrace some aspect of gender nonconformity but do not modify their bodies through medical transition (Stryker 1994, Valentine 2007). Transgender is thus an umbrella term that could include the trans men in this study but would not signify that all of the trans men in this study were in the process of medical transition. The term transgender also fails to signal the "direction" of sex transition, which in the case of trans men is exclusively female to male. The term "transgender man/men" and more frequently, "trans man/men," is therefore used in reference to my study participants in order to indicate that they are in the process of medically transitioning from female to male. None of the participants in this study referred to themselves using the term *transsexual* and so that term is not used here.

CHAPTER 2

METHODS

Pilot Research

Pilot research was conducted from May 25, 2007 through August 5, 2007 and involved in-person interviews with 9 transgender men who were living in Massachusetts. I use the broader term "transgender" here (versus trans men) because participants in the pilot study were not required to be on testosterone (T) therapy or pursuing transition-related surgeries during time of participation. Eligibility criteria welcomed participants whose gender identity was different from their female birth designation.

The purpose of these interviews was to develop a research methodology and instruments for qualitative and quantitative data collection related to gender-related and transition-related stress experience, and to assess the viability of biomarker collection for measures of stress response and immune function. Three of the participants were interviewed twice in order to obtain responses to modifications made in the questionnaire; a total of 12 interviews were therefore conducted with 9 pilot study participants.

Of the 9 participants, 7 identified as white/Caucasian, 1 identified as African American, and 1 identified as Chicano. Ages ranged from 18-55 years (mean age 37.5 years). All except 1, the final interviewee (18 years old), had been diagnosed with gender identity disorder (GID; defined as extreme discomfort with one's anatomical body and a persistent desire to be accepted as a member of one's self-identified or "psychological" sex) (American Psychiatric Association [*DSM-IV-TR*], 2000). Six were currently utilizing T therapy in order to transition from female to male (range 0.1-9 yrs, mean time

on T 2.2 yrs). Four participants had undergone chest reconstructive surgery ("top surgery") and three were planning on getting top surgery within a year. Seven out of nine participants said that, in a future research project, they would be willing to comply with self collection of saliva samples for T and cortisol measures, allow multiple finger pricks for blood-spot collection, allow ambulatory blood pressure (amBP) measures, and maintain a daily journal on days when amBP measures or salivary samples were taken.

Instrument development during pilot study

On the basis of the first unstructured interview, a series of open-ended questions were developed. The first and second interviews made clear that a lack of satisfaction regarding physical gender presentation and social treatment was linked to stress experience. The interview instrument was then modified to include a structured scale in order to assess the importance of particular secondary sex characteristics and surgeries and to evaluate the degree to which study participants were satisfied with their transitioning bodies. Open-ended and semi- structured questions concerning stress associated with social relationships and public identity were also added. The third interview resulted in the addition of questions pertaining to social support and community participation. On the basis of the fourth interview, a structured scale was developed in order to assess the importance of particular behaviors that are considered stereotypically linked to gender and to evaluate the degree to which study participants were satisfied with their behavior as it pertained to their gender presentation. Following interview number five, structured questions were added to address the role that age plays in the process of transition. Following interview number six, questions were added to access information concerning financial stressors and stressors experienced as a consequence of

racism. Interview number seven resulted in changes to the order in which questions were asked as well as an additional structured section concerning relationships and "passing."

Following my analysis of the first seven pilot interviews, the interview instrument was structured into thematic sections and follow-up questions were added pertaining to experience with a changing gender identity, physical gender- presentation, and gendered behaviors. Interview number eight exposed the need for follow-up questions throughout the interview. Additionally, interview 8 included discussion of stress related to unpredictable social treatment regarding gender presentation (i.e., sometimes being treated as male and sometimes being treated as a female socially) so questions related to "transitioning-identity stress" were added to the interview instrument. Repeat interviews were then conducted with participants number 3, 5, and 7 in order to assess the efficacy and clarity of the new questionnaire.

Pilot participant number eight expressed ambivalence about his/her gender identity (in fact preferred neither male nor female pronouns) and described a stress (and gender) experience that was substantially different from participants who identified as male and were medically transitioning in order to live publicly as male. A study comparing transitioning and non-transitioning transgender people is currently beyond the scope of the dissertation project; interview number eight thus resulted in the modification of the inclusion and exclusion criteria to include only those who wish to be identified publicly as male.

Interview number nine resulted in additional changes to the eligibility criteria. Because participant number nine had not yet started T, his stress experience differed substantially from participants who had already begun T therapy; during the interview,

this participant primarily discussed stress associated with the process of *deciding* to transition and gaining accessing to hormones. While these aspects of the transition process are important and interesting, since my project aim was to understand stress during physical transition, therefore I modified the eligibility to indicate that participants would be required to be using T therapy as part of their transition from female to male. While a longitudinal study involving a comparison between trans men who are physically transitioning and transgender men who want to medically transition but are not yet on T would provide an ideal way to study stress related to transition, a cross-sectional study is a more viable approach for the dissertation project.

Finally, pilot data collection enabled the development of three conceptual stages of transition for the purposes of within and between group comparisons. Stages are based on the duration of time an individual has been on T therapy as follows: stage 1 includes trans men on T for ≤ 6 months, Stage 2 includes trans men on T for >6 months to 3 years, and stage 3 includes men on T for > 3 years. The duration of time on T was selected as a way to measure stages of transition because of the relationship between T and the development of male secondary sex characteristics. Some of the pilot participant's indicated that six months on T marked a turning point for them in that it was when their voices stopped cracking and dropped permanently into male range and when they began developing facial hair. The period of 6 months to 2 years was also described as a period of significant physical changes and shifts in identity and social relationships. In contrast, pilot participants indicated that 3 years felt like another turning point in the sense that as one participant said, "things slowed down" after 3 years on T. These stages will be discussed in detail in the chapters that follow.

Recruitment for the dissertation study

Formal recruitment for the study began after receiving grant funding from the NSF in early May 2008. Interviews were conducted for 19 months, ending in Dec 2009. Recruitment efforts targeted online communities and bulletins, area support groups, and trans-friendly clinics and events. As a member of the trans community, I was able to access and participate in a number of internet-based list-serves and online communities that only allow trans-identified people to participate. The in-person support groups I attended allowed only those who identified "somewhere on the trans-masculine spectrum" to attend. Periodically, these meetings would be open to significant others, friends, family members, and allies (SOFFAS) but were otherwise closed meetings and thus enabled an opportunity for me to integrate myself into the group over several meetings and to discuss the aims and methodology of the study with the group as a whole. I began participating in all of these groups in person months prior to beginning study recruitment in order to learn of the issues and stressors that the members were experiencing, to familiarize myself with the members, and to develop a mutual relationship of respect and trust. I attended the support group meetings during their once a month meetings, and read and contributed to online discussions with at least 3 list-serves on a weekly basis. Facebook was an enormously useful resource for recruiting study participants as it enabled snowball techniques to occur through the function of "friending" peers who would then see my "advertisement" for the study and could "message" me directly through the site.

Trans communities have been targeted for numerous research studies, particularly by social scientists, social workers, and psychologists. As a result, many community

members reportedly feel "burnt out" and/or concerned that their participation in research may not be in their own or their community's best interest. During the interviews, many of the men I spoke with admitted that their participation was due in large part to my being a member of the trans community and my attendance at regular meetings. I therefore had the opportunity to interview and obtain biological samples and measures from many men who otherwise refuse to share their stories with researchers.

Inclusion and Exclusion Criteria

Recruitment efforts were focused on geographic areas that could be reached within two hours by car from either Western Massachusetts or Boston, MA. In order to be eligible for participation in the study, individuals needed to meet the inclusion criteria listed below and not meet any of the exclusion criteria as listed. Inclusion criteria included: 1) identifying as a different gender than the female designation that was assigned at birth (i.e., identifying as FtM, transmale, or male), 2) expressing a desire to be identified as male in public and social settings, and 3) using exogenous T therapy in order to physically transition. Exclusion criteria included: 1) the regular use of steroidal medication (beyond T) or medication for hypertension, and 2) having a diagnosed auto-immune disease or immune disorder.

Recruitment in Western Massachusetts

Prior to posting a call for participants through the support group in Western, MA, I contacted the founder and chair, a respected "elder" in the local trans community. He has opened his home as a safe place for monthly support group meetings and has dedicated himself to building an extensive library of LGBT books and ephemera that he loans out to any who ask. I met with him at his home and, since he knew me from my

attendance at the meetings and had helped me to recruit for the pilot study the previous summer, he was happy to help. He agreed to electronically circulate the flyer I had drafted and attached a supportive email urging trans men to participate in the study. This email then went to approximately 350 trans masculine identified people in the region in early June of 2008. The electronic flyer was also distributed through The Stonewall Center, which is the LGBT resource center at UMass.

For recruitment in the Western, MA region, I posted paper flyers (see Appendix A) approximately once a month in coffee shops, laundromats, bookstores, and Tapestry Health clinics in Springfield, Holyoke, Florence, Easthampton, Northampton, Amherst, Greenfield, Turners Falls, and Brattleboro, VT. In order to meet more people in person who may have been interested in participating in or helping me to recruit for the study, I attended the 2nd annual Transpride march and rally that took place in Northampton in June 2008. At this event, I encouraged people who were interested in learning more about the study to write their email address (omitting their names, phone numbers, or other identifiers) on an interest sheet. I then followed up with those contacts through email. Recruitment efforts in Eastern, MA and RI began following my move to Boston in April 2009 and will be detailed below.

Interview Locations in Western Mass

Tapestry Health Clinics are located in Northampton, Greenfield, Amherst, and Springfield and offer trans-sensitive care to low-income people and members of the LGBT community. I was particularly interested in making sure I could provide private and safe meeting places for interviews to take place in Springfield and Northampton since they were furthest from other places I could anonymously conduct interviews (i.e.,

my home office and offices at UMass). With that aim, I contacted the directors of Tapestry and eventually met with the onsite directors for both sites and was granted permission to conduct interviews on site if I were to schedule them at least 24-hours in advance and if I were willing to add an addendum to my letter of consent (Appendix B) indicating that Tapestry was in no way involved with the study. As a result of securing access to Tapestry and UMass offices, all of the interviews were conducted in places where the study participant and I could be alone for the audio-recorded interview. In addition to conducting interviews at Tapestry and UMass, interviews in western MA were conducted at participant's homes and in my home office. A total of 25 trans men were interviewed from western MA.

Recruitment and Interview Locations in Boston

Due to the facts that Boston has a larger trans community than western MA and that I was eager to recruit study participants from more than a single social "scene" through snowball techniques alone, I moved to Boston in April 2009 and lived there through Dec 2009. I focused my recruitment efforts as broadly as possible, soliciting volunteers through Facebook and online listservs such as Yahoo Groups, and I began to initiate meetings with community leaders and organizers as a means to access a more varied group of trans men.

In order to have the opportunity to recruit participants through the largest LGBT clinic in New England, I applied to be a mentee in the Pre-doctoral Mentorship and Training Program offered at the Fenway Institute in Boston, MA**.** Along with enabling me to post flyers inside the clinic and to encourage doctors and nurse practitioners to inform their patients about the study, participation in the mentorship program also

provided me access to safe and confidential meeting rooms in which to conduct interviews and enabled me to continue my training in LGBT health research. In terms of research training, Fenway's NIH-funded program is described as, "a joint endeavor of The Center for Population Research in LGBT Health, The Fenway Institute, and the Boston University School of Public Health (BUSPH)" with a mission "to link promising young scholars with the resources they need to improve the reach, quality and methodological rigor of their research and to springboard their careers in LGBT health and population science" (www.fenwayhealth.org).

Following IRB approval from Fenway, I was granted the opportunity to post flyers in the hallways and waiting rooms of the Fenway Health Center. Access to their secure meeting rooms and clinic space enabled me to meet with trans men in a confidential space that did not "out" them as being trans nor as being study participants. In addition to access to resources, my acceptance to the mentorship program at the Fenway Institute enabled me to meet regularly with researchers in Public Health, Psychology, and Sociology who had experience conducting research with LGBT populations and provided me the opportunity to participate in their annual meetings. I was also able to meet with a group of medical professionals in order to help them to increase the sensitivity with which they dealt with their trans identified clients and patients.

The benefit of using multiple avenues for publicizing and recruiting study participants was apparent within the first month of my arrival to Boston. By the end of my first full month in Boston (May 2009), I had received 29 emails requesting more information. From those 29 initial emails, I had already interviewed 7 and scheduled 3

more to be interviewed at a later date. Six of the 29 were ineligible due to medical conditions, medications use, or because they were not yet on T. Two trans men would become eligible for participation in the future once they had begun T therapy. Throughout the recruitment process, I continued to receive emails of interest from trans men but many of them would not follow-up with me to arrange an interview; it became apparent that continued recruitment efforts would be important. Additionally, I recognized the importance of asking participants to spread the word about their positive experience with the study in order to generate interest from other potential participants. A total of forty-five trans men were recruited and participated in this study from eastern, MA and Providence, RI.

During the interviews with participants from both western MA and Boston, MA, participants were asked where they learned about the study and reported the following: from a friend (n=16), through the Boston support group list-serve (n=12), from a Facebook event announcement (n=9), from the Western, MA ftm group list-serve (n=9), from a flyer at the Northampton trans pride rally (n=6), from an email list for queer social events (n=7), from a flyer posted at the Fenway clinic (n=4), and from an anonymous posting on someone's live journal (n=2). Interviews were conducted either in the participant's home (n=19), in private meeting rooms at Tapestry or Fenway health clinics in (n=5 and n=14, respectively), in private offices at UMass Amherst (n=13), in my home office (n=12), at their work-office (n=1), or in a local church meeting room (n=1).

Compensation and IRB approval for research with Human Subjects

Each participant was awarded a total of $50 compensation for participation in the study. Participants received half of the remuneration following the first meeting and the

second half was paid upon completion of participation after equipment and samples were collected. Following completion of the amBP monitoring period, a PDF document was generated and supplied to participants in person or via email. The PDF included the data obtained from 24-hour amBP readings as well as anthropometric measures and measures obtained using bio-impedance. I provided a conservative interpretation of the results of the amBP readings (using WHO guidelines for normal, pre-hypertensive, and hypertensive) and encouraged follow-up with a clinical practitioner as appropriate. Both research aims and protocol were approved by the IRB for research involving human subjects at the University of Massachusetts Amherst and The Center for Population Research in LGBT Health at The Fenway Institute in Boston, Massachusetts.

Data Collection

Semi-structured interviews and structured surveys were used in order to learn about transition experience, stress associated with transition, and to identify stressors associated with psychological and physical symptoms of stress

Demographic and bio-behavioral background questionnaire

The questionnaire included demographic and bio-behavioral items, and ended with a question prompting the participant to list the primary stressors that he felt he was facing currently in relation to his transition process (if any). This list provided a starting place for the in-person interview and I made sure that those items were discussed. Initially, these questions were asked in-person; however, following interview with participant #5 (out of 65 participants) the questionnaire was expanded and given to participants to fill out on their own in order to reduce the duration of the in-person interview. Prior to the interview, participants were asked to provide answers to a

background questionnaire that was sent to them via email. The questionnaire was either emailed back after completion or submitted in writing on the day of the interview. This background questionnaire is attached (see Appendix C).

Demographic measures

Demographic data were collected through participant self-report (described above) and included: age (in years), years on T, location (rural, suburban, urban, college town) of residence (during childhood, during initiation of T, and current), political characterization of residences (more progressive or more conservative), employment status (part-time, full-time, unemployed/laid off), student status (part-time, full-time, not a student), current occupation, years of education, degrees achieved, relationship status (single, dating, partnered, married), cohabitation status (Y/N), years in current relationship, monthly income (dual or single), housing status (rent/own), living conditions (# of roommates, # of bedrooms), race/ethnicity, religious/spiritual importance (Y/N), self-described sexual orientation, current sexual preference (F, M, tF, tM), prior sexual preference (F, M, tF, tM), current partner ID (F, M, tF, tM), # of children, biological parent to children (Y/N), preferred sex identity (trans man, just a man), and way most frequently known by people in their life (trans man, just a man).

Biobehavioral measures

Biobehavioral data were collected through participant self-report (described above) and included: T dose and route/frequency of administration, years since completion of transition related surgeries, alcohol/caffeine and nicotine intake (form, quantity daily), average sleep and wake times, number of days per week participants wake feeling rested, diagnosed medical or mental conditions (specifically prompted for

allergies, asthma, hypo/hyper glycemia, high cholesterol, polycythemia, high blood pressure, and depression), temporal relation between medical conditions and initiation of T, list of medications, medical conditions that run in the family, dietary information (vegetarian, low-fat, low sugar, or other type), exercise status (regularity and type), and "morning" or "evening" type of person.

Anthropometric Measures

Anthropometric measures conducted during this study included: height (cm), body weight (kg), triceps skinfold (mm), waist circumference, lean muscle (kg and %) and body fatness (kg and %). Height was measured with a free-standing portable anthropometer. Body weight was measured using a portable digital scale (Tanita, model BC-550T; Tanita Corp., Arlington Heights, IL). BMI was then calculated from wt/ht^2. Triceps skinfold measurements were taken to the nearest .5mm using Lange calipers. Waist circumference was calculated as the average of three consecutive waist measures using a tape measure. Percentage of lean muscle and body fatness were calculated using a bio-impedance monitor (see form Appendix D).

Biomarker collection

General Protocol

The protocol of the study, which aimed to collect biomarker data in relation to each participant's T administration schedule, required 3 meetings with each participant in order to obtain biomarkers, collect ambulatory data, conduct an interview and collect anthropometric measures (see details below and consent form as mentioned previously, Appendix B, which details the schedule of biomarker collection). Early in the study, I had scheduled the initial meeting with participants to take place at their earliest convenience,

regardless of their T schedule, in order to secure their participation. After completing 21 meetings with 7 participants during May 2009, I realized that the pace of interviews and biomarker collection was too intense for me to maintain without error. I then shifted my protocol and began to arrange initial meetings in accordance with participant's peak or trough T day (defined below) in order to be able to reduce the number of meetings to two visits. For example, if I met with a participant for the first time on their peak T day (24-48 hours following a T injection), I would hook them up to the amBP monitor during that first meeting (which they would then wear during the interview and for the next 24-hours as tolerated), collect a blood spot for measures of immune function, collect a saliva sample for peak T level, and conduct as much of the interview as possible. The following day, I would meet them again in order to retrieve the amBP monitor and upload the results to my computer. I would upload results with the participant present so that I could provide them with a PDF report of their results that they could then bring to their doctor. After giving participants the amBP results, I would obtain a battery of anthropometric measures including bio-impedance measures and would provide them with a copy of these measures as well. Any remaining portion of the interview was also completed at this time. Finally, following the completion of the interview, I would teach participants the protocol and proper methods for salivary collection, which they would then do during the final 3 days of their T cycle (approximately 3-4 days from the day they were trained).

Salivary cortisol collection

Participants were asked to collect their salivary samples 5-times a day for 3 consecutive days at the following times: upon waking, 30-minutes after waking (but before consuming caffeinated beverages or brushing their teeth), 4 hours after

waking/mid-morning (before lunch), 8 hours after waking (after lunch), and at bedtime. These are considered ideal time measurements for investigating differences in average cortisol levels between individuals (Pollard and Ice 2007). Participants were asked to make a record in the diary that was provided (Appendix E) each time they collected a saliva sample.

In order for me to be able to remind participants to collect their salivary samples, I asked for an estimate regarding the time that they would wake and go to bed during those days. The night prior to beginning salivary sample collection, I sent participants a text message or phoned them directly so that they would remember to place the collection materials by their bedside. I also asked for an estimate of wake and sleep times so that I could send them reminders to collect salivary samples via text message over the course of the next 3 days. I then sent text message reminders to participants for their mid-morning, mid-afternoon, and bedtime collections. They would be responsible for remembering to collect their sample upon awakening and 30-minutes after waking, although I encouraged them to use their alarm clocks for this purpose. After writing 3 texts a day to multiple participants, I began to generate haiku text reminders in order to make the interaction more fun. One text message for example, read:

"Spitting can be fun!
Starts the day a lovely way!
Though it looks like rain."

Participants were instructed to provide saliva by passively drooling into a straw into a polystyrene tube. Each participant was provided with a pen, preprinted labels where they could record the date and time, and a zip lock bag for storage as well as written instructions for salivary collection (Appendix F). They were asked to refrigerate

their samples as soon as possible after collection and to fill out a prepared diary with each collection (as mentioned previously, see Appendix E). Though I made every effort to retrieve salivary samples in person, each participant was provided with a stamped and preaddressed envelope so that they could drop their samples in the mail if necessary. This system allowed me to recruit more participants simultaneously and reduced error on my part.

Salivary T collection

Biomarker collection was timed in relation to each participant's T administration schedule in order to be able to evaluate the role of androgens in cortisol output, immune function and blood pressure as well as to be able to control for T levels as appropriate during analysis. T was assayed from saliva collected on both peak and trough days of T levels. The peak T day occurs 24-48 hours following an injection and the trough day occurs one day prior to injection. Injection and/or application schedules were obtained during the initial interview. A single peak T salivary sample was collected within the appropriate time-frame. The trough T level was measured from a sample taken during the cortisol salivary collection period. For trans men who used transdermal (cream or gel) application of T, a single salivary sample to measure testosterone level was obtained because, with transdermal application, a steady state of T is maintained.

Ambulatory Blood Pressure (amBP) Measures

Systolic (SBP), Diastolic (DBP) blood pressures and heart rates (HR) were measured for a 24-hour period with measures taken every 20 minutes while awake and every 30 minutes while asleep (as tolerated) using the Oscar2 ambulatory monitor, which

uses an oscillometric technique and has been validated for use in clinical research (Jones et al 2004).

In order to be able to control for the effect of T on amBP levels, participants were asked to wear the monitor to measure their amBP within their peak T window (between 24-48 hours following a T injection). The monitor was calibrated using back-to-back measures with a mercury column and stethoscope and was considered accurate when the two readings agreed to within 5mmHg. If calibration readings were inaccurate, a second monitor was used following calibration. One of the monitors was recalibrated by the manufacturer following two inaccurate calibration attempts.

Participants were fully trained in how to remove/turn off the monitor as well as how to reapply the monitor if they chose to put it back on. Each was encouraged to only wear the monitor insofar as he did not feel that it was increasing his sense of stress and to call with any concerns or questions at any time of day or night. Each participant was provided with a diary (Appendix G) and asked to record his location (work, home, or elsewhere), posture (sitting, standing, reclining), mood (positive or negative, Likert scale), and activity each time that the cuff inflates. A space was also provided for participants to note any particularly stressful or unusual occurrences as well as whether they consumed a caffeinated or alcoholic beverage. Participants were also asked to record the times at which they went to bed and got up.

Bloodspots for measuring C-Reactive protein (CRP) and Epstein-Barr Virus antibodies (EBVab)

Epstein-Barr virus antibodies and C-reactive protein (CRP) levels were measured using finger prick whole blood spot samples, which were collected during the peak T day.

The participant's finger was first cleaned with isopropyl alcohol and then pricked with a disposable sterile lancet (Microtainer #366357). Five drops of blood were spotted onto standardized Whatman filter paper (#903). Samples were allowed to dry for 24-hours at room temperature and then sealed in plastic bags, refrigerated, and then frozen in a lab grade freezer (McDade et al. 2000). Samples were then shipped to the Laboratory for Human Biology Research at Northwestern University to be assayed. Concentrations of EBV-ab and CRP (mg/L) were determined using enzyme linked immunosorbent assay (ELISA) protocols (McDade 2007).

Assessment of perceived stress and self-esteem

In order to evaluate perceived stress levels, participants filled out Cohen's Perceived Stress Scale (PSS) (1983) which is the most commonly used measure of perceived stress and has been shown to be predictive of a number of health outcomes (Ice 2007). Answers to the 10-item PSS were summed for each participant, yielding scores that ranged from 0 (low perceived stress) to 40 (high perceived stress). During the in-person interview, participants were asked to if they were currently experiencing symptoms of depression, insomnia, anxiety, and/or changes in appetite. Their answer was coded along a 4-point Likert Scale for intensity (severe, moderate, mild, none) and frequency (daily/nightly, a few times per week, a few times per month, never). A transition-stress score (TSS) was also obtained during the in-person interview (Likert scale 0-10). Rosenberg's Self -Esteem Scale (1965) was used to assess individual levels of self-esteem. Answers to the 10-item Self-Esteem Scale were summed for each participant, yielding scores that ranged from 0 (low self esteem) to 30 (high self esteem).

Instrument modification

Participants were interviewed using an instrument that was developed during pilot research (described above). The first 16 interviews included questions that led to lengthy discussions about the participants' life and gender identity prior to transition and the process leading to their decision to medically transition. While beneficial to my understanding of the varied experiences and identities of men prior to their transition, it became apparent early on (by the interview with participant #5) that these discussions resulted in the need for multiple interview sessions and these became increasingly difficult to schedule once multiple study participants were recruited. For that reason, and in order to reduce participant burden and focus on the specific aims of the study, I endeavored to restructure the order and modify the instrument in specific ways. In order to make these changes in the same manner that I had developed the questionnaire during the pilot, I conducted multiple interviews with volunteers (participants #5, 17, and 20) and included pilot questions to try to focus some of the themes that had emerged during the open-ended questions into semi-structured questions.

The resulting instrument (Appendix H) was finalized during Dec 2009 during which time I had no study participants (presumably due to holiday/winter intersession in the 5 college area). The final instrument no longer included a background/demographic questions as they were supplied in a separate survey that was emailed to participants prior to meeting. The final interview instrument begins with a section titled, "A whirlwind tour of your gender identity and gender process," which is made up of a number of semi-structured questions, replaced a previously open-ended question that had invited the participant to share their process/timeline of deciding to transition. That single question

had frequently taken more than an hour to complete, particularly with participants who had transitioned a number of years ago. Similarly, thematic sections were created in order to allow for ease of analysis (detailed below).

A number of questions were removed entirely from the final interview instrument. These included a multi-part question about negative social treatment (see Appendix I for the original questionnaire, final questionnaire Appendix H question 14, pg 12); this question failed to provide information regarding the perceived or actual cause of the negative treatment and only provided perceived frequency of occurrence over the past year. Prior to removing the question, I had attempted to add an additional matched question that queried treatment in the last 3-month period; however, since this study aimed to assess *current* stress associated with social experiences pertaining to gender identity and presentation, I decided to remove the question entirely. Some themes emerged organically during a number of questions (such as issues related to "coming out") so the specific question was also removed entirely. Similarly, questions that pertained to public gender identity (pg 7) were collapsed in order to reduce time. A number of participants agreed to meet again in order to provide answers to the additional questions (participant #2,3,5). The final instrument structure that was used consistently for participants #20-65 included the following sections:

Section 1: "Whirlwind tour" of process leading to medical transition

This section includes past and current gender identities, timing of coming out and living publicly as male, timing of diagnostic/legal/ medical steps of transition, learning about the option to transition, and a list of primary stressors and/or challenges that are being faced currently.

Section 2: "Stress experience during transition"

This section includes a Likert measure of transition specific stress (TSS), a evaluation of the current stress level in relation to levels 6 mos/1years ago/2years ago, rating of stress related to individual interactions pertaining to medical/legal parts of the transition process, open-ended questions on current relations with family/romantic partners/colleagues, Likert scale measures of injection and gender-specific public restroom stress (PRRS), and structured and semi-structured questions about physical and emotional symptoms.

Section 3: Gender "Fitting:" Appearance, Treatment and Behavior

This section aims to generate discussion of the way that participants feel about their bodies as they transition, and ideas about masculinity (including mannerisms and behaviors thought to cue normative gender). It includes the "transitioning body satisfaction scale" (TBSS) and the "gender satisfaction scale" (GSS) (described fully in the methods chapter) as well as follow-up questions regarding what men find stressful about their transitioning bodies and behaviors that associate with masculinity in order to also quantify levels of satisfaction. These questions aim to learn which "parts" of the body and which behaviors are most meaningful in terms of gender experience for men during transition. Additionally, men are asked to discuss the degree to which they do or do not consciously work to modify their behavior or presentation.

Section 4: Social Treatment

The questions in this section aim to generate answers indicating the degree to which men are treated as they want to be socially in terms of their gender. It also aims to identify how a trans identity is managed by asking men to identify who in their lives know that they are trans in relation to who they want to know, if they are ever "read" as trans or female and how they deal with it when they are treated inappropriately. Men are also asked to describe the ways that they are identified and known socially, how they manage a shifting social identity, and whether they find the experience stressful or challenging.

Section 5: Relationships, Resources and Support

This section asks men about their experiences with loneliness and isolation, their level of community involvement, and about their experience with dating and romantic relationships.

Section 6: Stress related to age, racism, and class

The questions in this section aim to generate answers that indicate the degree to which men are treated as they want to be socially in terms of their age, their perceptions of male privilege and social treatment, their financial status, stress associated with transition costs, and experiences with racism, violence, and discrimination.

Original Aims of data collection and hypotheses to be tested

Overall Aims:

1) To conduct analyses examining similarities and differences among individuals who are transitioning from female to male. Comparisons will include demographic and phenotypic characteristics (body composition), perceived stress and self-esteem scores, satisfaction scores pertaining to gender presentation (both body and behavior), ability to "control" or manage their transforming social identity, experience with/types of transition related stressors, and physiological biomarkers indicating stress response and overall health.
2) To characterize stages of the "liminal period" or "transition" from female to male as measured by duration of time on testosterone therapy.
3) To examine the relationship of stress and experience to physiological stress among individuals within each stage of transition.

Specific aim 1: To examine stress levels as measured through biomarker data (including mean and nighttime dip in ambulatory blood pressure, salivary cortisol levels, levels of EBV antibody titers, and levels of CRP) within the entire sample and within each stage of transition.

Hypotheses 1:

- **a)** Biomarkers are predicted to have a positive relationship to scores on Cohen's Perceived Stress Scale (1983).
- **b)** Biomarkers are predicted to have an inverse relationship to scores on Rosenberg's Self-Esteem Scale (1965).
- **c)** Biomarkers will have an inverse relation to satisfaction scores pertaining to gender presentation as measured through the "Transitioning Body – Satisfaction Scale," (TBSS) and "Gendered Satisfaction Scale" (GSS) where higher scores indicate a greater degree of sense of satisfaction.
- **d)** Physiological measures of stress will be higher among trans men who report stress associated with "social evaluative threat" (SET).

Specific aim 2: To examine stress as measured through biomarker data (including mean and nighttime dip in ambulatory blood pressure, mean salivary cortisol levels, levels of EBV antibody titers, and levels of CRP) within each stage of transition.

Hypotheses 2:

- **a)** Individuals in stages 1 and 2 are predicted to have higher perceived stress scores than individuals in stage 3.
- **b)** Self-esteem scores are predicted to have an inverse relationship to stage of transition.
- **c)** Stress measures related to transition specific stress are predicted to have an inverse relationship to stage of transition.

d) Individuals in stages 1 and 2 are predicted to have higher levels of mean salivary cortisol than individuals in stage 3.
e) Individuals in stages 1 and 2 are predicted to have higher mean systolic AMBP levels and less of a nighttime dip in AMBP levels than individuals in stage 3 when controlling for BMI and age.
f) Individuals in stages 1 and 2 are predicted to have higher CRP and increased levels of EBV antibodies compared to individuals in stage 3.

Specific Aim 3: To identify transition-specific variables associated with psychological measures of stress.

Hypotheses 3

a) "Satisfaction" as measured through the "Transitioning Body –Satisfaction Scale," (TBSS) and "Gendered Satisfaction Scale" (GSS) is expected to have an inverse relationship to stage of transition.
b) Low satisfaction with physical and behavioral aspects of gender presentation is expected to be associated with increased perceived stress scores and decreased self-esteem scores.
c) Social integration/social support is expected to be associated with decreased perceived stress scores and increased self-esteem scores.
d) Stress related to "social evaluative threat" (SET) is expected to be associated with increased perceived stress scores and decreased self-esteem scores.

Hypotheses Tested and Presentation of Results

The overall and specific aims presented above are addressed in the following chapters except for results pertaining to social integration/social support and EBVab. Examining the role of social support is not addressed in the dissertation; though the quantity and type of data obtained through the interviews will make this exciting work for the future. No significant relationships were identified between EBVab and psychosocial stress measures or stage so results pertaining to EBVab are not presented in the dissertation.

Analysis of the qualitative data made it particularly clear that focusing on transition-specific stressors would be both fruitful and interesting and thus became the framework through which the results chapters are structured. Additionally, because

quantitative analysis revealed significant relationships between measures of transition-specific stress (as examples of "social evaluative stress") and to physiological stress response while general measures of perceived stress were not associated with physiological stress response, the chapters that follow focus on both the experiential and physiological aspects of transition-specific stress. The chapters that follow detail the results of the hypotheses that were tested.

Chapter 3, titled "Gendered Bodies in Transition," present results pertaining to trans men's experiences of physical transition and draws comparisons between trans men in different stages of transition. Through a presentation of qualitative and quantitative data, this chapter addresses one of the overall aims of the study, which was to characterize the experiences of trans men in different stages of the transition process. This chapter also specifically addresses hypothesis 3a) through an examination of the relationship between "satisfaction" as measured through the "Transitioning Body – Satisfaction Scale," (TBSS) and "Gender Satisfaction Scale" (GSS) among trans men in different stages of transition.

Chapter 4, titled "Associations between transition-specific stress experience, nocturnal decline in ambulatory blood pressure, and C-reactive protein levels among transgender men," presents results linking transition-specific stress experience including stress associated with having a transitioning social identity, stress associated with being "out" as transgender, and stress associated with "passing" to physiological measures including ambulatory blood-pressure and levels of C-reactive protein. Through an examination of these measures, this chapter addresses specific aims 1 and 2 and their subsequent hypotheses.

Chapter 5, titled, “Associations between transition-specific stress experience and activation of the HPA axis,” presents results linking transition-specific stress experience including stress associated with having a transitioning social identity, stress associated with being “out” as transgender, and stress associated with the use of gender-specific public restrooms to activation of the hypothalamic-pituitary-adrenal axis (HPA) as measured through salivary cortisol. Similar to chapter 4, this chapter addresses aims and hypotheses 1 and 2.

Chapter 6, “Summary and Conclusions,” provides an overview of the results of this study and describes the significance of this research for scholars interested in liminal experiences, the gendered body, and physiological responses to psychosocial stress.

CHAPTER 3

GENDERED BODIES IN TRANSITION

Introduction

Because of the salience of the body in lived gender experience and the way in which specific physical characteristics are tightly bound with gender presentation and social identity in western cultures, this chapter will hone in on trans men's experiences of their transitioning bodies. As transitioning from female to male is a process that takes place over time through the administration of testosterone (T) therapy and surgical procedures, I draw comparisons between trans men in different stages of this process. During the early stages of the transition process, individuals may occupy a liminal (Bolin 1988; Turner 1967) or ambiguous social category in relation to the binary categories of female and male; defiance of or failure to abide by gender norms can result in negative social consequences and stigma. This liminal, gender-ambiguous period of transition can therefore be particularly challenging for trans men. Through these comparisons, my aim is to show the complex role of the body in processes of social gender attribution, the way in which lived gender experience is modified through changes of the body, and the dynamic interaction between experiences of the gendered body and what I will call sex identity.

I begin with an introduction of what transitioning from female to male entails, how it is that scholars have conceptualized the way bodies are attributed a gender or communicate their gender via culturally specific performances. Next, I present both narrative and quantitative data from my study among trans men obtained during their transition from female to male in order to document what they consider to be important

about their own gendered bodies, how they experience the physical and social transformations associated with transition, and how they navigate their experience of gender liminality. As gender, which is constructed within a cultural context, is "performed" by individuals in ways thought to be socially appropriate, I propose that experiences of the body during transition are linked to trans men's awareness of the *social expectation* that gender be performed *appropriately* through both the body and behavior. Additionally, because trans men are acutely aware of the effort needed to appropriately "do" gender and the risks associated with a "failure to perform," I suggest that the decision to identify oneself as a "trans man" or as "just a man" reflects a strategic way to navigate a system in which sex is viewed as binary. For some trans men in this study, their strategy has been to modify the binary sex category system to include a third gender identity while for others, transitioning itself strategically enables them to live more comfortably within the binary sex system rather than opting for a unique placement in it. This study therefore provides evidence of the malleability of the sex/gender system as individuals seek to find a way to navigate within a society that stigmatizes bodies perceived to be gender liminal.

Trans men and Transition

For trans men who are in the process of medically and socially transitioning from female to male, a transition of the body involves more than just genital surgery; it entails a lengthy *process* instead of simply a surgical *procedure.* A *sex change* is generally understood to refer to a host of physical changes brought about through surgeries as well as hormones in order to achieve harmony between a person's internal gender identity and their perceived sex. Trans men who are medically transitioning from female to male

utilize testosterone therapy (T) which modifies their biology in ways that are socially significant; hormonally induced changes of the body occur over months and years, slowly accumulating into the suite of characteristics that socially cue gender. Beyond transforming one's social identity, transition is also an *experience* involving changes in emotional and physical sensation; the person who is transitioning is often the first to notice and the only one to feel the sometimes subtle, sometimes extreme changes in physicality that occur during transition. Additionally, because of the social significance of bodies when it comes to sex and gender, trans men also experience changes in their relationships, amazingly subtle shifts in how they are treated by others, and even alterations in their feelings and perceptions of themselves.

While there is an increasing amount of research and scholarship on transgender issues and populations, the complexity and variation of experiences within this population present a challenge for researchers. To date, anthropological scholarship on transgender issues and experience has generally focused on institutionalized third gender categories and experiences of transgender people in cultures outside of the U.S. (Davies 2007; Herdt 1994, 2004; Kulik 1998) and on experiences of transgender people within the U.S. (Bolin 1988; Cromwell 1999; Devor 1997; Rubin 2003; Valentine 2002). Through these investigations, these scholars make clear the cultural constructedness of gender and provide insights into the lived-experience of those whose bodies are gendered in ways that deviate from the norm. The foci of interest differ among these scholars; for instance, Herdt (1994, 2006), Kulik (1998), Davies (2007), and Valentine (2002) conduct ethnographic research in order to engage with the complexity of third gender categories and the category of "transgender" and Bolin (1988), Kulik (1998), Rubin (2003),

Cromwell (1997) interview transgender people and attempt to contextualize and describe the varied ways in which gender identity is lived. Sociologist and public health researcher, Emilia Lombardi points to the problem of inconsistency in the way that researchers use the terms sex and gender and also indicates that *diversity* within these communities is effectively "masked" through the use of umbrella terms including "transgender" (Lombardi, 979: 2009).

While there is no single or linear process as to *how* trans men transition (when they begin, whether they obtain surgeries, in what order things are done), those who undergo testosterone therapy share an experience of physical transformation that takes place over time. Prior to coming to terms with the realization that they want to transition, most trans men first move through their own internalized struggle. My participation in multiple support groups throughout New England led me to understand that the decision to transition is borne out of a therapeutic dialogue with a trained mental health professional just as frequently as it is a conclusion trans men draw on their own and come to through interactions with others who share their experience. A series of medical hurdles must be navigated in order to access the *means* to transition (World Path Association of Transgender Health/WPATH 2005). Additionally, trans men must negotiate numerous legalistic processes associated with changing relevant identity documents; these complex steps that often precede access to hormones and surgeries tests the resolve of trans men to transition and points to the necessity of examining the *importance of the body* as a moderator of identity that is particularly salient among trans men.

The quandary of "care"

In order to access the means to medically transition in the United States – by this I am referring to both testosterone and surgical procedures –trans men generally must obtain a letter stating they meet the criteria for a diagnosis of gender identity disorder (GID; defined as extreme discomfort with one's anatomical body and a persistent desire to be accepted as a member of one's self-identified or "psychological" sex) (American Psychiatric Association [*DSM-IV-TR*], 2000). This letter must come from a licensed mental health professional who then refers them to a medical provider willing to prescribe cross-sex hormones (Meyer et al., 2005). However, meeting the diagnostic criteria to transition does not translate directly into access to care. Though a psychological diagnosis is required to access treatment, many insurance providers still do not consider hormonal therapy and surgical procedures involved in sex transition to be "medically necessary." In fact, many insurance policies contain a "Transsexual Exclusion Clause" which excludes all transition-related care (Hong 2002). As I learned from some of the participants in my study, the following circumstance can in fact arise when dealing with insurance companies with this clause: chest surgery may be covered for a man (who is recognized as such by the state as evidenced by the M gender marker on his identity documents) who has a medical diagnosis of "gynecomastia" (the *abnormal* development of large mammary glands *in males* resulting in the development of breasts), while coverage would be denied for chest surgery for a trans man.

An additional issue for people in the process of transitioning, is that many states require proof (in the form a letter signed by the surgeon) indicating that sexual reassignment surgery" (SRS) has been *completed* in order to modify the gender marker

on a state license or birth certificate (personal correspondence with records office in Boston, MA.). Moreover, there is no consistent definition of SRS across states and some surgeons who perform procedures that contribute toward sex reassignment refuse to write "letters of proof" for fear of committing fraud (personal correspondence with MA-based surgeon).

Nonetheless, trans men pursue these gender-affirming surgeries, often paying "out of pocket," in order to align their bodies with their internal gender identities. For trans men, SRS may include "top" surgery, which involves the removal of breast tissue by double mastectomy or liposuction followed by chest reconstruction including nipple grafts (Gorton 2005). They may also obtain "bottom" surgeries such as phalloplasty (the surgical creation of a phallus) or metoidioplasty (the surgical modification of existing genitalia) as well as full-hysterectomy (removal of the uterus and ovaries) or oopherectomy (the removal of one or both ovaries) (Kotula 2002). Currently, though a number of professional organizations including the American Medical Association (AMA) have issued statements acknowledging that theses surgeries as well as other forms of transition-related care (such as hormonal therapy) are neither "cosmetic" nor elective, many employers and insurance providers still systematically deny coverage for procedures that are related to gender transition (www.lambdalegal.org/trans-toolkit). Although some insurance providers have removed discriminatory exclusions of transition-related healthcare from their policies, non-profit organizations such as the Jim Collins Foundation have recently come into existence for the sole purpose of helping to raise funds to cover gender-confirming surgeries for people who have no ability to pay for it themselves.

Following the logic of care set up by insurance coverage (described above), if trans men retain a female gender marker on their identity documents *and* obtain a diagnosis indicating sufficient *medical* need (i.e. irregular menses or ovarian cysts), these "bottom" surgeries that involve the removal of "female" organs may be covered as they may pose a risk to physical health. However, the procedures that are explicitly transition-related and gender-confirming (i.e. chest surgery, phalloplasty or metoidioplasty) are generally denied coverage. Consequently, due to the complex bureaucratic obstacles there is substantial variation with regard to the order with which medical interventions including testosterone and surgeries are pursued/obtained by trans men; this delay in or denial of access can extend the duration of time in which one remains in a liminal category relative to gender presentation.

The body as a signifier of sex

Bodies are of central importance to trans men because of the way that gender has been deeply interwoven with the body in western culture. One common misperception of what a change in sex entails prioritizes changes brought about through the scalpel over and above the physiological changes brought about through hormonal administration (testosterone in the case of trans men). This focus on *surgery* as the most fundamental form of medical intervention involved in a change in sex reflects an understanding of sex as the sum of specific body *parts*. However, the focus on specific *parts* of the body as defining ones "sex" is a relatively new phenomenon. In Aristotelian and Galenic models of procreation, women and men were thought to occupy bodies and produce bodily fluids that were equivalent to each other. There was no unique terminology used to reference

what today are considered unique female organs and genitalia were perceived to differ only in terms of location, not kind (Laquer 1986, 1990**).**

Unlike these anatomists of antiquity who viewed characteristic differences between men and women as produced through differences in *physiology only*, historian's of science show how biological research during the 19th and early part of the 20th century resulted in a shift in perspective that in large part underlies the current cultural fixation on specific parts of the body, the skeleton, the brain, and in particular genitalia, as defining one's sex. Research during this era no longer emphasized the body *as a whole* as foundational when it came to sex differences; instead, researchers began to hone in on particular *parts of the body*, in order to locate and isolate specific differences and defining feature of sex (Fausto-Sterling 1985 and 2000, Schiebinger 2000). These differences were then used to taxonomically organize people on the one hand and to enable the identification of deviations from the norm that were considered to be socially dangerous on the other (Horn 2003, Terry 1993).

The Challenge of "Doing" Gender

In order to understand the importance of bodies in the contemporary social achievement of gender, it is first necessary to understand how "gender" is conceptualized in relation to "sex" and the way that gender is performed and socially attributed through the gendered interpretation of bodies and behaviors. Both sex and gender have been areas of intense anthropological inquiry and while the aim of anthropology is to study human diversity, the field has been sharply divided over how culture and biology shape that diversity. Research in the arena of sex and gender tends to exemplify the biological/cultural divide. Generally speaking, scholars have understood the term "sex" to

refer to the "objective" classification of bodies into the binary categories of male and female based upon characteristics of reproductive anatomy and physiology (West and Zimmerman 1987) while the term "gender" has been employed to refer to "the *meanings* a particular society gives to the physical or biological traits that differentiate males and females" (Mascia Lees 2000:1).

Scholars today largely concur on a vision of gender identities as social constructs, shaped predominantly by socioeconomic, cultural, as well as historical factors and gender as a concept came to stand for the culturally constructed and potentially variable nature of masculinity and femininity. Cultural and feminist anthropologists, as well as gender theorists in general, grapple with gender categories and gender roles as they relate to lived-experience and differential distributions of power (Mascia-Lees 2000). For biological anthropologists and biological researchers, one purpose of focusing on *physical* differences associated with both sex and gender is to tease out the evolutionary, ecological, and life-history processes that lead to human variation and to understand how those differences intersect with behavior and disease susceptibility (Panter-Brick 1997, Pol Hulshoff et al 2006, Worthman 1995). These differences in aim are reflected in contrasting methodologies and often result in disciplinary rifts where there might be interdisciplinary collaboration (Worthman 1995).

For example, biological approaches to sex and human variation provide a complementary critical lens with which to examine the gendering of bodies and the biological category of sex (Lauzanne and Lee 2000, Roughgarden 2004). These researchers contribute to our understanding that not only gender, but even sex itself, as a biological category, is more complex than a binary system suggests. For example,

feminist and biologist, Anne Fausto-Sterling (1993, 2000) goes so far as to say that the notion of absolute dimorphism is a false concept. Other scholars argue that work should be done with an, "eye to variability rather than bimodality (Blackless et al 2000:151).

The differentiation of gender from biological sex came about as an explicitly feminist response to the political, economic, and social oppression of women and the erroneous biological claims upon which sex inequality has so frequently been based Reiter 1975). And while feminist scholars and social theorists initially distinguished sex from gender in order to denaturalize the social roles or inequality of women, sociologists and gender theorists developed theories of gender as socially constructed in order to describe *how* people actually produced gendered bodies. In a now classic research article, "Passing and the Managed Achievement of Sex Status in an 'Intersexed' Person," social interaction theorist Harold Garfinkel applied what he termed an "ethnomethodological approach" to the question of gender (2006 [1967]). Garfinkel details his study of "Agnes," a male-to-female transsexual whose successful "passing as female," formed the basis for his theory that gender is an *accomplishment* that individuals both achieve and then manage during social interactions (2006[1967]).

Ethnomethodologists made it their aim to understand how gender was constructed in daily life and provided analyses that described how sex categories were ascribed to bodies and behavior rather than emanating from them; the construction of gender occurs in the context of social interactions where both the body and behavior are "read" for social cues. The body was therefore essential in the sense that physical cues were understood to be important signifiers of sex, but from the beginning of constructivist

theory, the focus remained on *interpretations* of the body and behavior and not the biological processes of the body itself.

Following Garfinkel, psychologists Suzanne Kessler and Wendy McKenna provided research-based analyses (2006 [1978]) and sociologists Candace West and Don Zimmerman provided theoretical contributions (1987) that elaborated on the specific ways in which gender is constructed and achieved through daily interactions. While Garfinkel (2006 [1967]) argued that gender was a "managed achievement," Kessler and McKenna (2006 [1978]) conducted studies from which they were able to quantify and assign relative weights of importance to specific physical attributes, namely secondary sex characteristics, in the process of gender attribution. In their attempt to uncover the mental processes people used to attribute gender to bodies, they found that the presence or assumed presence of a penis carried sufficient weight in people's minds for them to identify that person as male despite the appearance of other characteristics (including breasts). In other words, they found that "reasonable" gender labels were attributed following a process of mental "filtering" and interpreting *specific* parts of the body (1978). While ethnomethodologically focused research contributed an understanding of the social and mentally processes involved in gender attribution, biologically-focused research provides additional insights into the way in which biological sex is also socially constructed and not naturally "given." In particular, the acknowledgement of the myriad of ways in which sex is defined includes the evaluation of chromosomal, hormonal, anatomical, and genital characteristics, each of which is expressed with high degrees of variation (Fausto-Sterling 2000; Martin 1987).

Within the context of the increasingly complex way in which biological sex was viewed, West and Zimmerman (1987) argued for a distinction among "sex", an intermediary "sex category," and "gender." In agreement with the observations of Kessler and McKenna (1978), West and Zimmerman understood sex to be based upon certain socially agreed upon *biological* characteristics (i.e. genitalia, chromosomes) that function as sex criteria. Because these sex criteria are generally inaccessible during social interactions, placement into a sex category is "established and sustained by the socially required identificatory displays that proclaim one's membership in one or the other category" (127: 1987). Gender, in contrast, represents a social achievement as it involves conducting oneself in accordance with normative expectations associated with membership in a sex category. The concept of "sex category" thus provides a "better way to think" through the gendering of bodies by recognizing the process through which gendered presentation and behavior becomes an assumed proxy for anatomical or biological sex. Within this complicated framework, the concept of the "sex category" provides a means of explaining the possible disconnect between a person's anatomical sex, their gender performance/behavior, and the categorical sex that is applied to them socially.

In terms of the study presented here, which focuses on trans men during transition from female to male, the concept of the "sex category" is useful for understanding how a trans man who has *not* undergone bottom surgery (and thus may be considered anatomically female) yet lives "appropriately" performing a masculine gender, is also *socially* recognized as male in terms of being ascribed a sex category. In this way, instead of being based upon assessing sex criteria, "genital sex" is attributed based on

"reasonable" assumptions based on gender characteristics (including behavior, clothing) and secondary sex characteristics (e.g. deepness of voice, muscularity, facial hair) allowing for the male "sex category" to be ascribed. Yet because there is discord between his anatomical sex and the male sex category that was applied to him socially, a trans man in this situation risks *incorrect* (female) sex categorization despite the fact that he is consistently *correctly* attributed the gender of a man. In other words, as sex categorization occurs through subtle ways in which bodies are gendered, breaching the rules of the binary system during sex transition can render a trans man's male sex categorization suspect, or at risk.

The stressful and challenging experience associated with a "sex category at risk" for trans men is particularly poignant in gender-specific spaces such as public restrooms, during medical examinations, and/or when they are open about discussing their unique gender history. Trans men, in fact, experience the process of sex *re-categorization* during their physical transition. In this way, transgender experience exposes and lends insights into the very way sex categorization occurs and is experienced by people whose bodies expose the limits of a binary system of sex.

The analytical necessity for the "sex category" pointed to a limitation I many of the social constructionist arguments, which was the increasing exclusion of the material body from scholarship on gender. For while the constructivists engaged with the powerful material effects of discourse (particularly discourse *about* the body), they less frequently wrote about the material body itself in terms of physical characteristics (in the way that the ethnomethodologists did) that are then socially linked to categories of sex. While Foucault's (1978) influential book on the history of sexuality provided scholars

with a means to link the normative and productive power of discourse on sexuality and gender with the way in which bodies themselves are seen as signifiers of difference, more recent gender theorists continued to theorize on gender referring to bodies as "sites" through which gender is produced through performance (Butler 1993, Halberstam 1998). They conceptualize sex as something that is produced socially through the process of gender attribution and understand gender itself to be a series of complex, often subtle, repetitious acts performed *through* the body. The meanings that are read into these performances are produced socially and these theorists argue that it is social *meaning* that contributes to the gendering of bodies (Butler 1993, Halberstam 1998). Coming out of the contributions made by the ethnomethodologists in particular, examinations of transgender bodies and transgender experience have been highly informative in the endeavor to differentiate sex from gender, to understand how gender is lived by individuals, and to explore the importance of bodies and behaviors in the "performance" of gender.

Transitioning Bodies

The *doing* of gender presents a challenge for trans men, particularly during the liminal period of transition, because of the very way that gender is defined in reference to the body and also achieved through both physical presentation and behavior in western culture. In this context, trans men are in jeopardy of being "read" by others as performing a *gender lie,* as pretending to be something they are not. In contrast to being "read," trans men aim to be "seen," that is to say, they aim to be recognized socially as men despite being designated female at birth (Rubin 2003). To be "seen" requires successfully meeting insidious expectations pertaining to gender performance that reside in the minds of culturally informed observers. For many trans men, life *prior* to transition represents

the "gender lie" and medical transition allows them to live truly as the men that they feel themselves to be (Cromwell 1999, Devor 1997).

While the *experience* of transition is not uniform, all trans men who medically transition share the experiences associated with a dramatic transformation of the body. Some of the changes that can occur during testosterone administration include a deepening of the voice, increased growth of facial and body hair, male pattern hair loss, increased musculature and libido, changes in skin tone and texture, shifts in body fat distribution/changes in overall body shape, and physiological changes that can affect metabolism, mood, energy levels, and sleep quality. Surgeries - in particular, double mastectomies or "top surgery" – together with the changes produced through hormone therapy combine to create some of the socially recognized gender "cues" that dramatically affect how individuals are perceived and treated.

A number of researchers and scholars who have studied sex transition have applied the concept of liminality or used categorical stages in useful ways to characterize specific components involved in the process. For example, in her study of male to female transition anthropologist Anne Bolin (1988) employed the concept of liminality and "rites of passage" in order to examine the experience of male-to-female transition. In contrast to this focus on the experiential aspects of transition, psychological scholars and clinical researchers have conceptualized stages of transition that for the most part prioritize coming out processes and identity development. For example, clinical social worker Ari Lev proposed six stages in her "Transgender Emergence Model," which begins with an individual's awareness of feeling "different" and ends with social integration and acceptance. In her model, stage 5 incorporates the entire process of physical transition

(Lev 2004). In contrast to this conceptualization of transition as a process driven by psychological stages, I am proposing a way to look at transition that places emphasis on the liminal stages of transition as experienced through changes *in the body*, which is itself a moderator of identity.

The study presented here aims to document, through a presentation of both narrative and quantitative data, what characteristics of the body and what aspects of behavior are important for this sample of trans men during different stages of their transition. What clusters of physical characteristics and gendered behaviors have particular salience for these trans men? How are the characteristics of the body that are important to this sample of trans men linked to their gendered social experience and what does this say about the way that gender is socially performed and constructed for trans men during transition?

Methods

Participant Recruitment

The participants in this study were sixty-five transgender men recruited from western MA, Boston, MA, and southern Vermont. As transgender men represent a relatively hard to reach population, I focused my recruitment efforts on online list-serves, area support groups, social networks, and Facebook announcements. In an effort to gain the trust of members of the trans community and become acquainted with the range of experiences I might encounter, I attended monthly support group meetings and transgender focused conferences as well as individual meetings with "elder" members of the community and other transgender health researchers. In order to participate in this study, eligibility criteria required that each participant was over 18 years old, was

assigned a female sex designation at birth but expressed a male gender identity, and was using testosterone therapy as part of their transition from female to male.

Data Collection and Coding of Variables

Due to the social stigma and risks endured by transgendered individuals in our society, extraordinary care was taken to insure that study participants' identities were protected. Interviews were conducted either in the participant's home, in private meeting rooms at area LGBT health clinics, or in private offices at UMass Amherst and responses were transcribed onto the interview instrument as well as digitally recorded. Consent forms were provided and discussed and participants were asked to provide their consent by writing their initials into a notebook instead of providing their full names on the consent forms themselves. Both research aims and protocol were approved by the IRB for research involving human subjects at the University of Massachusetts Amherst.

Stages of Transition

Because transition, in this study, is viewed as a liminal process involving the transformation of bodies *over time* on testosterone (T) therapy, time on T is itself used as a measure for conceptual stages of transition. These stages were developed *a priori* based on characteristics associated with T administration over time as well as qualitative data obtained during the pilot study. These three stages of transition are based on duration of time on T because, while there is individual variation in how bodies respond to T, as the results of this study will show that, on average, these stages correlate with certain physical changes and transition experiences that have relevance for trans men. For purposes of comparison, trans men in this study are grouped into stage 1 if they have

been on T for ≤ 6 months, into stage 2 if they have been on T for >6 months to 3 years, and into stage 3 if they have been on T for > 3 years.

Measures of Importance and Satisfaction with the Body (TBSS) and Behavior (GSS)

I developed two multi-item scales from information obtained during a pilot study, in order to learn what "parts" of the body and which aspects of behavior are important to trans men, and to assess the degree to which trans men in this study and in different stages of transition are "satisfied" with these specific "parts" and aspects of behavior. The characteristics of the body used in the scale represent those discussed by the trans men who were interviewed in the pilot study. The behaviors used in the scale were also discussed during the pilot study and also match a number of those stereotypically associated with masculine gender presentation.

The scale of physical characteristics, which will be referred to as the "Transitioning Body –Satisfaction Scale," (TBSS) included the following 8 items: acquiring a male chest (through double mastectomy and chest reconstruction), full-hysterectomy and/or oophorectomy (removal of the uterus and/or ovaries), change of voice, bottom surgery (phalloplasty, metoidioplasty), growth of facial hair, fat redistribution/change in body shape, growth of body hair, and increased muscle mass. The "Gender Satisfaction Scale" (GSS) has to do with behaviors that are often associated with masculine gender and included the following 11 items: masculine mannerisms/body movements, having a job/or a (gender) specific type of job, men's clothing, masculine haircut, sexual role, looking a particular age, being able/not able to cry, emotional expression (i.e. affection and enthusiasm), appearing assertive, appearing confident, and appearing heterosexual to others.

During the in-person interview, participants were asked to first rate each characteristic on the scale as "not at all (0)," "somewhat (1)," or "very (2)" important and then to disclose whether they currently feel satisfied regarding that characteristic (1) or if they are dissatisfied (-1). Importance ratings were used in all analyses that refer to "Importance" factors. In order to assess the degree to which men were satisfied with the characteristics of interest, the product of "level of importance" and "satisfied/not satisfied" was calculated and two points were added to all scores in order to make all the results positive versus negative numbers. A total TBSS score and GSS score was then calculated as the sum of the score for all items. The individual item scores were derived as follows:

Highest level of Satisfaction	Very important (2)*Satisfied (1) = 2 + 2 = **4**
	Somewhat important (1)*Satisfied (1) = 1 + 2 = **3**
	Not important (0)*Satisfied (1) = 0 + 2 = **2**
	Not important (0)*Not Satisfied (-1) = 0 + 2 = **2**
	Somewhat important (1)* Not Satisfied (-1) = -1 + 2 = **1**
Lowest level of Satisfaction	Very important (2)* Not Satisfied (-1) = -2 + 2 = **0**

The resulting score on the TBSS thus represents the level of satisfaction an individual has with regards to his own body specifically in terms of changes associated with T therapy and with changes that result from surgical interventions and the scores on the GSS represent levels of satisfaction with aspects of behavior and appearance that are stereotypically associated with masculinity. Higher scores on both scales reflect higher levels of satisfaction.

Thematic Analysis

Following the methods for thematic analysis as suggested by Ryan and Bernard (2003), specific themes of interest for the present study were identified *a priori* through open-ended pilot interviews with 9 trans men. The themes that emerged during those

interviews were then used to construct the interview instrument used in this study. The instrument and thus the interview was itself organized thematically into the following sections: gender history and identity, stress associated with navigating medical/legal/relational aspects of transition, physical and behavioral aspects of transition, social treatment, and romantic relationships/social support. While there is often thematic overlap across sections, data presented here are drawn primarily from the two subsections that focus on bodily and behavioral changes during transition.

Follow-up questions for thematic analysis

Following the completion of the above mentioned structured question regarding physical changes of the body, participants were asked a number of follow-up questions including: *How do you feel about your body now? Are you satisfied with the changes in your body that you've experienced through testosterone and surgeries (if applicable)? Which "parts" of your body currently dissatisfy you or cause you insecurity if any? Do you expect your body to change in ways that you want it to?* Similarly, when participants completed the structured question regarding behaviors stereotypically associated with masculinity, I asked participants a number of follow-up questions including: *Do any of the behaviors (indicated in the survey) currently cause you stress or insecurity? Do you consciously "work on" or modify your behavior deliberately in order to be more masculine in any way? If yes, in what way? Has what you "work-on" changed over the course of your transition?* These open-ended questions aimed to contribute a narrative, explanatory element to the previous scales enabling a nuanced interpretation and contextualization of the quantitative results thus allowing me to expand upon and complicate previous understandings of transgender bodily experience and transition.

Emergent themes: Identity

In the context of the follow-up questions (listed above) and in response to questions pertaining to relationships (listed below), particular themes emerged. It became apparent through the way that trans men in my study spoke of their bodily experience during transition, that their perceptions of their own gendered bodies informed how they described themselves in terms of their "sex identity" (e.g. "trans man" or "just a man").

Themes of bodily experience and "sex identity" also emerged in the analysis of responses to some of my other interview questions. I asked participants for example: *Can you describe some of the challenges or difficulties you are currently facing in relation to your gender presentation and transition? What would you say has been the most challenging part of transitioning in terms of relationships?* In order to be able to conduct quantitative analysis in addition to qualitative analysis, answers pertaining to "sex identity" were coded as described below.

Coding of Sex Identity

The term "sex identity" in this case is used to refer to a nuanced recognition that some trans men prefer to emphasize the *trans* aspect of their manhood while others prefer to identify and think of themselves "just as men." The term "sex identity" for this study is used to refer to trans men's own internal identity rather than signifying any aspect of their bodies that signal others to the fact that they have or are transitioning. The eligibility criteria I used in my study ensured that 100% of study participants were designated female at birth, were using testosterone therapy as part of their transition, and expressed some version of a male gender identity ("trans man" or "just a man") as well as a desire to live socially as men. While participants shared a common identification with male

identity, as in the larger community of trans men, there is variation in the ways that trans men refer to their gender; some trans men prefer to explicitly recognize the *trans* aspect of their manhood while others prefer to identify and think of themselves "just as men."

As part of the larger study on stress during transition, I was interested in learning the degree to which an individual's sex identity corresponded to how they were viewed/treated socially, and the effect of any discrepancies on stress experience during transition. Participants were asked to fill out a pencil/paper background and demographic questionnaire which included a structured question asking them to specify whether they preferred to think of themselves as a "trans man" or "just a man." Each participant was then grouped within one of two categories (trans man or "just a man"). To aid in interpretation of these questionnaires, I also included a number of questions about identity in the in-person interviews. For purposes of providing narrative and explanation of these identity categories, responses to the structured question from the background questionnaire were then examined within the context of answers provided during the interview. I identified five categories from an open-ended question, "How do you identify in terms of your gender?" These categories included: trans man, man or guy, man in public/trans man with close friends, genderqueer/queer, and "not female." These 5 categories were found to correspond to answers on the written questionnaire in that 1) trans men who described themselves as a "man or guy" or as "a man in public settings but a trans man with close friends" circled "just a man" on the written questionnaire and 2) trans men who primarily described themselves as "trans men," "genderqueer/queer" or "not female" circled "trans man" on the written questionnaire.

Analysis

Qualitative data analysis focused on participant responses to the questions pertaining to the importance of specific characteristics of the body and behavior (as described above) in order to identify patterns and themes and to draw comparison between trans men in different stages of transition. If statements pertaining to the body appeared spontaneously or during follow-up questions, these were also included in analysis. Thematic lists were then generated for each stage of transition (Ryan and Bernard 2003) and particularly illustrative narratives were selected for presentation here. Additionally, participant's answers were coded and entered into a database so that quantitative analysis could be conducted in order to learn of any statistically significant relationships between stages of transition and responses to questions pertaining to the body and/or behavior. Statistical analyses were performed using SPSS v.16.0 for the Mac. Results were considered statistically significant if $p<.05$.

In order to provide a description of this sample of trans men in terms of their transition and to conduct comparisons across stages of transition, univariate tests including T-tests and crosstabs with chi-square analysis were conducted using variables pertaining to transition status (duration of time on testosterone and surgeries obtained), sex identity, and satisfaction scores on the TBSS and GSS. To address the aim of identifying which physical and behavioral characteristics *are important* for gender expression among the entire sample of trans men, frequency analyses were conducted for levels of importance for each individual physical characteristic queried in the TBSS (described above).

To then address the aim of identifying the way in which important physical and behavioral characteristics clustered together for this sample of trans men, items in the TBSS and the GSS were combined and exploratory factor analyses were conducted. The first set of analyses included the importance ratings from each scale. In order to identify the way that physical and behavioral characteristics clustered together in terms of levels of satisfaction for this sample of trans men, a second set of analyses included the satisfaction scores from each scale. Principal component analysis was used to extract the number of factors with eigen values greater than 1. Scree plots were also examined to identify the point at which eigenvalues began to level off.

Regarding the importance of physical and behavioral characteristics, seven factors were suggested by the eigen values (>1.00); three factors were suggested by the unrotated scree plot. Three factors is probably the best reflection of the number of factors because the percentage of variation explained by the initial eigen values of the first three components was 16.3%, 13.1%, and 9.5%. The percentage of variation then leveled off for the other factors. Three factors were then extracted using the method of unweighted least squares with varimax rotation. Unweighted least squares was applied to achieve more conservative results (i.e., fewer characteristics with scores >0.400). Factor scores were calculated by regression and saved.

The same method was applied to identify factor clusters related to levels of *satisfaction* with physical and behavioral characteristics. Nine factors were suggested by the eigen values (>1.00); two factors were suggested by the unrotated scree plot. Two factors is probably the best reflection of the number of factors because the percentage of variation explained by the initial eigenvalues of the first two components was 15.4% and

9.7%. The percentage of variation then leveled off and began to decline for the other factors. Two factors were extracted using the method of unweighted least squares with varimax rotation. Factor scores were calculated by regression and saved.

Linear regression was used to examine 1) whether stage of transition was associated with the importance of physical and behavioral factors and 2) whether stage of transition was associated with satisfaction factors. In these models, factors were entered as dependent variables with a categorical variable for stages (1,2, and 3) entered as a determinant variable. Next, in order to examine the association between perceptions (importance factors) and how experiences of the body (satisfaction factors) affect sex-identity during different stages of transition, logistic regression analysis was performed with the categorical variable for sex-identity (0=trans man, 1 = "just a man) entered as the dependent variable. Determinants in the first model included the three "importance" factor clusters, two "satisfaction" factor clusters, and stages of transition. A second model replaced stage of transition with age as a predictor while retaining the other variables.

Results

A total of 65 trans men completed background questionnaires and participated in in-depth, in-person interviews. Selected demographic characteristics as well as characteristics pertaining to transition status (time on T, surgeries completed), satisfaction scores, and sex identity are presented in Table 3.1.

Table 3.1 Sample characteristics and surgeries completed across stages of transition

Characteristic	Total Sample n=65	Stage 1 n=14	Stage 2 n=26	Stage 3 n=25
Age [a]	31.76 (9.1)	29.95 (9.7)	28.7 (7.5)	35.9 (9.1)
Yrs on T [a]*	3.27(3.3)	.24 (.16)	1.67 (.77)	6.62 (3.13)
Top Surgery[b]**	40 (62%)	2 (14%)	17 (65%)	21 (84%)
Hysterectomy[b]	15 (23%)	1 (7%)	5 (19%)	9 (36%)
Oophorectomy[b]*	15 (23%)	1 (7%)	4 (15%)	10 (40%)
Bottom Surgery[b]	2 (3%)	0	0	2 (3%)
TBSS[a]**	14.56 (6.3)	9.78 (4.9)	13.50 (5.5)	18.36 (5.7)

GSS[a]	26.38 (4.0)	25.64 (4.2)	26.00(4.4)	27.20 (3.6)
ID's a "trans man"[b]	29 (45%)	9 (64%)	10 (39%)	10 (40%)
ID's as "just a man"[b]	36 (55%)	5 (36%)	16 (62%)	15 (60%)

[a]ANOVA comparisons across stages, with Tukey post hoc tests * $p<0.05$, ** $p<0.01$
[b]Crosstabs with Chi Square analysis across stages,* $p<0.05$, ** $p<0.01$

Participants in this study ranged from 18-55 years of age with a sample mean of 31.76 years. Trans men in later stages of transition are older than those earlier in transition, and trans men in stage 2 were significantly younger than trans men in stage 3. There are significant differences between men in different stages of transition when it comes to having transition-related surgeries. A higher percentage of trans men in stages 3 (84%) and 2 (65%) had completed "top surgery" compared to only 14% of participants in stage 1. Similarly, a significantly higher percentage of trans men later in transition had obtained oopherectomies than those in the earliest stage of transition. Levels of bodily satisfaction (as measured by the TBSS) are also significantly higher among men in stage 3 (18.36) compared to those in stage 1 (9.78). In terms of sex identity, the sample was split with 45% preferring to identify as a "trans man" and 55% preferring to identify as "just a man." While not statistically significant, it is notable that the majority of participants in stage 1 preferred the identity "trans man" (64%) while the majority of men later in transition (62% in stage 2 and 60% in stage 3) preferred the identity "just a man."

During interviews, study participants described the dramatic nature of the physical changes that occur during transition as transformative to *experience*. Comparing trans men in different stages of transition through ethnographic data illustrates how certain physical characteristics carry sufficient social weight so as to be prioritized by trans men during transition. Interview data reflected the impact of physical presentation on lived gender experience, gender attribution, and sex identity and the way in which bodily perceptions change over the course of transition. For instance, one study

participant, a 27-year-old high school teacher in stage 3, who had transitioned 4.5 years ago, reflected aloud about his perception of his body, his experience of gender and his reasons for transitioning saying,

> "Part of it was wanting to grow up. As long as I did not undergo this process, I would always be a boy and not a man. I wanted those [physical] *markers* of being a man. That was important to me and for my job [as a high school teacher]. I wanted to be an adult."

Similarly, a trans man in stage 2 of transition said,

> "I decided to go on T because I didn't want to be ambiguous anymore after (running into problems) in a gym locker room."

Both of these comments are made in the past tense, so represent *reflective* statements made by trans men in stage 3 and stage 2; these trans men have already undergone top surgery and feel relatively content in their current bodies. These comments in fact *lack* any reference to *specific parts of the body*, but instead convey an overall sense that physical "markers" make the (adult) man. Instead of emphasizing the specific parts of the body that matter to them, their emphasis exposes their understanding of the link between certain socially salient physical characteristics and the context in which gender is attributed; for the trans man in stage 3, his job working with youth as a high school teacher made the link between gender and maturity (he wanted to grow up) particularly apparent. In this way, physical transition is seen as accessing a fuller, more mature masculine gender. For the trans man in stage 2, gender-specific spaces like the men's locker room made a liminal, ambiguous gender presentation untenable. Another case in point, a 27-year-old trans man in stage 2 (11 months on T) conveyed his perception that he *had* changed a lot since starting T when he said,

> "I don't know [if I want a hysterectomy], now that I've stopped bleeding it isn't something I think about but I wanna be sure nothing is going bad. If it's better for my health, I will pursue it. I have a lot of organs I don't

> think about! As far as bottom surgery goes, again – it's something that a year ago I would have said, "not important" but now it's something I think about. Now that I blend more fully into male spaces like the locker room, I have the realization that I'm always going to have stress if my towel falls down. If I could only take the magic pill but I'm afraid of going under the knife again."

In describing his shifting relationship to his body and the way in which his "blending" into male spaces transforms his perceptions, he is also conveying a shift in priorities insofar as physical characteristics are concerned; his attention is no longer on secondary sex characteristics that are readily apparent to others (i.e. facial hair, male chest) but is instead focused on aspects of medical health. He is describing *decisions* that he has to make regarding his own care and in relation to living as a man, instead of pursuing surgeries or awaiting imminent changes. The focus on other aspects of their transitioning bodies and gender experiences is not surprising in light of the fact that 65% - 84% of the trans men in stages 2 and 3 had already completed top surgery (Table 5.1).

In contrast, trans men in earlier stages of transition used a high degree of specificity when talking about their bodies in relation to their transition experience and frequently discussed their desire for top surgery. A 47 year-old participant who was in stage 1 (3 months on T) conveyed his reasons for wanting to transition when he said,

> "I used to be small chested, so I could get away with it but then my chest grew with age and after my hysterectomy. I wanted a hysterectomy when I was 18 years old because I didn't want to have a period. Now all I want is the one more surgery – chest surgery."

Along with conveying specific desires when discussing their transition, trans men in stage 1 also tended to communicate a sense of excitement, hope, and a clear sense that changes were *in process.* Table 3.2 shows the responses of trans men in different stages of transition when asked, "Do you expect your body to change more in ways that you

want it to?" A significantly higher percentage of trans men in stages 1 and 2 ($p<.05$) indicated that they did expect more in way of physical changes.

Table 3.2 Do you expect your body to change more in ways that you want it to?

	Total sample n=53	Stage 1 n=12	Stage 2 n=23	Stage 3 n=18
Yes	38 (72%)	11 (92%)	18 (78%)	9 (50%)
No	15 (28%)	1 (85)	5 (22%)	9 (50%)

The following two examples illustrate this: an 18 year-old trans man in stage 1 (1.5 months on T), after answering questions on the TBBS, commented

> "I'm hoping to get my top surgery during intersession from school….my voice started changing recently because of T….now it's more important and I think it will get deeper! I hope I don't get body hair (laughs). Bottom surgery isn't important and I won't get a hysto unless I need to medically. Nothing is really bothering me because it will all change with hormones or surgery."

Similarly, a 24 year-old in stage 1 (4 months into transition) said,

> "I'm confident…I can't change anything right now but I'd like to change my chest….but that is scheduled! I probably should get a hysto since I heard or read it could be dangerous because of T….I'm sure I'll get more facial hair…I try to stay optimistic and keep my head up. I need to be patient."

Trans men early in transition also discussed the challenges they faced in gender-specific settings. For these men, their experiences in such spaces were described as challenging because of the way that their bodies were read as ambiguous or liminal in terms of gender presentation. As opposed to trans men in stage 3, who were referring to their past, those in earlier stages of transition or who had yet to obtain top surgery referenced the presence or absence of male secondary sex characteristics that are readily apparent. Trans men later in transition referred instead to their surgical scars or a desire to hide what is "under the towel" while in the locker room.

An illustrative example of this was made when a participant who was in stage 1, whose voice was just beginning to drop and who had nearly a full beard described his

discomfort using public restrooms because of the fact that he hadn't yet been able to have top surgery. He said, "it's horrible, I'm never comfortable. I try to use what I like to call 'the bathroom of least astonishment' which is usually the men's room." The "horrible" position of discomfort he is describing is the essence of gender liminality, where his body is giving what appear to other's to be *conflicting* cues about his sex identity. His comment also indicates the importance of "top surgery" even when other "male" secondary sex characteristics including a beard are visible.

The frequency with which trans men pursue top surgery in comparison to other surgeries reflects the degree to which they experience the social significance of breasts in gender attribution. The consciousness that trans men have regarding the relative importance of certain characteristics of their bodies is shown in the importance ratings they gave to specific changes produced through a combination of surgeries and testosterone therapy. Table 5.3 gives the percentages of trans men who rated specific characteristics as "very important" to their gender presentation as men.

Table 3.3 "Very Important" ratings of physical characteristics across different stages of transition.

	Chest	Voice change*	Body Shape	Facial Hair	Muscle mass	Hysterectomy	Body Hair	Bottom Surgery
Stage 1	(93%)	(43%)	(64%)	(57%)	(77%)	(14%)	(7%)	(7%)
Stage 2	(89%)	(93%)	(69%)	(65%)	(58%)	(27%)	(12%)	(12%)
Stage 3	(88%)	(80%)	(36%)	(64%)	(52%)	(24%)	(28%)	(12%)

*Chi-Square Analysis $p<.05$

As described previously in this paper, the primary aim in accessing hormones and surgery for trans men is for them to achieve a greater sense of accord between their internal male gender identity and their bodies and to be able to live life socially as male. The results in Table 3.3 show that chest surgery was most frequently rated as "very important" among this sample of trans men. There is variation in how trans men in

different stages of transition rated other characteristics of importance. Hysterectomy, increased growth of body hair, and bottom surgery were least important among these characteristics for trans men in this sample. Of note, for 60% of the entire sample of trans men in this study, bottom surgery was said to be "not at all" important (not shown).

As shown in Table 3.1 and 3.3, among the entire sample of trans men and within each stage of transition, top surgery is both the most important and most frequently obtained surgery in comparison to other surgical options. When describing the importance of chest surgery, a study participant in stage 2 related his memory of life prior to top surgery saying, "…it was hard to be treated as male in my old body. I'm much more comfortable now. Before my (chest) surgery, I was harassed when I was out in public." It is clear that the importance of top surgery for trans men is related to the significance of the chest (or absence of breasts) in the process of gender attribution. Both the high percentage of trans men who rated this surgery as "very important" *and* its status as the most frequently obtained surgery indicates that having a male chest is a key physical feature for trans men.

The importance of having a voice that is in male range is also significant, particularly among men later in transition (in stage 2 and stage 3) (Table 3.3). A 46 year old trans man in stage 3 (5 years on T) indicated this when he said, "My anxiety about passing let up when my voice stopped squeaking…" The importance of voice is in large part related to the degree to which these trans men have bodies that are in fact read as "male" to others and the way in which their voices put their gender into question. A participant in stage 2 made this point clear:

> "I have facial hair and still get 'she'd.' So it needs more time…for my voice to change. My voice is still up and down, especially if I'm interested or excited. I know it will change more in time so I'm just waiting."

Another participant in stage 3 (8 years on T) expressed the continued relevance of his voice in his life despite his awareness that it may deepen further:

> "My voice does bother me. I wish it didn't fall in that range since I know it's never getting deeper…I know, especially when I'm on the phone that it isn't in normal range…my facial hair was what I wanted within 2 years!"

Linking Bodily Experience to Behavior: Results of Factor Analysis

In order to understand the way that *the importance* of bodily characteristics and masculine behaviors cluster for trans men who are pursuing medical transition to achieve male sex attribution in public settings, factor analysis was conducted using the combined answers participants provided from both the bodily characteristics and behavioral characteristics survey. The results for three factors are shown in table 3.4.

Table 3.4 Factor loadings for importance related to physical and behavioral characteristics

	Factor 1	Factor 2	Factor 3
Chest surgery	.005	.257	.135
Hysterectomy	-.083	**.473**	.098
Voice depth	-.003	**.537**	-.184
Bottom surgery	-.127	**.696**	.084
Facial hair	.299	**.462**	.106
Body hair	.251	.303	.128
Body shape	.066	.056	**.452**
Muscle mass	.039	-.059	**.768**
Masculine mannerisms	.180	.383	**.464**
Job type	.176	-.004	.030
Men's clothing	-.120	**.407**	.255
Men's haircut	.023	.135	.321
Sexual role	.160	.383	.023
Looking age	.351	.132	.109
Crying/not crying	**.739**	-.117	-.271
Show enthusiasm/affection	**.729**	-.004	-.194
Assertive/in charge	.399	.029	.219
Appearing confident	**.615**	-.062	.267
Heterosexuality	.281	.268	-.005

Looking at the factor scores >.400, the first factor combined aspects of emotional expression (importance of crying or not crying, showing emotions such as affections and enthusiasm) and public presentation (appearing assertive and appearing confident). The second factor combined physical changes brought about through testosterone therapy and surgeries (vocal changes, facial hair, hysterectomy, and "bottom" surgery) and wearing men's clothing. The third factor combined aspects of overall gender presentation (body shape/fat redistribution, muscle mass, and masculine mannerisms).

In order to understand the way that *levels of satisfaction* with specific bodily characteristics and masculine behaviors cluster for trans men who are pursuing medical transition to achieve male sex attribution in public settings, factor analysis was again conducted. The results for three factors are shown in table 3.5.

Table 3.5 Factor loadings for levels of satisfaction related to physical and behavioral characteristics

	Factor 1	Factor 2
Chest surgery	.212	.031
Hysterectomy	.315	.042
Voice depth	**.438**	.160
Bottom surgery	.200	.332
Facial hair	**.633**	-.005
Body hair	**.692**	-.126
Body shape	**.673**	.088
Muscle mass	**.439**	.207
Masculine mannerisms	.322	.001
Job type	.039	.233
Men's clothing	.124	-.039
Men's haircut	.013	-.143
Sexual role	-.075	-.022
Looking age	.214	**.396**
Crying/not crying	-.046	**.494**
Show enthusiasm/affection	-.077	**.771**
Assertive/in charge	.212	.007
Appearing confident	.085	.027
Heterosexuality	-.195	-.151

Looking at the factor scores >.400, the first factor combined levels of satisfaction with physical changes brought about through testosterone therapy (vocal changes, growth of facial hair, growth of body hair, body shape/fat redistribution, and increased muscle

mass). The second factor combined satisfaction with aspects of emotional expression (ability to crying/not cry, showing emotions such as affections and enthusiasm) and satisfaction with age appearance.

Linking Bodily Experience to Behavior: Results of Thematic Analysis

Through thematic analysis and comparison drawn between trans men in different stages of transition, the link between ways that participants interpreted their own gendered bodies and their views on "masculine" behavioral characteristics became apparent. For example, when asked if he modified his behavior in any way to be more masculine, one participant who was in stage 3 of his transition described becoming increasingly aware of his mannerisms and body language,

> "I'm more aware of my body language and attitude…I'm self-conscious about my height. I'm only 5'3"

Similarly, after completing the surveys about the body and behavior, while explaining how he no longer "works on" his gender presentation in the same way he used to, a trans man in stage 2 (2.5 years into transition) said,

> "When I first started T (testosterone), I didn't pass so I tried to through behaviors and manner. Now, I pass so I don't have to try….now I'm more like what I was like before."

Moreover, some trans men in the study felt aware of the new ways in which their behaviors would be interpreted and consciously modified their own behavior accordingly:

> "With friends, I'm less likely to stifle queerness. How I carry myself has changed; early on, I sometimes would forget that people were looking at a big dude….and things I was saying or doing….I couldn't do. Like commenting on a cute kid – scared people. I would have been more chatty with a cute girl but won't now because they'll think I'm hitting on them."

In terms of crying behavior for instance, during interviews the trans men in this study conveyed that they do not so much fear the consequences of being overly emotive or crying too frequently. Instead, they expressed an awareness that they do not or cannot cry as easily as they could prior to starting T; most attribute this change to hormones and mourn their new inability to cry. For example, a participant in stage 1 of transition said, "I think the crying thing is recent…I used to be able to cry and now I can't." The descriptions that trans men provided regarding their relationship to other aspects of behavior and appearance also made clear that their perceptions were very much linked to their stage of transition and their desire to live and be read as mature adult males. A participant in stage 1 conveyed this when he said,

> "I think I'll relax more about it (the behavioral stuff) when I'm on T longer…(right now) the difference between a butch lesbian (hair) cut and a man's cut is subtle but stressful to me so I go to a barbershop. I'm ready to not look like a teenage anymore. I want it to stop – I'm 27 years old!"

This last comment again reflects the desire that trans men feel to not only be regarding as male but to in fact be treated as mature, adult men. The appearance of masculine secondary sex characteristics, in addition to specific aspects of behavior and gender presentation play an important role in this regard.

Regression Analyses examining associations between stage of transition and factor clusters.

With regard to the ranking of the importance of physical and behavioral characteristics in relation to stages of transition, linear regression analyses revealed a significant negative association (adjusted Beta -.248, $p<.05$) between stages of transition and the third factor (Table 5.6). This finding indicates that men later in transition place less importance on aspects of gender presentation including body shape, muscle mass,

and masculine mannerisms. Stage of transition was not significantly associated with the first or second importance factors.

Table 3.6 Results of five models examining the relation between stage of transition and factors clusters.

Factors (DV)[a]	Standardized Beta	Adj R^2	p-value
Importance factor 1 (emotions)	.028	-.015	.836
Importance factor 2 (body)	.183	.018	.183
Importance factor 3 (gender appearance)	-.248	.046	**.047**
Satisfaction factor 1 (body)	.427	.169	**.000**
Satisfaction factor 2 (emotions and age)	.207	.028	.098

[a] Each model included a single factor as the dependant variable with stage as the predictor variable.

With regard to satisfaction with physical and behavioral characteristics in relation to stages of transition, a significant positive association (adjusted Beta .427, $p<.01$) was identified between stages of transition and the first factor (Table 3.6). This finding indicates that the longer trans men are on T therapy, the more satisfied they are with their bodies, particularly with regard to vocal changes, growth of facial hair, growth of body hair, body shape/fat redistribution, and increased muscle mass. Stage of transition was not significantly associated with the second satisfaction factor.

Regression analyses examining associations between factor clusters and sex identity.

In this study of transition among trans men, the experience and appearance of the physical body is recognized as an important moderator of identity. The importance of the role of the body in the way that sex-identity is experienced during transition is illustrated in this comment made by a 23-years-old who was just beginning stage 2 of transition (6 months on T) when he said,

> "I want to be read as male…I'd like to be out (as a trans man) and have it just be ok but since that's not possible (for me), I'd rather be read as just male."

In order to examine the way in which trans men's perceptions of certain physical and behavioral characteristics and their satisfaction with those characteristics influence their sex identities, logistic regression analysis was conducted with the categorical variable for sex identity (0=trans man, 1= "just a man") entered as the dependant variable. Importance and satisfaction factors along with stage of transition were entered as predictor variables. Results from logistic regression analyses are presented in Table 3.7.

Table 3.7 Results of logistic regression examining factor clusters, stage of transition and sex identity.

Independent Variables	**B**	**S.E.**	**p**
Importance factor 1 (emotions)	.214	.369	.563
Importance factor 2 (body)	**1.370**	**.442**	**.002**
Importance factor 3 (gender appearance)	-.035	.380	.926
Satisfaction factor 1 (body)	**.983**	**.500**	**.049**
Satisfaction factor 2 (emotions and age)	.322	.424	.448
Stage of transition	-.323	.476	.498
Constant	1.022	.476	.351

Sex Identity (DV) (trans man =0, "just a man" =1)
Cox and Snell R^2 .230, Nagelkerke R^2 .308

The results from this analysis show the way in which perceptions and experiences of the body affect sex identity among trans men. The second importance factor, which clustered physical changes brought about through testosterone therapy and surgeries (vocal changes, facial hair, hysterectomy, and "bottom" surgery) and wearing men's clothing is significantly associated with identifying as "just a man." The first satisfaction factor, which clustered levels of satisfaction with physical changes brought about through testosterone therapy (vocal changes, growth of facial hair, growth of body hair, body

shape/fat redistribution, and increased muscle mass), is also significantly associated with identifying as "just a man."

Discussion

Using narrative and survey data obtained from interviews with 65 trans men during their transition from female to male, the findings presented in this chapter suggest that the physical and behavioral characteristics that are important to trans men vary among trans men in different stages of transition and that trans men do not conform to the view that a physical penis is necessary to "make the man." The view that the penis is an essential and defining characteristic of manhood is logical in many ways in that it is an essential reproductive organ as well as an icon of masculinity. Thus we saw, for example, that ethnomethodological research showed that the presence or assumed presence of a penis was sufficient to attribute "maleness" to a person, even in the face of features normally associated with females; male genitalia fulfills the sex criteria for male sex categorization. However, this research shows that instead of emphasizing the importance of "bottom surgery" in their transition process, trans men in this study rated behaviors that are involved in social interaction (i.e. emotional expression and mannerisms) and characteristics that are publicly visible (physical characteristics including vocal depth, male chest, facial hair, general body shape, musculature) as "very important" in comparison to physical characteristics that are not readily apparent to others (such as genitalia). In short, other physical features can serve as "proxies" for "genital sex" as they signal masculinity.

Similarly, despite the challenges of living in a society where gender is constructed in relatively inflexible ways that fail to appreciate diversity, trans men in this study

expressed a uniquely flexible relationship to their own gendered bodies and identities. They managed to consistently express contradictions in their perception of their gendered selves in ways that made clear their capacity to live with contradiction. In these interviews, trans men conveyed their need to reconcile their lived-experience in their own bodies with their public social identities during a transition of the body and within the confines of a gender system that often fails to recognize the validity of their gender. They managed to convey a capacity to differentiate what ”parts” and behaviors are necessary within different social contexts and to acknowledge the degree to which their anxieties were related to the social performance of gender and the risks associated with “failing” to perform in appropriate ways. Embracing a trans identity (in comparison to identifying as “just a man”) could point to a strategic way of navigating the earlier part of transition where bodies may be ambiguous in terms of being recognized socially as male or female. In short, the “trans man” label works to signal a claim to masculinity but with an acknowledged difference from the normative unmarked “male”. As gender is performed through presentations of the body as well as through gendered behaviors in the context of social interactions, for trans men (and arguably for non-transgender people as well), this performance can represent a challenge insofar as internal gender identity and variation in bodies themselves may not conform to the socially expected and socially *accepted* norms through which gender is defined.

As expected, this study found that trans men in the later stages of transition were more satisfied with the gendered presentation of their bodies in terms of changes brought about through T therapy. They also relegated less importance to masculine characteristics affecting gender presentation such as overall body shape and increased muscle mass.

Interestingly, factor analysis clustered "masculine mannerisms" with these more general characteristics of the body and less importance was placed upon mannerisms for trans men later in transition who were more consistently publicly accepted and treated as men. These findings point to the way in which, for trans men earlier in transition, masculine manner and the development of secondary sex characteristics together retain relevance as they navigate their transition process and how, for trans men later in transition, these characteristics become less relevant aspects of their daily lives. The body itself could be said to become something of which they are less "aware" and the decrease in importance of bodily characteristics may reflect less self-reflection regarding the body as trans men become more satisfied with their physical presentation.

The enthnomethodologist's contribution of the "sex category," provides a conceptual bridge explaining the way that secondary sex characteristics are socially interpreted and thus act as a "proxy" for (usually inaccessible) sex criteria (i.e. genitialia or chromosomes) allowing for sex categorization. For trans men who embrace the sex identity of "trans man," this additional or "third" sex category enables sex identity to function as a way to incorporate gender non-conformity in meaningful and social recognized ways even within a society that privileges the binary system of sex. The role of sex identity in the case of trans men in transition seems to reflect the necessity to create meaningful categories that include bodies that are in transition. This speaks to the overall importance of the body in gender assignation and the way that trans men negotiate the problems that arise as "reasonable" gender labels are socially assigned. For trans men in the early stages of transition, the "trans" sex identity thus functions as an intermediate

category through which contradictions between gender presentation and "genital sex" can be interpreted, just as Kessler and McKenna (1987) proposed.

Moreover, as ethnomethodologists understood gender to be interpreted and assigned through social interaction where secondary sex characteristics are "read" as proxies for anatomical (genital) sex, trans men appear to have a socially functional approach to their own bodies; for the trans men in this study, immediately apparent characteristics such having a male chest (and thus *not* having female breasts) were recognized as a key to manhood. Moreover, secondary sex characteristics including facial hair and a deep voice were understood to enable fully mature, adult male identities to be maintained. Moreover, with these physical features in place, the participants in this study expressed an ability to feel less anxious that they will be read incorrectly.

Insofar as sex identity is associated with perception and satisfaction with the body for trans men in all stages of transition, it appears that identifying as "just a man" includes holding specific male characteristics of the body in high regard while *also* feeling satisfied with masculine presentation. Perhaps in the case of trans men then, the trans identity itself could be viewed as an intermediate category enabling trans men to cope with the "risk" associated with the potential for incorrect sex categorization insofar as the binary of sex is concerned. In this way, the concept of "sex identity" may be a useful way to understand the way that trans men navigate a system in which sex is viewed as binary, particularly during liminal stages of transition when their bodies may not conform to the sex criteria and social expectations associated with the categories of male or female.

CHAPTER 4

ASSOCIATIONS BETWEEN TRANSITION-SPECIFC STRESS EXPERIENCE, NOCTURNAL DECLINE IN AMBULATORY BLOOD PRESSURE, AND C-REACTIVE PROTEIN LEVELS AMONG TRANSGENDER MEN

Introduction

Health disparities, including higher rates of mental or physical illness, are found among members of minority or marginalized groups (Williams and Mohammed 2009) including people who identify as lesbian, gay, bisexual or transgender (LGBT) (Huebner and Davis 2007). Transgender men (trans men) are people who were assigned a female sex designation at birth and who have a male gender identity. Many trans men pursue medical transition, enabling them to deliberately induce changes to their own phenotype through the use of exogenous T therapy and surgical procedures. These phenotypic changes help to align their internal male gender identities with their physical gender presentation. In a recent report from the National Institute of Health, the specific health needs of transgender individuals were identified as a priority research area due to the population's unique health experiences, particularly chronic stress faced by sexual and gender minorities as a result of stigmatization (IOM 2011). For transgender people, the threat of violence and/or discrimination due to social stigma represents a real and daily threat; a study of transgender people in the United States found that 37% had experienced economic discrimination and 60% had experienced harassment or violence due to their gender presentation (Lombardi et al., 2001).

Though it is recognized that transitioning from one sex to another is a stressful experience, relatively little is known about the physiological manifestations of psychosocial stress or the implications for health among trans men. The process of medically transitioning from one sex to another within a North American social context,

where sex is in large part viewed as both immutable and binary, provides a unique opportunity for insights into chronic stress effects related to a transition in phenotype and social identity. Psychosocial stress associated with the experience of social stigma or discrimination is known to function as a potential contributor to disparities in health through stress effects on behavioral, metabolic, and hormonal mechanisms. Chronic psychosocial stress has been shown to result in increased risk for cardiovascular diseases and cardiovascular disease (CVD)-related mortality (Matthews and Gump, 2002) with evidence that a diminished decline in nocturnal blood pressure (Ohkubo et al., 2002) as well as chronic inflammation (Danesh et al., 2000; Wilson et al., 2006) play key roles linking stress to CVD-related morbidity and mortality.

Research aimed at understanding the mechanisms by which psychosocial stress gets "into the body" leading to increases in disease risk is central to understanding the link between social inequality and social disparities in health (Miller et al., 2009). A number of studies have shown that stress that is chronic in occurrence or chronic in its effects leads to increased risk for negative cardiovascular outcomes such as coronary heart disease (Esler et al., 2008; Miller and Blackwell 2006; Segerstrom and Miller 2004). As an acute phase protein released in response to increased cytokine production, C-reactive protein (CRP) has been found to increase in response to acute injuries or infection and also to acute and chronic psychosocial stress (Hansel et al., 2001; Steptoe et al., 2007 for review). While inflammation is clearly beneficial during an acute (particularly physical) stressor, extended periods of inflammation have been linked to increased risk for CVD through processes such as atherosclerosis and hypertension (Virdis et al., 2007). As even slight elevations in CRP have been found to be predictive of

CVD, CRP measured using high sensitivity assays is a useful measure of low-level inflammatory activity and CVD risk (McDade et al., 2006; Ridker et al., 2000). In terms of nocturnal decline in ambulatory blood-pressure (amBP), there is evidence that even a minor diminishment in nocturnal decline in amBP is associated with increased disease risk; for each 5% decrease in the decline in nocturnal amBP there is a 20% to 30% increase in cardiovascular related morbidity and/or mortality (Ohkubo et al., 2002; Verdeccia et al., 1994).

The purpose of the study presented here was to utilize amBP measures and CRP levels in order to examine the physiological effects of self-reported perceived stress and transition-specific stress experience during the process of medical transition among 65 trans men undergoing T therapy. A pilot study was conducted during the summer of 2008 where, during in-depth interviews, nine trans men described their experience of sex transition. Using the themes that emerged during these interviews, the present study design aimed to contextualize the challenges that are faced during sex transition and to examine stress through both psychological and biological measures.

Hormonally Induced Changes and Transition-Stress

Stressors associated with sex transition are multifaceted as hormonally-induced changes in phenotype are tightly bound with gender presentation and social identity. The objective of T therapy for trans men is to initiate changes in secondary sex characteristics so as to enable others to socially recognize them as male. In order to access T therapy, trans men generally must obtain a letter stating they meet the criteria for a diagnosis of gender identity disorder (GID) (American Psychiatric Association [*DSM-IV-TR*], 2000) from a licensed mental health professional who then refers them to a medical provider

willing to prescribe cross-sex hormones (Meyer et al., 2005). As many feel that the GID diagnosis is itself stigmatizing, some clinics are beginning to follow informed consent models of care, which may not require a diagnosis of GID to access hormone treatments (Lev 2009).

Since the half-life of testosterone in blood is approximately 70 minutes, it is necessary for HRT to be administered regularly, in order for male secondary sex characteristics to be maintained. The two most commonly prescribed forms of injectable testosterone esters for use by trans men in the United States are testosterone enathate (Delatestryl) and testosterone cypionate (Depo-Testosterone). Both forms function similarly and are suspended in a lipid base such as sesame oil, which slows the rate of metabolization. Multiple administration routes for T are available including weekly or biweekly intramuscular or subcutaneous injections or daily applications of transdermal creams. While appropriateness of T dosage is assessed using serum levels of circulating T aiming to achieve levels that approximate normal male physiologic production (4-9mg/daily = 290-900 ng/dl), satisfactory masculinization through the development of secondary sex characteristics and not lab values are the true target of therapy (Gorton et al., 2005). Hormonal replacement dosages used by trans men are usually 50-150mg per week depending on surgical status (dosage can be lower post-oopherectomy), age, and individual response and peak levels of testosterone are generally reached within 48 hours following injection while trough levels occur the day before next injection. The aim of transdermal application is to achieve a relatively consistent level of circulating T.

Some of the characteristic changes that can occur during T administration include a deepening of the voice, increased growth of body hair, male pattern hair loss, increased

musculature and libido, changes in skin tone and texture, shifts in body fat distribution, and physiological changes that can affect metabolism, mood, energy levels, and sleep quality. Surgeries - in particular, double mastectomies or "top surgery" – together with the changes produced through hormone therapy combine to create the socially recognized gender "cues" that dramatically affect how individuals are perceived and treated.

A recent meta-analysis reports several studies with findings that indicate that cross-sex hormonal intervention improves quality of life (QOL) and overall happiness among individuals who were diagnosed with GID (Murad et al., 2010). Similar findings were reported from a recent study of QOL among transgender men (Colton Meier et al., 2011), though when compared to the general population in the U.S. trans men show diminished mental health related QOL (Newfield et al., 2006). These findings indicate that though the physical changes associated with T administration are desirable, experiencing dramatic changes in one's own body and social relations can at least initially increase perceived stress. Current research also suggests that the mental health and well-being of LGBT people is impacted by personal and social acceptance of both sexual orientation and gender identity (Grant et al., 2011; DHHS 2010). Because T initiates a slow process of physical change that occurs over the course of years, trans men who are early in transition may be susceptible to negative social consequences due to their liminal gender position of being perceived by others as "ambiguous" or failing to conform to the binary social categories of female and male. Liminality is itself characterized as falling "betwixt and between," and people who occupy liminal positions are often viewed as contradictory in the sense that they elude social categorization (Turner 1967). The stress experience of being continuously categorized by others as

female or as ambiguously sexed, can be exacerbated by delayed access to either hormones or surgical procedures. These factors, which contribute to the duration of time in which one remains in a liminal category relative to gender presentation, can contribute to the stress experience of transition.

The concept of stress, defined as a perception of demands with which an individual is unable to cope, has provided a useful framework within which to examine how individuals respond to environmental or psychosocial challenges (Lazarus 1966). The stress that is experienced *during* the process of transition, which in many ways mirrors the experience of adolescent puberty, obviously varies between trans men as do the stressors that they endure and their psychological and physiological response to those stressors. Stress researchers generally acknowledge that cultural context and social factors play a role in both exposure to and appraisal of stressors, thereby influencing an individual's physiological and psychological reaction (Ice and James 2007). The application of a biocultural approach to psychosocial stress has enabled an examination that asks how "psychological processes mediate the effect of culture on individual bodies" (Hruschka et al., 2005:4). Subjective experiences are key to understanding the way that the body responds to its cultural surroundings.

Research examining the effects of psychosocial stress on stress physiology and health provides an important contribution to understanding the factors that may ameliorate or increase risk for CVD in particular. Through the use of multiple measures of perceived stress and physiological stress response, this study aims to enable us to better understand the physiological and psychological manifestations of stress associated with a physical transformation that influences social identity.

Methods

Participant Recruitment

The participants in this study were sixty-five healthy transgender men recruited from western MA, Boston, MA, and southern Vermont. As transgender men represent a relatively hard to reach population, recruitment efforts focused on online list-serves, area support groups, social networks, and Facebook announcements. Efforts to earn the trust of members of the trans community included attendance at monthly support group meetings and transgender focused conferences as well as individual meetings with "elder" members of the community and other transgender health researchers. Numerous phone calls and/or in person meetings often preceded consent to participate and many potential participants conveyed their inability to commit to participate due to the stress they were experiencing in their lives as a consequence of transitioning. This fact is reflected in the lower number of participants who had been on T therapy for less than six months compared to those later in transition (Table 2.1).

Eligibility criteria required that each participant was over 18 years old, was assigned a female sex designation at birth but expressed a male gender identity, and was using T therapy as part of their transition from female to male. Participants were ineligible for participation if they were currently taking medication for any cardiovascular or immune related conditions.

Due to the social stigma and risks endured by transgendered individuals in our society, extraordinary care was taken to insure that study participants' identities were protected; interviews were conducted in LGBT sensitive settings or the participant's own home and consent forms were provided and discussed with initials signed into a notebook

instead of on the forms themselves. Both research aims and protocol were approved by the IRB for research involving human subjects at the University of Massachusetts Amherst.

Data Collection

The procedures used to collect data for this study were structured around individual participants' T administration schedule. Interviews and anthropometric measures were conducted either in the participant's home, in private meeting rooms at area LGBT health clinics, or in private offices at UMass Amherst.

Extensive semi-structured interviews (2-4 hour) were conducted with each participant. All interviews and measures were conducted in a private setting with no one else present and were digitally recorded. Psychometric scales and surveys with demographic and biobehavioral data were distributed via email or on paper prior to meeting and were collected in person during the interview.

Anthropometric Measures

Height was measured with a free-standing portable anthropometer. Body weight was measured using a portable digital scale (Tanita, model BC-550T). Body mass index (BMI) was then calculated from weight (kg)/height(m^2).

Ambulatory Blood Pressure (amBP) Measures and Nocturnal Decline

Ambulatory systolic (amSBP) and diastolic (amDBP) blood pressures were measured for a 24-hour period with measures taken every 20 minutes while awake and every 30 minutes while asleep (as tolerated) using the Oscar2 ambulatory monitor, which uses an oscillometric technique and has been validated for use in clinical research (Jones et al., 2004).

Each participant was fitted with a monitor following the completion of height and weight measures. Participants then wore the monitor during the interview to guarantee tolerance and address any complications. The monitor was calibrated using back-to-back measures with a mercury column and stethoscope and was considered accurate when the two readings agreed to within 5mmHg. If calibration readings were inaccurate, a second monitor was used following calibration. One monitor was recalibrated by the manufacturer following two inaccurate calibration attempts. Participants were fully trained in how to remove/turn off the monitor as well as how to reapply the monitor if they chose to put it back on. Each was encouraged to only wear the monitor insofar as they did not feel that it was increasing their sense of stress and to call with any concerns or questions at any time of day or night. Participants were also asked to keep a diary in which they recorded the times at which they went to bed and got up.

Mean amSBP and amDBP were calculated from waking and sleeping measures for the entire sample and for each stage of transition. The percentage of decline in nocturnal amSBP was calculated as: (mean daytime amSBP –mean nighttime amSBP) x 100/mean daytime amSBP (Metoki et al., 2006). The percentage of decline in nocturnal amDBP was calculated using the same method.

Sampling for measurement of C-Reactive Protein (CRP)

CRP levels were measured from participants who reported no symptoms of illness or injuries in the last two weeks. Drops of blood were collected on standardized Whatman filter paper (#903), following a single finger prick using a sterile disposable lancet. Samples were dried for 24-hours at room temperature and then frozen in a lab grade freezer until shipped to the Laboratory for Human Biology Research at

Northwestern University. Concentrations of CRP (mg/L) were determined using enzyme linked immunosorbent assay (ELISA) protocols (McDade et al., 2004; McDade 2007).

Sampling for measurement of testosterone (T)

T levels were measured from salivary samples collected from participants using the "passive-drool" technique, using a straw and polypropylene vial (Ice 2007). Participants were provided with collection materials and written and verbal instructions regarding salivary collection procedures. Participants administered exogenous T using either weekly or biweekly injections or daily transdermal application of T gel or cream. Participants who used injection techniques were instructed to collect salivary samples for "peak" T levels within 48 hours of an injection (Gorton et al., 2005). Participants who applied transdermal gel were instructed to collect salivary samples for peak T approximately 4 hours following application. Samples were labeled with the date and collection time and then refrigerated until retrieved by the investigator. Samples were then frozen in a lab-grade freezer until being shipped to the University of Dresden, Germany for analysis. Analysis was conducted using a chemiluminescence immunoassay assay (CLIA) with a lower sensitivity of 1.8 pg/ml (IBL-International; Hamburg, Germany). Intra and interassay coefficients of variation were below 10%.

Assessment of perceived stress and self-esteem

In order to evaluate perceived stress levels, participants filled out Cohen's Perceived Stress Scale (PSS) (1983) which is the most commonly used measure of perceived stress and has been shown to be predictive of a number of health outcomes (Ice 2007). Answers to the 10-item PSS were summed for each participant, yielding scores that ranged from 0 (low perceived stress) to 40 (high perceived stress). Rosenberg's Self

Esteem Scale (1965) was used to assess individual levels of self-esteem. Answers to the 10-item Self Esteem Scale were summed for each participant, yielding scores that ranged from 0 (low self esteem) to 30 (high self esteem).

Stages of Transition

Stages of transition were developed a priori based on characteristics associated with T administration over time as well as qualitative data obtained during the pilot study. These three stages of transition are based on duration of time on T because while there is individual variation in how bodies respond to T, on average these stages correlate with certain changes that take place that have relevance for trans men.

Stage 1 includes men on T for ≤ 6 months,
Stage 2 includes men on T for >6 months - 3 years, and
Stage 3 includes men on T for > 3 years.

Assessment of transition-specific stress

During the in-person interview, participants were asked to answer a number of questions about their transition experience, social identity, and personal relationships.

Stress associated with "Passing"

Stress experience related to "passing" as someone who was born male was assessed through a number of questions from the in-person interview. These questions included: *Do people refer to you as "she" or use your old name on a regular basis? If yes, does it bother you? Is the issue of "passing" a source of stress for you?*

A categorical variable was then created to reflect the answers to these questions. Individuals who answered "yes" or described that for them the issue of "passing" was a source of stress were coded 1 (yes) for "passing stress." Those who live socially

comfortably and consistently as male or who did not describe experiencing any stress related to "passing" were coded 0 (no) for "passing stress."

Stress associated with being "out" as transgender:

Stress associated with being "out" as transgender was assessed through a number of questions from the in-person interview. Initially, participants were asked: *Is being out a source of stress or anxiety for you?* Potential answers included: *never, sometimes, most of the time, always* and were coded *0-3.* In order to clarify and contextualize the meaning of participant's answers, follow-up questions included: *Are there people with whom or situations in which being known as trans makes you feel uncomfortable? Are there people in your life who know you're trans who you wish didn't know? Why?* Participants were then placed into 2 groups: those who described frequent stress about being "out" (1) and those with infrequent or no stress about being "out" (0).

Methods of Analysis

Prior to data analysis, participants were categorized into stages based upon their duration of time on T as described above. CRP and T levels were log transformed in order to normalize the distribution prior to analysis.

Characteristics of this sample of trans men and differences between men in different stages of transition were assessed using demographic, anthropometric, psychological, and physiological variables. Comparisons were conducted across stages of transition using analysis of variance (ANOVA) with Tukey post hoc tests and chi-square tests. Two-way main effects ANOVA were conducted to control for stage of transition when assessing the effect of transition-related stress on physiologic stress measures.

Age, BMI, and smoking status were entered as covariates. T-tests were used to examine differences between stressed/non-stressed groups.

Hierarchical linear regression analyses were performed to test associations between scores on Cohen's Perceived Stress Scale (PSS), Rosenberg's Self-Esteem Scores, the presence or absence of stress related to "passing" and being "out," and physiologic stress measures including nocturnal decline in amBP and levels of CRP. "Passing" stress and stress about being "out" were entered into separate models as categorical variables. Each model included age, BMI, and smoking status as covariates. Because significant associations have been found in some studies between T and CRP (Gooren and Giltay 2008; Maturana et al., 2008), additional models for analyses of CRP included peak T levels. Results were considered statistically significant if $p<.05$. Statistical analyses were performed using SPSS v.16.0 for the Mac.

Results

A total of 65 trans men participated in in-person interviews. Of those, 63 filled out the perceived stress scale (PSS) and self-esteem scale. Table 4.1 shows selected demographic and psychosocial stress characteristics across the three stages of transition. Men in stage 2 were significantly younger than men in stage 3. Men in stage 2 reported significantly higher perceived stress scores (PSS) than men in stage 3. Nearly half of the total sample reported stress concerning being "out" with no significant differences across transition stages. A higher percentage of men in stage 1 reported experiencing stress related to "passing" when compared to men in later stages (ns, $p=.08$). The majority of the total sample (N=65) self-identified as Caucasian (74%) with 11% identifying as Jewish, 6% as Latino, 5% as African American, 3% as Asian, and 3% as having a mixed

racial/ethnic background. Of the 44 participants who provided amBP measures while they were sleeping, 40 were of European descent and 4 were of non-European descent.

Table 4.1. Selected demographic and psychosocial stress characteristics across stages of transition (N=65)

Characteristic Mean (SD)	Total Sample N=65	Stage 1 N=14	Stage 2 N=26	Stage 3 N=25
Age [a]*	31.76 (9.1)	29.95(9.7)	28.7(7.5)	35.9(9.1)
Yrs on T [a]**	3.27(3.3)	.24 (.16)	1.67 (.77)	6.6 (3.1)
BMI kg/m^2	30.21 (6.66)	30.55 (7.21)	30.84 (6.27)	29.38 (6.94)
% who smoke	20%	7%	27%	20%
Perceived Stress Scores(PSS) [a]*	16.44 (6.73) N=63	17.57 (6.75)	18.79 (6.45) N=24	13.56 (6.12)
Self-Esteem Scores	21.78 (5.14) N=63	20.79 (4.83)	21.46 (4.96) N=24	22.64 (5.52)
Reports stress related to being "OUT" as transgender	44%	57%	46%	32%
Reports stress related to "passing"	22%	43%	19%	13%

[a]ANOVA comparison across all three groups with Tukey post hoc tests, * $p<0.05$, ** $p<0.01$

Sixty-three participants provided amBP readings while they were awake and 44 of those were able to tolerate amBP monitoring during sleep. The mean number of total readings for all of the participants was 44 (SD 16.5) with a mean of 35 (12.5) measures taken while awake and 13 (4.0) while asleep. Mean ambulatory amSBP/amDBP values for the total sample were 130 (11)/78 (8) while awake and 108 (10)/59 (7) mmHG while asleep. The mean percentage of decline in nocturnal amSBP/amDBP was -16.16 (5.69)/-23.14 (6.23).

Sixty-one participants provided blood spots for analysis of CRP. Two cases with CRP >8.6, a cut-off point used to indicate the presence of active infection, were excluded

from analyses (Mcdade et al., 2011). Mean amBP, nocturnal decline in amBP and CRP levels were not significantly different when comparing men across different stages of transition (Table 4.2). ANOVA analysis revealed no significant differences in stress variables between racial/ethnic groups. T-tests revealed no significant differences in nocturnal decline in amBP among study participants of non-European and those of European descent (not shown)

Table 4.2: Selected biological characteristics across stages of transition (N=65)

Characteristic Mean (SD)	**Total Sample**	**<.5yrs on T N=14**	**>.5-3yrs on T N=26**	**>3yrs on T N=25**
Peak T levels pg/ml	367.5 (184.4) n=42	320.3 (125.1) n=8	437.5 (197.2) n=17	319.7 (180.7) n=17
Peak T levels (log)	2.51 (.22)	2.48 (.15)	2.60 (.21)	2.44 (.24)
CRP levels (ELISA units)	1.50 (2.75) n=59	1.01 (1.3)	1.61 (3.05) N=22	1.68 (3.12)
CRP levels (log)	-.23 (.55) n=59	-.29 (.50)	-.20 (.56) n=22	-.21 (.58)
amSBP awake	130 (11) n=63	128 (9) n=14	129 (10) n=25	131(13) n=24
amDBP awake	78 (8) n=63	78 (6) n=14	78 (8) n=25	79 (10) n=24
amSBP asleep	108 (10) n=44	109 (7) n=10	108 (8) n=17	107(12) n=17
amDBP asleep	59 (7) n=44	60 (7) n=10	59 (6) n=17	59 (8) n=17
% dip wake to sleep amSBP	-16.16 (5.69) n=44	-14.80 (5.56) n=10	-16.35 (5.59) n=17	-16.76 (6.04) n=17
% dip wake to sleep amDBP	-23.14 (6.23) n=44	-20.30 (4.6) n=10	-23.82 (5.64) n=17	-24.12 (7.37) n=17

No significant differences between groups

Men who reported experiencing stress about being "out" (n=18) had significantly less of a nocturnal decline in amSBP/amDBP (p<.01) (-13.17%/-20%) than men who did not report experiencing stress about being "out" (-18.23% / -25.31%) (n=26) (Figures 4.1 and 4.2). There are no significant differences in age or BMI when comparing these two groups.

Figure 4.1: Percent of nocturnal decline in amSBP among men with and without stress about being "out" as transgender (p<.01).

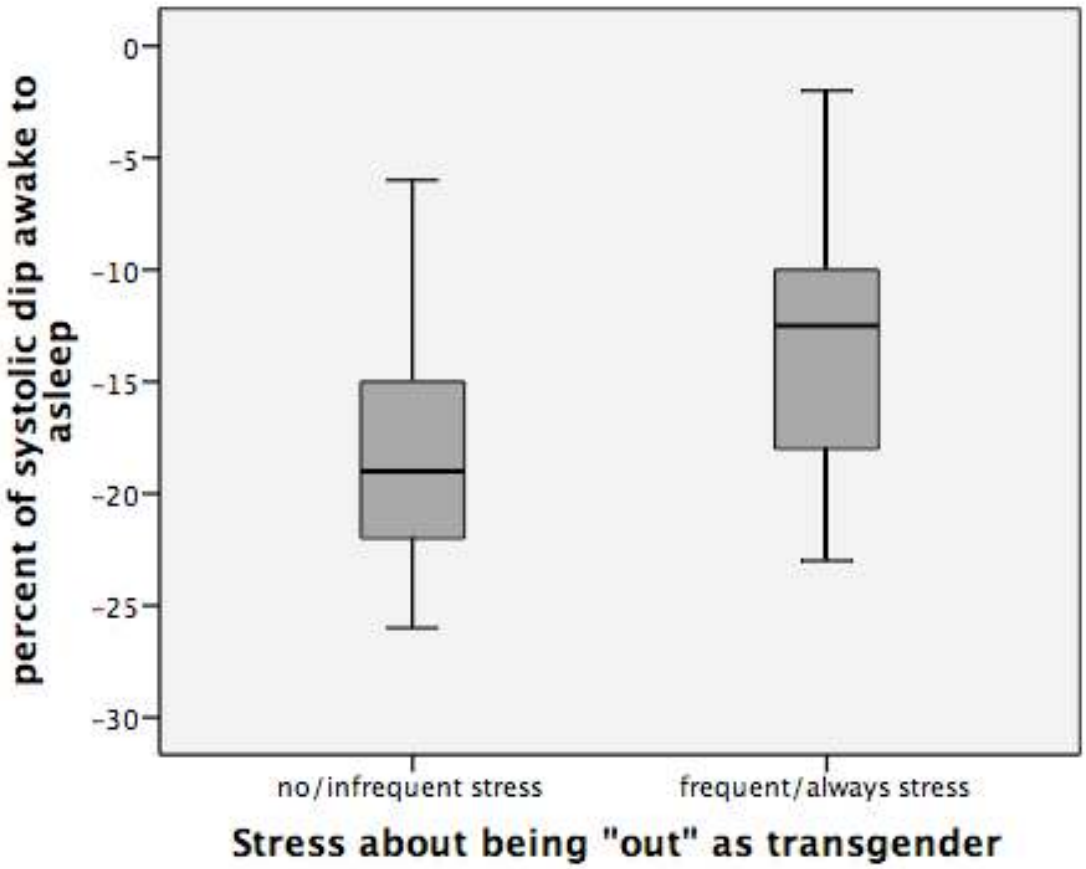
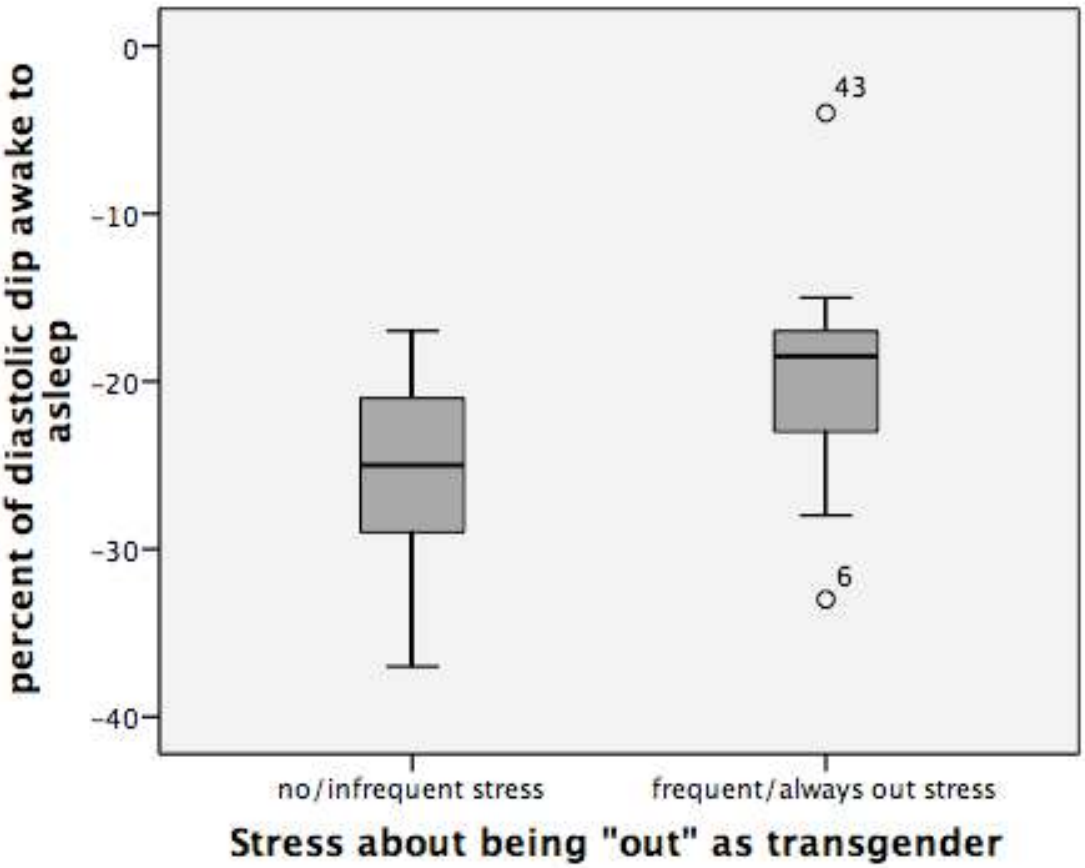


Figure 4.2: Percent of nocturnal decline in amDBP among men with and without stress about being "out" as transgender (p<.01).



The effect of experiencing stress associated with being "out" on the percentage of nocturnal decline in amBP was then assessed within each stage of transition, among men early in transition (<3yrs on T=stages 1 and 2 combined) and among the entire sample using separate linear regression models. Among the entire sample, when controlling for age, BMI, and smoking status, stress about being "out" was significantly associated with a diminished nocturnal decline in both amSBP (Beta .461, p<.01) and amDBP (Beta .468, p<.01) (Table 4.3). Table 4.4 shows the effects of stress related to being "out" among men early in transition (stages 1 and 2). Among these men, in addition to BMI, stress about being out was significantly associated with a diminished nocturnal decline in both amSBP(Beta .653, p<.01) and amDBP (Beta .681, p=.01).

Table 4.3. Relationships between stress variables and physiological measures among the entire sample of trans men.

	% amSBP Dip (n=44)		% amDBP dip (n=44)		CRP (n=59)	
	Standardized Beta	**P value**	**Standardized Beta**	**P value**	**Standardized Beta**	**P value**
PSS	Model not significant		Model not significant		.064 [a]	NS[a]
"Out" Stress	.461[b]	.003[b]	.468[c]	.003[c]	.064[d]	NS[d]
"Passing" Stress[c]	Model not significant		Model not significant		.327[e]	.004[e]

Models included age, BMI, and smoking status as covariates.
[a.] BMI (Beta .488, p = .000), Adjusted R^2 = .209, model significance = .002
[b.] Adjusted R^2 = .193, model significance = .014
[c.] Adjusted R^2 = .162, model significance = .027.
[d.] BMI (Beta .513, p = .000), Adjusted R^2 = .223, model significance = .001
[e.] BMI (Beta .532, p = .000), Adjusted R^2 = .379, model significance = .000

Table 4.4. Relationships between stress variables and physiological measures among men early in transition (<3 years on T).

	% amSBP Dip (n=44)		% amDBP dip (n=44)		CRP (n=59)	
	Standardized Beta	**P value**	**Standardized Beta**	**P value**	**Standardized Beta**	**P value**
PSS	Model not significant		Model not significant		Model not significant	
"Out" Stress	.653[a]	.000[a]	.681[b]	.001[b]	Model not significant	
"Passing" Stress[c]	Model not significant		Model not signficant		.336[c]	.039[c]

Models included age, BMI, and smoking status as covariates. NS = models were not significant.
[a.] BMI (Beta .449, p=.010), Adjusted R^2 =.488, model significance = .001
[b.] BMI (Beta .403, p=034), Adjusted R^2 = .354, model significance = .008
[c.] BMI (Beta .413, p = .011), Adjusted R^2 = .224, model significance = .019

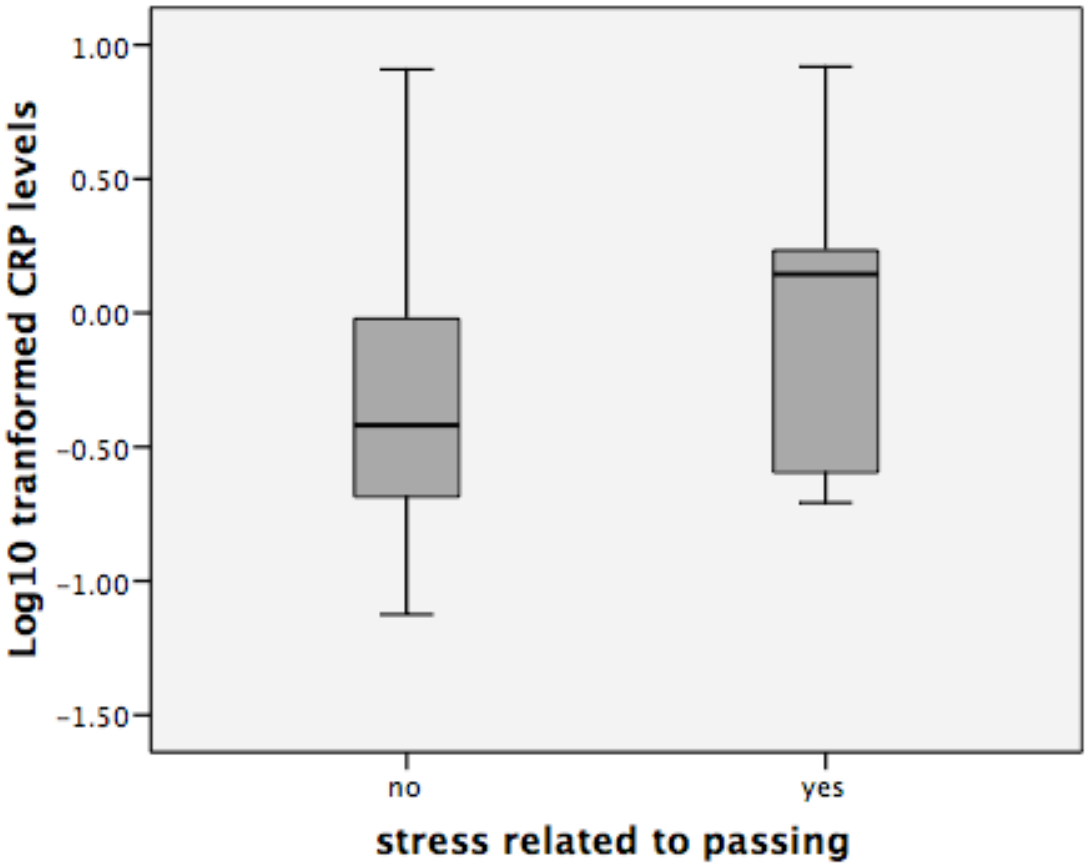
The relationship between stress about being "out" and diminished nocturnal decline remained significant among men who were in stage 2 (amSBP=Beta .432, p<.05, amDBP=Beta .514, p<.05). The relationship was not significant when examined only among men in stage 1 or among men in stage 3. Results from 2-way main effects ANOVA showed that the between subjects effect of "out" stress significantly diminishes nocturnal decline in amSBP ($F(1,35)=9.29$, p<.01) and amDBP ($F(1,35)$, p<.01) even when stage is taken into account.

As a measure of general stress, PSS was correlated with DBP while awake (r=.26, p<.05) and SBP while asleep (r=.317, p<.05) but the association was no longer significant when entered into a regression model which controlled for age, BMI, and smoking (Table 4.3). PSS was found significantly associated with nocturnal decline in amDBP (Beta .607, p<.05) only among men in stage 1 of transition when controlling for age, BMI, and smoking. PSS was not significantly associated with nocturnal decline in amBP when examined among the entire sample, men early in transition (combined stages 1 and stage 2) or men in stage 3. When examining the effect of PSS among men in stage 2, only age and BMI were significantly associated with nocturnal decline in amSBP.

Self-esteem was significantly correlated with nocturnal decline in amSBP (r=-.318, p<.05) and reflected that as self-esteem scores increased, the percentage of nocturnal decline also increased (becomes a larger negative number). The relationship remained significant when examined among men in stage 1 (Beta -.650, P<.05). Neither relationship remained significant when BMI, age, and smoking status were controlled for using linear regression models.

T-tests revealed significant differences in logCRP levels (p<.05) between men who reported stress associated with "passing" (n=13) and those who reported no stress associated with "passing" (n=46) (Figure 4.3). Figure 4.3 shows that among the entire sample, men who reported experiencing stress associated with "passing," had significantly higher logCRP levels than men without "passing" stress. Bivariate correlations were significant between logCRP and log peak T levels (r = -.334, p=.041) (not shown).

Figure 4.3: LogCRP level among men with and without stress about "passing"(p<.05).



The effect of experiencing stress associated with "passing" on logCRP levels was assessed among the entire sample, within each stage of transition, and among men early in transition (stages 1 and 2) using separate linear regression models. Log peak T levels were included in a second model to examine effects on logCRP.

When controlling for age, BMI and smoking, men who reported experiencing stress related to "passing" were more likely to have higher levels of logCRP than men who did not experience "passing" stress (Table 4.3). These findings were also significant among men in stage 2 (Beta .431, p<.05), men early in transition (combining stage 1 and 2) (Beta .336, p<.05) (Table 4.4) and men in stage 3 (Beta .388, p<.05) but not among men in stage 1. "Passing stress" was no longer significantly associated with CRP for any

group of men after controlling for T levels (Tables 4.5 and 4.6). Results from 2-way main effects ANOVA show the between subjects effect of "passing" stress ($p<.01$) which, along with BMI (F(DF) $p<.01$) was significantly associated with elevated CRP levels even when stage is taken into account.

Table 4.5: Relationship between stress about "passing" and logCRP levels when controlling for peak T levels among the entire sample of trans men.

Outcome variable: logCRP

	Stand. Beta	p-value
Age	.195	.079
BMI	.673	.000
Smoker	-.153	.181
Peak T level(log)	-.211	.071
"passing" stress	.209	.066

Adjusted R^2 .577, model significance=.000

Table 4.6: Relationship between stress about "passing" and logCRP levels when controlling for peak T levels among men early in transition (<3 years on T).

Outcome variable: logCRP

	Stand. Beta	p-value
Age	.367	.053
BMI	.413	.030
Smoker	-.148	.404
Peak T level(log)	-.291	.111
"passing" stress	.186	.322

Adjusted R^2 .566, model significance=.013

PSS was not significantly associated with levels of logCRP when examined among the entire sample or within the separate stages of transition. When controlling for age, BMI and smoking, men in stage 1 who had lower scores on the self-esteem scale were more likely to have higher levels of logCRP than men with higher self-esteem scores (Beta -.559, $p<.05$).

Discussion

In this cross-sectional study of female to male sex transition, amBP measures and CRP levels were utilized in order to examine the physiological effects of self-reported

general perceived stress and self-esteem alongside levels of transition-specific stress that were assessed through ethnographically derived measures. Overall, the general measure of stress (PSS) was found to be less effective at capturing psychosocial stress with physiological effects than measures of stress associated with being "out" as transgender and stress associated with "passing," both of which more specifically reflect aspects of the transition experience. These findings have implications for this sample as well as for studies among other people for whom stress is experienced in association with changes in the body and social identity.

Though several field-based studies have found mean amBP to be elevated in response to perceived stress including stress while at work (Kario et al., 2002; James and Bovbjerg 2001), lifestyle incongruity (Bindon et al., 1997; Dressler 1991), and a lack of cultural consonance (Dressler and Bindon 2000), general perceived psychosocial stress was not associated with significant changes in mean amBP among this sample of trans men. Though there were significant differences in levels of PSS among men in different stages of transition, mean amBP levels for both waking and sleeping measures were also in normal range among men in all stages of transition despite a relatively high mean BMI for this sample.

In this study, transition-specific stress measures were associated with nocturnal decline in amBP and levels of CRP. Men who experienced stress associated with being "out" as transgender had a significantly diminished decline in nocturnal amBP and men who experienced stress associated with "passing" had significantly higher levels of CRP. These findings correspond with those of other researchers who have found associations between psychological factors and diminished nocturnal decline in amBP (Huang et al.,

2011; Ituarte et al., 1999; Linden et al., 2008) and to studies finding increased levels of inflammation associated with perceived stress (Mcdade et al., 2006) and chronic stress associated with caregiving (Kiecolt-Glaser et al., 2003).

The findings in this study are consistent with a hypothesis linking elevated CRP with "social evaluative threat" (SET), characterized as threats to the social self that occur when an aspect of the self could be negatively judged by others (Dickerson et al., 2004, 2009). Increased levels of inflammatory molecules have been found in response to these specific types of stressors, as well as to psychosocial stressors that are both serious and chronic (Segerstrom and Miller 2004) prompting researchers to propose a model recognizing that chronic stress can result in immune dysregulation (Robles et al., 2005). In the North American context where this study took place, sex attribution into one of two categories occurs on a largely unconscious level and deviation from the binary categories of female/male can arguably be characterized as both serious and chronic and can also lead to interactions that are perceived as evaluative and/or threatening to the social self.

Studies involving nonhuman animals provide evidence that an inflammatory response to social threat may be adaptive. Inflammation would be beneficial in the context of social subordination where immunosuppression would be maladaptive for purposes of healing from a wound or infection (Sapolsky, 2004). Similarly, elevated levels of CRP have been linked to depressive symptoms and "sick behavior," which could also function as an adaptation to reduce conflict (Dickerson et al., 2009; Everson-Rose and Lewis, 2005).

Elevated levels of CRP and diminished nocturnal decline in amBP were each observed in response to transition-specific stressors among men in early stages (stages 1 and 2) of transition. Stress associated with being "out" as transgender was also significantly associated with nocturnal decline in amSBP and amDBP (Figures 4.1, 4.2) among men in stages 1 and 2. In this study, sex transition was viewed as a potentially stressful process in part due to its liminal nature – as a process during which time one's gender identity and physical presentation may not conform to normative gender expectations. In a sense, stage 2 can be understood to include men in the most liminal of the 3 stages.

Though transition-specific stress related to being "out" was associated with a diminished nocturnal decline in amBP among men in the liminal stage, which could indicate increased risk for CVD (Ohkubo et al., 2002), the effect was not observed among men in stage 3, who had been on T for >3 years and still reported experiencing stress about being "out." This finding points to the potentially temporary nature of negative health effects associated with transition-related stress. When stage of transition was controlled for, stress associated with being "out" remained significantly associated with diminished decline in amBP. Stress associated with "passing" was not significantly associated with increased levels of CRP once peak T levels were added to the model.

The amBP results suggests that, while overall stress decreases the longer someone is on T, there are specific stressors that endure and have physiologic effects across stages of transition and among men who have been on T for more than 3 years. Qualitative interview data suggests that stress about being "out" occurs both among men who, early in transition, are concerned about informing others about their trans status for fear of

rejection or discrimination but also among men later in transition, who tend to be living full lives as men. These men may desire to be "out" as transgender in order to have more people in their lives who understand their complex life history. An improved understanding of the stages of change could help to elucidate some of the observed differences in *who* experiences stress associated with "passing" and being "out" and how that stress manifests in the body.

While transition-specific stressors consistently predicted physiological responses among men in different stages of the transition process, in this study, the more general measure of perceived stress (PSS) was associated with nocturnal decline in amDBP only during the earliest stage of transition and was not associated with CRP. This finding may reflect that only men in stage 1 may experience generalized stress that can be captured sufficiently with the PSS. Similarly, among men in stage 1, higher self-esteem scores were associated with lower CRP indicating the possible amelioration of stress-effects that come about with the onset of T access/administration as well as the overall positive effect of higher self-esteem. On the other hand, general measures of PSS and self-esteem did not sufficiently capture the stress effects of being "out" or "passing" among men in later stages of transition. Particularly among men in the liminal stage of transition, the ethnographically-derived measures of stress better assessed the specific stress associated with physiological change. These findings suggest that psychosocial factors that are specific to the experience of sex transition, including stress associated with being "out" as transgender and stress associated with "passing" as male, are important predictors of health outcomes such as CVD risk, particularly when stage of transition is taken into

account. They also reflect the importance of targeting efforts to reduce transition-specific stress and increase self-esteem among trans men during transition.

This study documents a number of important psychological and physiological manifestations of stress associated with the process of transition. But it is important to note that, when study participants were asked if they felt that transitioning was the right thing for them to do, 100% responded yes without qualification. Additionally, consistent with the aim of gender affirmation treatment (including T therapy), several studies have found an increased quality of life and lower levels of depression, anxiety and stress among trans men who have received T therapy compared to those who have not (Colton Meier et al., 2011; Newfield et al., 2006). The findings presented here document a decline in stress over the course of transition and are consistent with prior research that identifies T therapy as an adaptive therapeutic option and key to the well-being of trans men.

Because of the cross-sectional design, small sample size, select nature of the sample population, and the lack of prevalence estimates of those undergoing female to male transition, caution should be used when extrapolating these findings to the general population. Additionally, this study was conducted predominantly among trans men living in urban and rural Massachusetts; as transition-specific stress response could reflect experiences that are in part contingent upon local, cultural interpretations of gender norms, future research of a longitudinal nature and among trans men living in different cultural environments would be worthwhile.

This research has relevance beyond the trans population to other populations and circumstances of physical change. The findings of this study indicate that stress

associated with a changing body and social identity can result in increased disease risk, but also that the effect may be transient and most strongly evident in the midst of the most liminal stage of transition.

CHAPTER 5

ASSOCIATIONS BETWEEN TRANSITION-SPECIFIC STRESS EXPERIENCE AND ACTIVATION OF THE HPA AXIS

Introduction

Findings from lab-based studies indicate that specific types of stressors related to social evaluative threats (SET) as well as individual interpretations of stressful experiences result in differential effects on the activation of the HPA axis (Dickerson and Kemeny, 2004). The social evaluative threat model/Social Self Preservation Theory posits that prolonged exposure to stressors of a *specific nature,* namely stressors that threaten the "social self," demean one's social image, and/or threaten social status (as occurs in individual's with a stigmatized identity) can have a variety of adverse psychological and physiological effects (Gruenwald et al 2004; Kemeny, 2009). Lab-based research in this area has consistently identified an increased cortisol response in relation to these specific types of threats, particularly when compounded by experiences of shame (Gruenwald et al 2004). There is currently a lack of research applying this specificity model (Dickerson et al. 2004) in field settings among individuals experiencing day-to-day stress associated with a stigmatized identity. There is an even greater lack of data obtained from individuals who are experiencing stress associated with a change in phenotype and social identity as is the case during sex transition from female to male.

Transitioning sex involves physical changes and shifts in social identity that can be challenging to navigate and, while socially more uncommon, is nevertheless in many ways comparable to other transitions in life, such as pregnancy, adult onset disability, or aging. Moreover, transgender people still occupy a highly stigmatized social position, as they are transitioning in a world that still remains firmly committed to the notion that sex

is binary and immutable. Through an integration of qualitative and quantitative methods, this study aims to better understand the concrete health impact a binary sex/gender system has on individuals whose lives push its boundaries and to interrogate how these specific challenges may influence health.

Current research confirms that for trans men who desire sex reassignment, accessing the medical means to transition both improves their quality of life and reduces symptoms of psychosocial stress (Newfield et al. 2006; Colton Meier et al. 2011). This project, however, engages with sex transition as a stressful *process* of physical, social, and psychological change during which time individuals may experience psychosocial stress. In order to transition, trans men utilize a combination of testosterone therapy (T) and surgical measures to change their bodies in order to achieve greater accord between their body and internal sense of gender identity. The surgical and hormonally induced changes to the body allowing one to live fully as male take months, if not years, to "complete." During the early stages of the transition process (first few years on T), individuals may occupy a liminal or ambiguous social category in relation to the binary categories of female and male (Bolin 1987; Turner 1967). Moreover, defiance of or failure to abide by gender norms can result in negative social consequences and stigma for transgender people. This liminal, gender-ambiguous period of transition can be particularly challenging for trans men and is the focus of this study.

The overall aims of this paper are: 1) to identify some of the stressors that trans men face during transition, 2) to characterize the relation between measures of transition-specific stress and more measures of more general stress, and 3) to measure the effects of transition-specific psychosocial stress experience on HPA activation through

comparisons of trans men in different stages (based on duration of time on T) of the transition process.

Psychosocial stress and HPA activation

The HPA axis is a system that can be activated by both physical and psychological stress. The primary corticosteroid produced during stress-induced HPA activation is cortisol, which is secreted by the adrenal gland in pulsatile fashion following a circadian rhythm that is diurnal. Within this circadian rhythm, there is a marked increase in cortisol secretion upon waking, which is then followed by a 50-60% increase in the first 30-45 minutes following awakening referred to as the cortisol awakening response (CAR) (Adam 2006, Clow et al. 2004; Stalder et al. 2011). Cortisol levels then continue to decline over the course of the day with lowest levels occurring around midnight (Adam 2006; Pruessner et al. 1997). The decline over the course of the day is evidenced through measures of cortisol daily decline (CDD), which represents the difference between levels taken 30-min after awakening and evening bedtime samples (Karlson et al. 2011). However, because of the diurnal rhythm of cortisol secretion, in addition to stress-induced activation, sleep patterns including average wake times and average hours of sleep may play an important role in the functioning of the HPA axis (Zeiders et al. 2011).

Due to its regulatory role in multiple body systems including the immune system, cortisol has been implicated as a mechanism through which stress can lead to disease (Miller et al. 2007).). While short-term activation of the HPA axis and increased cortisol secretion is considered to be an adaptive response to stress as it helps the body to access the energetic resources needed to cope effectively with the stressful event (Sapolsky et al.

2000), c*onsistently* elevated cortisol levels can indicate a maladaptive dysregulation of the HPA axis in response to chronic perceived stress (Adam et al. 2006). Chronic stress induced dysregulation of the HPA axis can lead to chronically high circulating cortisol levels or to the opposite effect where cortisol levels are decreased and a "flattening" of the diurnal slope occurs (Carpenter et al. 2007; Ice et al. 2006). Flattening of the diurnal slope as well as elevated levels of cortisol can thus both indicate dysregulation of the HPA axis. Chronically elevated cortisol levels as well as dysregulation of the normal diurnal pattern in response to psychosocial stress have been associated with negative health outcomes (Marketon and Glaser 2008). A "flattening" of the diurnal rhythm of cortisol secretion has been related to both acute and chronic psychosocial stress among individuals who suffer social anxiety (Shirotsuki et al. 2009) while elevated nocturnal cortisol levels and a "flattened" diurnal rhythm have been found in association with fatigue among ovarian cancer patients (Weinrib et al., 2010). In terms of CAR, studies examining psychosocial stress and HPA activation have linked psychosocial stress to both high and low CAR while others have found no significant effect (Clow et al. 2004 for review). In this sense, there is more evidence for diurnal slope than CAR as a consistent indicator of dysregulated HPA reactions to psychosocial stress.

The HPA axis is one of the main components of a response system enabling the body to maintain homeostasis and access energetic resources through complex physiological fluctuations in the face of constant real and perceived stressors (Charmandari et al. 2005; Sapolsky et al. 2000). In light of this adaptive function, it is not surprising that investigators have found that stress response is not indiscriminant and that both the specific characteristics of the stressor and of the individual can contribute to

variation in stress response (Dickerson and Kemeney 2004; Kudielka et al. 2009). Elevated levels of salivary cortisol for example, have been observed among individuals who are experiencing stress due to a lack of predictability or control regarding the outcome of a situation (Dickerson and Kemeny 2004; Gruenwald et al 2004). Chronic threats to the "social self," including enduring situations wherein individuals experience negative social evaluations, have also been associated with substantially greater cortisol responses (Dickerson et al 2004). Moreover, studies have found increased levels of cortisol and a steeper diurnal decline among members of stigmatized groups (such as African Americans) who report experiencing discrimination (Fuller-Rowell et al. 2012). Overall higher levels of cortisol secretion over the course of the day have also been found among individuals who experienced early life stress, such as those with low socioeconomic status (SES). Moreover, consistently elevated levels of cortisol have been interpreted as part of a "defensive phenotype" that may contribute to increased vulnerability to disease later in life (Miller et al 2009).

Social scientists have documented the cultural processes and challenges faced by individuals involved in maintaining a public/social identity, particularly one that is stigmatized and/or liminal in nature (Goffman 1963). Liminality is characterized as falling "betwixt and between" categories (Turner 1967). The experience of the liminal in this case includes the experience of going through a *second* puberty-like process that is induced through exogenous hormonal administration, which in the case of trans men is testosterone. The adult onset of puberty-like changes of the body is often publicly perceived, particularly during the first few years on T, as the body is slowly transformed into what is often referred to as the "opposite" sex. The relatively slow pace of physical

changes, socially navigating the public nature of physical transformation, and anxiety associated with the possibility of negative or threatening social experiences can each present challenges and stressors.

A number of researchers and scholars, including anthropologist Anne Bolin in her study of male to female transition (Bolin 1987), have applied the concept of liminality or used categorical stages in their studies of sex transition because of its' utility in characterizing specific experiential components involved in the process. In contrast to this focus on the experiential aspects of transition, psychological scholars and clinical researchers have conceptualized stages of transition that for the most part prioritize coming out processes and identity development. For example, clinical social worker Ari Lev proposed six stages in her "Transgender Emergence Model," which begins with an individual's awareness of feeling "different" and ends with social integration and acceptance (Lev 2004). In her model, stage 5 incorporates the entire process of physical transition. In contrast to this conceptualization of transition as a process driven by psychological stages, I am proposing a way to look at transition that places emphasis on the liminal stages of transition as experienced through hormonally induced changes in the body. For that reason, the stages used in this study are defined in relation to individual's duration of time on T therapy.

In addition to the experience of stigma related to a liminal gender position, transgender people often face social stress related to overt hostility and discrimination due to their gender presentation and identity (Grant et al 2011). They may also face stress related to having a transitioning identity; male secondary sex characteristics develop during the first few years of T administration and as phenotypic traits cue gender, men

early in transition may be identified socially as either male or female. Consequently, particularly in the early stages of the transition process, they may experience a lack control over who knows their personal medical histories, how they are referred to in terms of name/gender pronouns, and/or who knows they are transgender. Similarly, as gender-specific public restrooms are spaces in which people behave according to accepted social norms, the use of a restroom by a person who is perceived by others to be ambiguous, queer, or of the "wrong" sex can lead to socially awkward or even dangerous situations. Since the shift in physical appearance is usually publicly observed, the timing of transition is key and must be negotiated with regard to a "coming out" process.

The purpose of this study was to examine stress experience and physiological stress response during sex transition among trans men who were on testosterone (T) therapy as part of their transition from female to male. This paper aims to identify some of the specific stressors experienced during transition, to compare stress experience and stress response across stages of transition, and to examine the relationship of general perceived stress and transition-specific stress with HPA axis activation and dysregulation. Alongside general measures of perceived stress, this paper presents measures of transition-specific stress, including transitioning identity stress (TIS), gender-specific public restroom stress (PRRS), and stress related to being "out" as transgender (OUT) as measures of "social threat" among men during transition.

In this study, trans men who report experiencing transition-specific stress are expected to exhibit elevated total mean cortisol levels as well as higher levels as measured at specific time-points throughout the day. Elevated cortisol levels throughout the day are expected to result in a flatter slope for CDD (because of higher bedtime

cortisol levels). Hypotheses were not generated for CAR because of the mixed results regarding the direction of CAR in response to psychosocial stress. Because transition is considered a liminal process during which individual's bodies and social gender identities are changing over time through the administration of testosterone (T), these effects are expected to vary between men in different stages of the transition process. Time on T and stage of transition (based upon duration of time on T) is included as both a predictor and covariate in examinations of effects on the HPA axis.

Methods

Participants.

Sixty-five healthy trans men were recruited from western Massachusetts Boston, Massachusetts, and southern Vermont for participation in a study aimed at assessing stress experience and health during sex transition from female to male. As transgender men represent a relatively hard to reach population, recruitment efforts focused on online list-serves, area support groups, social networks, Facebook announcements and snowball techniques. Eligibility criteria required that each participant was over 18 years old, was assigned a female sex designation at birth but expressed a male gender identity, and was using T therapy as part of their transition from female to male. Participants were ineligible for participation if they were currently taking medication for any cardiovascular or immune related conditions.

Due to the social stigma and risks endured by transgendered individuals in our society, extraordinary care was taken to insure that study participants' identities were protected. Interviews were conducted either in the participant's home, in private meeting rooms at area LGBT health clinics, or in private offices at UMass Amherst and responses

were transcribed onto the interview instrument as well as digitally recorded. Consent forms were provided and discussed and participants were asked to provide their consent by writing their initials into a notebook instead of providing their full names on the consent forms themselves. Both research aims and protocol were approved by the IRB for research involving human subjects at the University of Massachusetts Amherst.

Procedures

Prior to beginning salivary sample collection at home, each participant completed an in-depth, in-person interview, filled out background and perceived-stress questionnaires and provided anthropometric measures. Extensive semi-structured interviews (2-4 hour) aimed at assessing stress experience during transition were conducted with each participant. Interviews and anthropometric measures were conducted either in the participant's home, in private meeting rooms at area LGBT health clinics, or in private offices at UMass Amherst and were digitally recorded. Psychometric scales and background questionnaires with demographic and biobehavioral data were distributed via email or on paper prior to meeting and were collected in person during the interview. Height was measured with a free-standing portable anthropometer. Body weight was measured using a portable digital scale (Tanita, model BC-550T). Body mass index (BMI) was then calculated from weight (kg)/height($m^{2)}$.

Saliva Sampling.

Participants were provided with collection materials and written and verbal instructions regarding salivary collection procedures. Participants collected salivary samples using the "passive-drool" technique, using a straw and polypropylene vial (Ice 2007). Participants were encouraged to refrain from brushing their teeth, smoking, or

consuming dairy, alcohol or caffeine for 30 minutes prior to sample collection.

Participants filled out a compliance questionnaire with each sample collection. For the waking sample, the questionnaire required participants to note their bedtime the night prior, the time they think they actually fell asleep, the number of times they awoke in the night, their final wake time, and what method they used to wake (alarm, partner etc). For the remaining samples, in addition to a number of questions pertaining to mood and stress experience, the questionnaire required participants to circle if they had consumed/done any of the following within an hour of sample collection: eating, dairy, caffeine, nicotine/smoking, exercise, sleep, pain, medication/drug use, brushing/flossing.

Samples were collected over three consecutive days: upon awakening (while still in bed), thirty minutes post-waking (prior to coffee and brushing teeth), mid-morning (approximately 4 hours post waking), mid-afternoon (approximately 8 hours post-waking, avoiding meal time), and bedtime (prior to brushing teeth). Participants received phone calls or text-message reminders for the mid-morning and mid-afternoon samples. Study participants labeled their samples with the date and time of collection and then refrigerated them until they were retrieved by the investigator. Samples were then frozen in a lab-grade freezer (in either -20 or -80 degrees) until being shipped to the University of Dresden, Germany for analysis. Analysis was conducted using a chemiluminescence immunoassay assay (CLIA) with high sensitivity of 0.16 ng/ml (IBL-International; Hamburg, Germany). Intra and interassay coefficients of variation were below 8%.

Data Exclusion.

Of the 65 participants who provided interview and psychometric data, 61 provided at least one full day of salivary samples for cortisol analysis (5 salivary

samples), 44 provided 2 full days totaling ten samples, and 37 participants provided 15 samples over 3 consecutive days. Salivary cortisol data were excluded if assay values were > or < 2SD from the sample mean for that time-point (waking, 30-min post waking, mid-morning, mid-afternoon, or bedtime). Seven outliers were removed from samples collected upon waking, 10 were removed from collections taken 30 minutes after waking. Ten outliers were removed from a mid-morning sample, 6 were removed from mid-afternoon samples, and 6 were removed from bedtime samples. Adjusted variables were then used in subsequent statistical analysis.

Cortisol Measures

Total mean cortisol levels were calculated by averaging values (nmol/L) from all time points across days of data (waking, 30-min post waking, mid-morning, mid-afternoon, or bedtime). In order to evaluate the effect of psychosocial stress on diurnal rhythm, change scores reflecting cortisol awakening response (CAR) and cortisol daily decline (CDD) were calculated using data from 1-3 days of sample collection. CAR for each participant was defined as the nmol/L difference between mean salivary cortisol levels obtained 30 minutes after waking and mean waking levels of salivary cortisol. CDD was defined as the difference between mean salivary cortisol levels obtained 30 minutes after waking and mean bedtime levels.

Psychosocial stress measures

General perceived stress measure.

Each participant filled out Cohen's Perceived Stress Scale (PSS) (1983), which is the most commonly used measure of perceived stress and has been shown to be predictive of a number of health outcomes (Ice 2007). The questions in the scale ask

participants to rate how often they felt or thought in specified ways during the last month. Answers to the 10-item PSS were summed for each participant, yielding scores that ranged from 0 (low perceived stress) to 40 (high perceived stress).

Transition-specific psychosocial stress measures.

Transition-specific stress was assessed using a number of questions from the in-person interview. Three transition-specific stressors were examined in association with HPA activation:

Gender-specific Public RestRoom Stress Score (PRRS):

During the interview, participants were asked to rate their stress experience when using gender-specific public restroom on a Likert Scale (0-10) with 0 indicating "no stress."

Transitioning Identity Stress (TIS*):*

The presence or absence of TIS, defined as a sense of stress or discomfort as a consequence of a having public sex identity that is in flux, was assessed through in-depth qualitative interviews. Participants were asked: *Do you feel that you are known by more than one gender identity in your public life (e.g. some people know you as a man and others know you as a woman)? If yes, do you prefer it this way or would you prefer to be known only as a man or trans man?* Follow-up questions included: *Do you feel stress related to your public identity?* Two independent coders analyzed answers to these questions pertaining to TIS with 75% agreement (Kappa). All differences were then resolved by consensus. Participants were designated as experiencing TIS if they a) found themselves being socially identified as male *and* female (as opposed to having a single public male gender identity) in different arenas of their life *and* b) felt the experience to

be distressing or out of their control. Those with no reported distress were designated as experiencing no TIS.

Stress associated with being "out" as transgender (OUT):

Participants were asked: *Is being out a source of stress or anxiety for you?* Potential answers included: *never, sometimes, most of the time, always* and were coded *0-3.* In order to clarify and contextualize the meaning of participant's answers, follow-up questions included: *Are there people with whom or situations in which being known as trans makes you feel uncomfortable? Are there people in your life who know you're trans who you wish didn't know? Why?* Participants were then placed into 2 groups: those who described frequent stress about being "out" (1) and those with infrequent or no stress about being "out" (0).

Time on T therapy:

Because transition is considered a liminal process during which individual's bodies and social gender identities are changing over time through the administration of testosterone (T), time on T is included as both a predictor and covariate in examinations of effects on the HPA axis. A continuous variable for "years on T" was used to measure duration of time on T therapy.

Stages of Transition

Stages of transition were developed *a priori* based on qualitative data obtained during the pilot study. These three stages of transition are based on duration of time on T and details regarding the descriptions provided for each stage are presented elsewhere (see Chp 3 and 4). Stage 1 includes trans men on T for ≤ 6 months; significantly more of the trans men (79%) in this stage want, but have yet to obtain, chest surgery ($p<.01$), and

do not have the redistribution in body fat/reduction in hip width (71%) and increased musculature (71%) that they desire ($p<.01$), compared to trans men in stage 3. Fourteen participants were interviewed in this stage and 13 of those provided sufficient salivary samples for analysis.

Stage 2 includes trans men on T for >6 months - 3 years; significantly more of the trans men (69%) in this stage do not have the redistribution in body fat/reduction in hip width and increased musculature (69%) that they desire ($p<.01$), compared to trans men in stage 3. Twenty-six participants were interviewed in this stage and 24 of those provided sufficient salivary samples for analysis.

Stage 3 includes men on T for > 3 years; a minority of trans men in this stage have not obtained top surgery (12%) and only 20% are dissatisfied with hormonally induced fat redistribution (20%) and increased musculature (44%). Twenty-five participants were interviewed in this stage and 24 of those provided sufficient salivary samples for analysis.

Data Analysis.

Descriptive statistics including Chi-Square, T-tests, and ANOVA were conducted using selected demographic, biobehavioral, anthropometric, psychological, and physiological variables. Correlation and linear regression tests were conducted in order to identify covariates. Hierarchical linear regressions were conducted to test associations among both general and transition-specific psychosocial stress variables and mean cortisol levels and change scores associated with CAR and CDD. Results were considered statistically significant if $p<.05$. Statistical analyses were performed using SPSS v.16.0 for the Mac.

Results

Sample characteristics

A total of 65 trans men (mean age 31.7, range 18-53 years) participated in in-person interviews and provided information regarding their experience of transition-specific stress. Selected characteristics for this sample are presented in Table 5.1.

Table 5.1: Selected characteristics of all study participants (n=65).

Characteristic	Mean (SD) or number (%)	range
Yrs of Age*	31.7 (9.1)	18-53
Yrs on T**	3.3 (3.3)	.04-13.8
BMI kg/m^2	30.2 (6.7)	20.1-5.0
Steroidal (cold meds etc.) medication use	6 (9.2)	
Wake time over sample days	8.02 (1.9)	5.0-16.4
Hours of sleep over sample days	7.21 (1.12)	4.1 – 10.8
PSS (perceived stress scale)*	16.4 (6.73)	1-33
PRRS (public restroom stress)*	4.2 (3.1)	0-10
Reports TIS (transitioning ID stress)*	29 (44.6)	
Reports OUT stress	29 (44.6)	
Waking cortisol level	12.7 (3.9)	.84-23.0
Wake+30 min cortisol level	15.7 (5.6)	.74-27.8
Mid-morning cortisol level*	5.8 (2.4)	1.9-12.4
Mid-afternoon cortisol level	3.8 (1.5)	1.3-7.8
Bedtime cortisol level	2.1 (1.5)	.32-7.1
Total mean cortisol level	8.1 (1.7)	1.5-11.4
CAR (cortisol awakening response)	17.9 (3.3)	-8.2-17.9
CDD (cortisol daily decline)	13.9 (6.4)	-4.0-27.2

ANOVA comparison across all three stages of transition with Tukey post hoc tests, * $p<0.05$, ** $p<0.01$
All cortisol levels are nmol/L

Significant differences between trans men across stages of transition were identified for certain sample characteristics and stress variables as presented in Chapters 3 and 4. The expected linear relationship exists between stage and years on T with significant differences between each stage ($p<.05$) and trans men in stage 3 were significantly older than those in stage 2 (mean difference 6.4 yrs, $p<.05$). In terms of stress measures, trans men in stage 2 reported the highest levels of PSS (18.8) compared to those in stage 1 (17.6) or stage (13.6) ($p<.05$) (Chapter 4). In terms of experiencing OUT stress, differences were not significant between trans men in stage 1 (57%), stage 2

(46%), and stage 3 (36%) (Chapter 4). Additionally, a significantly higher percentage of trans men in stage 2 (62%) and stage 1 (50%) ($p<.05$) reported experiencing TIS than those in stage 3 (24%). Trans men in stage 1 reported higher PRRS (4.6) than those in stage 3 (2.9) ($p<.05$). The only significant difference regarding average cortisol levels was found in mid-morning levels where trans men in stages 1 had significantly higher levels than those in stage 3 ($p<.05$) (Table not shown).

General perceived stress scores (PSS) and Transition-specific stress measures (PRRS, TIS, OUT) and HPA Diurnal Rhythm

Of the 65 individuals who participated in interviews and biomarker collection as part of the overall study, 61 provided salivary cortisol data in sufficient quantity for analysis. Associations between continuous stress variables including PSS, transition-specific stress measures (PRRS), mean cortisol levels from specific time points, total mean cortisol, CAR, and CDD were examined using bivariate correlation (Table 5.2).

Table 5.2: Bivariate Correlations between continuous study variables and mean cortisol levels.

	Waking	Wake+30m	Mid-Morning	Mid-Afternoon	Bedtime	Total Mean	CAR	CDD
Age r	-.173	-.166	-.039	-.122	-.111	**-.255**	-.093	-.142
2-tail Sig.	.174	.195	.768	.340	.393	**.044**	.475	.287
n	63	63	61	63	63	**63**	61	58
Yrs on T r	-.012	.037	**-.252**	-.062	-.203	-.124	-.002	.076
2-tail Sig.	.924	.776	**.050**	.628	.117	.335	.991	.570
n	63	63	**61**	63	61	63	61	58
BMI r	**-.335****	**-.481****	-.236	-.233	.146	**-.486****	**-.303***	**-.496****
2-tail Sig.	**.007**	**.000**	.067	.066	.262	**.000**	**.017**	**.000**
n	**63**	**63**	61	63	61	**63**	**61**	**58**
wake time r	-.069	-.237	.038	-.025	**.336****	-.068	-.057	-.215
2-tail Sig.	.590	.061	.774	.843	**.008**	.597	.663	.104
n	63	63	61	63	**61**	63	61	58
Hrs sleep r	.175	-.097	-.183	-.163	.120	-.072	-.063	-.078
2-tail Sig.	.170	.452	.157	.203	.357	.576	.627	.563
n	63	63	61	63	61	63	61	58
PSS r	.076	-.094	.133	.066	.157	.049	-.035	-.111
2-tail Sig.	.558	.471	.315	.611	.235	.707	.790	.414
n	61	61	59	61	59	61	60	56
PRRS r	**.330****	-.065	.121	-.035	.153	.193	-.230	-.080
2-tail Sig.	**.009**	.613	.357	.787	.243	.132	.077	.556
n	**62**	62	60	62	60	62	60	57

* p<0.05, ** p<0.01.

Table 5.2 shows that age was negatively correlated with total mean cortisol levels such that older study participants had significantly lower total mean cortisol than younger participants. Significant negative correlations were also found between years on T and mid-morning cortisol levels (p=.05) indicating that mid-morning cortisol levels decline with years on T. BMI was also negatively correlated with a number of cortisol measures including waking cortisol (p<.01), wake+30min cortisol (p<.01), total mean cortisol levels (p<.01), and CAR (p<.05) and CDD (p<.01). Average wake time was positively correlated with bedtime cortisol levels (p<.01) so that later wake up times correlated with higher bedtime cortisol levels. PRRS (as a transition-specific psychosocial stress measure) was positively correlated with waking cortisol levels (p<.01) so that as public restroom stress increased, so did waking cortisol levels. A negative correlation between PRRS and CAR approached significance (p=.077) indicating that men reporting higher stress with regard to public restrooms had an attenuated cortisol awakening response that

is likely due to higher waking cortisol levels. PSS was not significantly associated with cortisol measures among this sample of trans men.

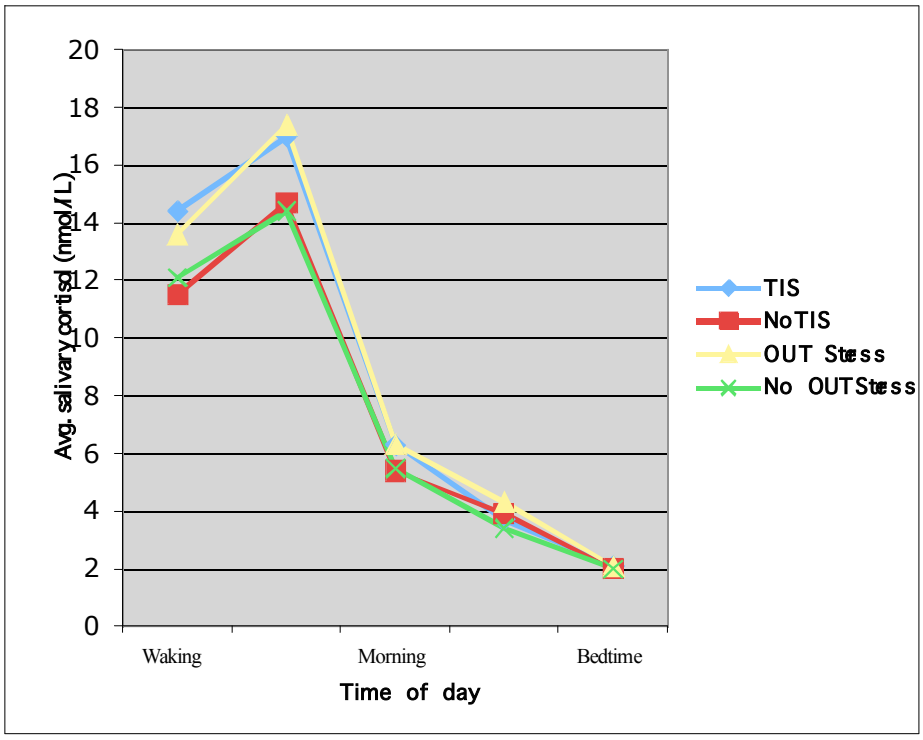
Table 5.3 Cortisol measures across dichotomous stress groups

Cortisol levels Mean (SD)	**Total Sample**	**TIS** n=27	**No TIS** n=34	**OUT stress** n= 27	**No OUT stress** n=36
Waking n=63	12.7(3.9)	**14.4(3.4)****	**11.5(3.9)****	13.6(4.1)	12.1(3.8)
Waking+30m n=63	15.7(5.6)	17.0 (6.1)	14.7 (4.9)	**17.4(6.9)***	**14.4(3.9)***
mid-morning n=61	5.8(2.4)	6.3 (2.3)	5.4 (2.4)	6.3(2.3)	5.5(2.3)
afternoon n=63	3.8(1.5)	3.7 (1.4)	3.9 (1.6)	**4.3(1.5)***	**3.4(1.4)***
bedtime n=61	2.1(1.5)	2.1 (1.6)	2.0 (1.4)	2.1(1.7)	2.0(1.2)
Overall mean n=63	8.1(1.7)	**8.6 (1.4)***	**7.7 (1.9)***	**8.6(2.0)***	**7.6(1.5)***
CAR n=61	3.3(5.7)	3.3 (6.7)	3.3 (4.9)	4.2(6.9)	2.6(4.5)
CDD n=58	13.9(6.4)	14.4 (7.9)	13.5 (4.8)	**17.0(6.3)****	**11.8(5.5)****

Results from T-tests * p<0.05, ** p<0.01.

Table 5.3 shows results from T-tests indicating significant differences in cortisol levels between trans men who reported transition-specific stress and those who did not. In general, men in the TIS and OUT stress groups had higher average cortisol levels than men who did not report TIS or OUT stress. More specifically, trans men who reported experiencing TIS had significantly higher cortisol levels upon awakening (p<.01) as well as overall mean cortisol levels (p<.05) than men who did not report experiencing TIS. Trans men who reported experiencing OUT stress had significantly higher overall mean cortisol levels (p<.05) (also see Figure 5.1), as well as levels taken 30 minutes after waking awakening (p<.05) and in the mid-afternoon (p<.05). Additionally, those who experienced OUT stress had greater CDD (p<.01) than men who did not report experiencing OUT stress.

Figure 5.1: Average diurnal cortisol among "stressed" and "not-stressed" groups.



Hierarchical linear regressions models were then used to assess the relationship of continuous psychosocial stress measures (PSS, PRRS) and stressed versus non-stress groups (OUT, TIS), with measures of HPA activation (cortisol levels). Two base models were created in order to isolate appropriate control variables; one base model included age, BMI, smoking status, and the use of medications known to affect the HPA axis (such as cold medication). A second base model substituted "years of time on T" for "age" due to correlation between these two variables. Dependant variables for these base models included: mean cortisol levels for each individual at each of the five time points (waking, waking+30min, mid-morning, mid-afternoon, bedtime), mean total cortisol levels, CAR, and CDD. Control variables were then included in subsequent analysis if they were

significantly associated with the dependant variable in either of the two base models. Each model also included average wake times and average hours of sleep as covariates.

Transitioning Identity Stress (TIS) and cortisol measures

Table 5.4 shows results from hierarchical linear hierarchical regression analyses, revealing that TIS is significantly associated with higher waking cortisol levels (Beta .317, p=.008). In this model, BMI was negatively associated (Beta -.170, p<.05) and average hours of sleep were positively associated (Beta .271, p<.05) with waking cortisol levels.

Table 5.4: Relationship between transitioning identity stress (TIS) and cortisol levels.

Cortisol levels (mean)	Standardized Beta	t	Adj R^2	p-value
Waking[a]	.317	2.766	.219	.008
Waking+30min[a]	.143	1.244	.213	.219
Mid-morning[b]	.097	.733	.087	.467
Mid-afternoon[c]	-.058	-.474	.085	.637
Bedtime	.013	.105	.073	NS model
Total Mean[a]	.176	1.540	.223	.129
CAR	.003	.021	-.047	NS model
CDD[a]	-.004	-.030	.202	.976

[a] Model controlled for BMI. [b] Model controlled for years on T. [c] Model controlled for medication use. All models include average waking time and average hours of sleep as covariates.

In follow-up analyses, the effect of experiencing TIS on waking cortisol levels was then separately assessed within each stage of transition using separate linear regression models. As Table 5.5 shows, TIS was significantly positively associated with waking cortisol levels among trans men in both stage 2 (>6 months-3years on T) and stage 3 (>3years on T) such that men with TIS in these stages of transition had higher waking cortisol levels.

Table 5.5: Relation between transitioning identity stress (TIS) and waking cortisol levels among men in different stages of transition.

	Stage 1 (n=14)		Stage 2 (n=26)		Stage 3 (n=25)	
	Beta	p	Beta	p	Beta	p
BMI	-.154	.789	-.035	.861	-.303	.163
Avg wake time	-.289	.521	.029	.911	-.295	.281
Avg Hrs sleep	.129	.765	.408	.116	.034	.893
TIS	.255	.573	.496	.017	.407	.048
Model p=	.765 NS		.034		.039	
R^2=	.186		.391		.260	

Gender-specific Public Restroom Stress (PRRS) and cortisol measures

Table 5.6 shows results from hierarchical linear regression analyses.

Table 5.6: Relation between Public Restroom Stress (PRRS) and cortisol levels.

Cortisol levels (mean)	Standardized Beta	t	Adj R^2	p-value
Waking[a]	.471	3.956	.306	.000
Waking+30min[a]	.032	.251	.180	.803
Mid-morning[b]	.044	.317	.078	NS model (.076)
Mid-afternoon[c]	-.088	-.632	.073	NS model
Bedtime	.065	.033	.067	NS model (.077)
Total Mean[a]	.256	2.060	.246	.044
CAR	-.267	-1.854	.012	NS model
CDD[a]	-.026	-.194	.188	.847

[a]Model controlled for BMI. [b] Model controlled for years on T. [c] Model controlled for medication use. All models include average waking time and average hours of sleep as covariates.

PRRS levels were significantly positively associated with waking cortisol levels (Beta .471, p<.01) and total mean cortisol (Beta .256, p<.05) (Table 4.6). In these model, BMI was negatively associated with waking cortisol levels (Beta -.206, p=.004) and total mean cortisol levels (Beta -.139, p=.000).

In follow-up analyses, the effect of PRRS on waking cortisol and total mean cortisol levels was then separately assessed within each stage of transition using separate linear regression models. As Table 5.7 shows, among men in stage 2 of transition (>6 months-3years on T), higher PRRS was associated with higher levels of waking cortisol

but with a trend level association among men in stage 1 (.01-6 months on T) but with no significant association among men in stage 3 (>3yrs on T).

Table 5.7: Relation between Public Restroom Stress (PRRS) and Waking Cortisol levels among men in different stages of transition.

	Stage 1 (n=14)		Stage 2 (n=26)		Stage 3 (n=25)	
	Beta	**p**	**Beta**	**p**	**Beta**	**p**
BMI	-.330	.358	-.219	.238	-.317	.160
Avg wake time	-.540	.154	-.385	.179	-.546	.078
Avg Hrs sleep	.329	.331	.485	.063	.358	.178
PRRS	.666	.057	.550	.010	.338	.110
Model p=	.220 NS		.023		.074 NS	
Adj. R^2=	.213		.418		.348	

Follow-up analyses examining the effects of gender-specific PRRS on total mean cortisol among different stages of transition revealed no significant associations within specific stages, though there is a trend toward a positive significant association between PRRS and total mean cortisol levels among trans men in stage 2 (p=.061) (Table 5.8).

Table 5.8: Relation between Public Restroom Stress (PRRS) and Total Mean Cortisol levels among men in different stages of transition.

	Stage 1 (n=14)		Stage 2 (n=26)		Stage 3 (n=25)	
	Beta	**p**	**Beta**	**p**	**Beta**	**p**
BMI	-.651	.043	-.484	.014	-.307	.209
Avg wake time	.223	.440	-.061	.826	-.254	.437
Avg Hrs sleep	-.344	.214	.070	.777	.027	.979
PRRS	.100	.687	.496	.061	.019	.932
Model p=	.047		.020		.282 NS	
Adj. R^2=	.496		.313		.060	

Stress associated with being "out" as transgender (OUT) and cortisol measures

Table 5.9 shows results from linear hierarchical regression analyses. Analyses revealed that OUT stress is significantly associated with a greater CDD (Beta .333, p < .01). In this model, BMI was negatively associated with CDD (Beta -.394, p= .001). There was also a trend toward a positive association between OUT stress and higher total mean cortisol (p=.058) and levels from 30 minutes after waking (p=.064).

Table 5.9: Relationship between "OUT" stress and cortisol levels.

Cortisol levels (mean)	Standardized Beta	t	Adj R^2	p-value
Waking[a]	.154	1.283	.140	.205
Waking+30min[a]	.213	1.891	.239	.064
Mid-morning[b]	.127	1.026	.095	.310
Mid-afternoon[c]	.219	1.775	.129	.081
Bedtime	-.052	-.417	.076	.676
Total Mean[a]	.218	1.930	.240	.058
CAR	.146	1.113	-.025	NS model
CDD[a]	.333	2.973	.316	.004

[a] Model controlled for BMI. [b] Model controlled for years on T. [c] Model controlled for medication use. All models include average waking time and average hours of sleep as covariates.

In follow-up analyses, the effect of OUT stress on CDD, total mean cortisol levels, and levels of cortisol taken 30 minutes after waking, were then assessed within each stage of transition using separate linear regression models. Table 4.10 shows that among trans men in stage 2 ((>6 months-3years on T), OUT stress is positively associated with CDD indicating a steeper diurnal decline among trans men with stress related to being out as transgender.

Table 5.10: Relation between OUT Stress and CDD among men in different stages of transition.

	Stage 1 (n=14)		**Stage 2 (n=26)**		**Stage 3 (n=25)**	
	Beta	**p**	**Beta**	**p**	**Beta**	**p**
BMI	-.400	.368	-.553	.010	-.352	.097
Avg wake time	-.014	.969	-.205	.521	-.421	.116
Avg Hrs sleep	.358	.366	.052	.857	.041	.855
OUT	.303	.373	.431	.018	.224	.208
Model p=	.622 NS		.006		.010	
Adj. R^2=	-.118		.435		.411	

Tables 5.11 and 5.12 shows that for trans men in stage 2 (>6 months-3years on T), OUT stress is also significantly associated with higher total mean cortisol levels (p<.01) and higher levels of cortisol taken 30 minutes after waking. These relationships were not significant among trans men in stage 1 (.01-6 months on T) nor among trans men in stage 3 (>3yrs on T) of transition.

Table 5.11: Relation between OUT stress and total mean cortisol levels among men in different stages of transition.

	Stage 1 (n=14)		Stage 2 (n=26)		Stage 3 (n=25)	
	Beta	**p**	**Beta**	**p**	**Beta**	**p**
BMI	-.582	.062	-.438	.014	-.314	.197
Avg wake time	.241	.324	.066	.773	-.245	.415
Avg Hrs sleep	-.365	.166	.124	.583	.001	.996
OUT	.204	.351	.482	.006	-.021	.917
Model p=	.033		.003		.238 NS	
Adj. R^2=	.542		.441		.078	

Table 5.12: Relation between OUT stress and levels of cortisol taken 30-minutes after waking among men in different stages of transition.

	Stage 1 (n=14)		Stage 2 (n=26)		Stage 3 (n=25)	
	Beta	**p**	**Beta**	**p**	**Beta**	**p**
BMI	-.386	.401	-.698	.000	-.179	.420
Avg wake time	.011	.978	-.407	.054	-.435	.126
Avg Hrs sleep	-.085	.832	.268	.182	-.050	.837
OUT	.208	.551	.390	.010	.075	.689
Model p=	.746NS		.000		.067 NS	
Adj. R^2=	-.206		.570		.210	

General perceived stress as measured through PSS and cortisol measures.

Table 5.13 shows results from linear hierarchical regression analyses. Analyses revealed no significant associations between general perceived stress as measured through the PSS with HPA activation as measured through cortisol levels.

Table 5.13: Relationship between general perceived stress measured through PSS and cortisol levels.

Cortisol levels (mean)	Standardized Beta	t	Adj R^2	p-value
Waking[a]	.101	.819	.109	.416
Waking+30min[a]	-.046	-.363	.207	.718
Mid-morning[b]	.114	.872	.092	.387
Mid-afternoon[c]	.105	.848	.094	.400
Bedtime	.168	1.34	.093	.186
Total Mean[a]	.120	1.04	.218	.303
CAR	-.028	-.210	-.047	NS model
CDD[a]	-.051	-.446	.299	.658

[a] Model controlled for BMI. [b] Model controlled for years on T. [c] Model controlled for medication use. All models include average waking time and average hours of sleep as covariates.

In follow-up analyses, the effects of stress as measured through the PSS on levels of cortisol were then separately assessed within each stage of transition using separate

linear regression models. PSS was not significantly associated with any measure of cortisol for trans men in any stage of transition.

Discussion

This cross-sectional study examined stress experience and physiological stress response during different stages of the sex transition process. Transition-specific stressors were identified in order to examine the relationship of general perceived stress and transition-specific stress with HPA axis activation and dysregulation. The particular types of transition-specific stress utilized in this study pertained to stress experiences that threatened aspects of the "social self." In addition to testing whether increased psychosocial stress related to social evaluative threat (SET) resulted in increased cortisol levels and dysregulation of the HPA axis, this project analyzed this relation in trans men in different stages of the transition process in order to test hypotheses pertaining to stress experience related to stigma associated with liminal status.

Trans men who reported experiencing transition-specific stressors were expected to exhibit elevated cortisol levels measured at specific time-points throughout the day as well as elevated total mean cortisol levels. Additionally, elevated cortisol levels throughout the day were expected to result in a flatter slope for CDD (because of higher bedtime cortisol levels). Hypotheses were not generated for CAR because of the mixed results indicated in the literature regarding the direction of CAR in response to psychosocial stress. Trans men in the early, liminal stages (stage 1 and stage 2, <3 years on testosterone therapy) of transition, whose bodies may not conform to normative expectations of gender presentation, were expected to experience more in the way of social evaluative threat than men in the later stage (stage 3 >3 years on testosterone

therapy) of transition. Consequently, trans men who were in earlier stages of transition were expected to exhibit overall higher levels of cortisol across the day and to have a flattened slope for CDD. These hypotheses developed out of an understanding that sex transition involves a period of gender liminality where individuals may be read as "ambiguous" or as failing to conform to social norms pertaining to gender.

In general, the hypothesis that transition-related stress would result in increased cortisol levels among trans men was supported by the findings of the study; waking and total mean cortisol levels were elevated in association with individual measures of transition-specific stress among the entire sample of study participants and also when measured among trans men in specific stages of transition. These findings support those of researchers that have found elevated cortisol levels in lab-setting under conditions of social-evaluative threat (Dickerson and Kemeny 2004) as well as in naturalistic studies of day-to-day stress where feeling overwhelmed as well as feelings of anger and tension were associated with higher average diurnal cortisol levels (Adams et al 2006).

The absence of a relationship between general perceived stress as measured using Cohen's perceived stress scale (PSS) and any cortisol measures in this study suggests that when looking at people in transition, general measures of perceived stress are inadequate in examining the experience of stress and their effects at the biological level. These findings are consistent with other investigators who have shown that stress response is not indiscriminant and that both the specific characteristics of the stressor and of the individual can contribute to variation in stress response (Dickerson and Kemeny 2004; Kudielka et al. 2009; Michaud et al. 2008 for review; Zoccoloa et al. 2008). Particular results related to each transition-specific stress measure will be discussed below.

Trans men who reported stress associated with experiences related to a transitioning social identity (TIS) exhibited significantly higher waking cortisol levels than trans men who did not report experiencing TIS. The finding that a higher percentage of trans men in stages 1 and 2 reported experiencing TIS than men in stage 3 is consistent with my hypothesis that trans men in the liminal stage of transition would experience more in way of transition-specific stress. The association between TIS and elevated levels of waking cortisol was significant among trans men in stage 2 and among trans men in stage 3 of transition but not among trans men in the earliest stage of transition (stage 1, ≤ 6 months on T).

The measure of TIS aimed to capture trans men's stress experience of navigating a transforming public identity (in this case, from female to male). Participants were categorized as experiencing TIS if they a) found themselves being socially identified as male *and* female (as opposed to having a single public male gender identity) in different arenas of their life *and* b) felt the experience to be distressing or out of their control. Within this definition, it is not surprising that trans men who are in stage 2, for whom masculine secondary sex characteristics are likely to be more apparent compared to trans men in stage 1,are more susceptible to stress experiences associated with the shift in social identity that accompanies such dramatic changes of the body. Because other studies have found increased waking cortisol levels associated with feelings of depression (Bhagwagar et al. 2005), future research might investigate the specific emotional response of trans men in relation to transition-specific stressors such as TIS. In the case of trans men in stage 3, who have been on T for more than 3 years and are living full lives as men, increased waking cortisol may reflect a temporary and adaptive response to

the novel and acute nature of TIS for these trans men (McEwan 2000a, 2000b). Finally, while trans men in stage 1 of transition also experience TIS, their lack of a cortisol response may reflect differences in appraisal of the stressor; TIS may be considered an expected and relatively temporary stressor as they begin their transition. This interpretation makes sense in the context of the meta-analysis of Dickerson and Kemeny (2004), which identifies the importance of predictability and controllability to elevated cortisol levels.

As a measure of experience with liminal gender position, stress experienced in gender-specific public settings such as public restrooms (PRRS) was also expected to be elevated during the liminal process of sex transition. The significant association between PRRS and waking cortisol and the trend toward a positive association with mean cortisol levels provide support for this hypothesis. These results contribute to those of previous studies that have identified a link between stress related to a perception of risk for humiliation or disrespect and greater cortisol reactivity (Dickerson et al. 2004; Miller et al. 2007). This is particularly important as researchers have also linked these increased cortisol responses to the experience of self-conscious emotions such as shame and embarrassment (Orth et al 2006). The fact that the association between increased waking cortisol and PRRS was significant among men in stage 2 but not among those in stage 1 could reflect a tendency among trans men in the earliest stage of transition to avoid public restrooms entirely, which was one coping strategy described during interviews. All of the participants in this study confirmed that when using public restrooms, they were using the men's (not the women's) room so this difference among stages does not reflect variation in that way.

Contrary to my hypothesis, trans men who were experiencing stress related to being OUT had significantly steeper CDD rather than the flattened profile generally associated with chronic stress (Adam and Gunner 2001; Barker et al. 2012). Some researchers interpret the flattened profile as a product of elevated bedtime cortisol levels Lindeberg et al. 2008; Lovell et al. 2011). Though it is important to recognize the potentially negative effects of psychosocial stress on the healthy functioning of the HPA axis, this finding (linking steeper CDD with OUT stress) may instead reflect a healthy response to psychosocial stress associated with stigma. In other words, in this case, where elevated waking levels are followed by a steep diurnal decline indicative of healthy cortisol variability, the response could be viewed as evidence of an adaptive response to stress as opposed to an indicator of dysregulation. The steeper decline in cortisol over the course of the day (CDD) found among trans men experiencing OUT stress provides evidence for this interpretation.

While this result was surprising, some researchers understand that *acknowledgement* of stigma and discrimination may be a necessary component for effective coping (Major et al. 2002). This steep (more healthy) decline in CDD among men with OUT stress coincides with a recent study that found an association between higher levels of perceived discrimination and a steeper CDD among African Americans but not among Whites (Fuller-Rowell et al. 2012). They interpreted their results as indicating the benefits of awareness of racism in daily life may and suggest that awareness itself may serve as an important protective mechanism (Fuller-Rowell et al. 2012). This interpretation can be brought to bear in this case where trans men are aware that there is often stigma associated with a trans identity. Another possible explanation

might be related to a sense of control that trans men have regarding coming OUT as many of the trans men in this study described "OUT stress" in terms of a decision that they needed to make. For them, the process of *deciding* whether or not to disclose their transgender history or identity was stressful.

In summary, this study is the first to examine psychosocial stress experience during sex transition, to incorporate biological measures of HPA activation, and to identify associations between transition-specific stress and cortisol levels and diurnal rhythm among trans men. Further, this study examines stress during transition among a cross-section of trans men during different stages of the transition process in a naturalistic setting and incorporates data obtained during in-depth in-person interviews. The findings in this study suggest that it is important to include measures of transition-specific stress in future studies that aim to examine potential stress effects on HPA activation or health among this population. The significance of these findings is due to the types of stress that the specific measures represent, which are indicative of managing social relationships (OUT, TIS) and cultural norms pertaining to gender presentation and sex identity (PRRS).

Despite these contributions however, it is important to note some of the limitations of this study. First, while the findings of this study are clearly not generalizable, it is important to note that this study was deliberately designed to examine stress experience related to lived-experiences of gender liminality as experienced by trans men during transition. The sample size is small, particularly for trans men in stage 1 of transition, which reduced power for analysis. But considering that trans men represent a

hard to reach population, the number of participants and high level of compliance with study protocols is promising for future research.

CHAPTER 6

SUMMARY AND CONCLUSION

How individuals and societies mark the transition from one social status to another – from youth to adult, from single to married, from layperson to chief – has been a subject of anthropological inquiry virtually from the beginnings of the discipline. In his now classic study of the Ndembu, Victor Turner provided a framework for the study of such "rites of passage." Central to that framework was the core concept of "liminality" – a term for that moment when the individual is neither here nor there but instead betwixt and between socially recognized statuses (1967). Trans men who use testosterone therapy to transition from female to male experience what many of them describe as a "second puberty" that transforms their bodies and their social relations, placing them in a liminal status for months if not years. Turner's framework suggests liminality is a stressful experience; this project acknowledges that transition is a stressful process and aims to document as well as measure the effects of this experience.

Contemporary anthropologists have found Turner's concept of liminality to be a fruitful framework for the study of many kinds of transitions from the experience of adult onset disability (Murphy 1990) to experiences of immigration (Simich et al. 2009). In terms of sex transition, anthropologist Anne Bolin (1987) employed the concept of liminality and "rites of passage" in order to examine the lived-experience of male-to-female transition. Psychological scholars and clinical researchers have conceptualized liminal stages of transition to prioritize psychological stages of the coming out process and identity development (Lev 2004). I am proposing a way to look at transition that places emphasis on stress experience during liminal stages of transition as experienced

through changes *in the body* and argue that experience of the physical body is itself a moderator of identity.

During pilot research, I developed conceptual "stages" of transition (early (liminal), middle (liminal), and late/post) that were based on the duration of time a participant had been on testosterone therapy in order to emphasize *the interaction* between the changes of the body with the lived experience of transition and identity. In this way, the liminal character of the first two stages is emphasized while the third stage reflects more of a "post-transition" status. A number of the trans men interviewed referred to their transition using the term "stage." For instance, in describing experiences of early or stage (1) of transition, trans men often discussed the challenges they faced related to changing identity documents. The concept of stages is useful because of the way in which it demarcates shared experiences.

In order to learn what characteristics of the body are most important for trans men during their transition, I also developed multiple scales to assess their satisfaction with physical and social aspects of gender presentation. For the dissertation research, I then conducted in-depth semi-structured interviews with 65 trans men in Massachusetts, Vermont, and Rhode Island who were using testosterone as part of their transition. I also obtained multiple health measures (including ambulatory blood pressure measures, salivary stress hormone levels, and levels of C-reactive protein (CRP) as a measure of immune function).

The aims of my project were to understand trans men's experience of their changing bodies, the ways that they navigate sociocultural expectations of masculinity, and physiological and psychological indicators of stress and health; therefore my analysis

included both qualitative and quantitative techniques. My general hypothesis was that men in earlier, more liminal stages of transition would experience more transition and gender-related stress than men later in the process (i.e. in my third category "late/post") and that this stress would manifest experientially, psychologically, and physiologically. As expected, transition-specific psychosocial stress was associated with physiological measures, and was more pronounced among trans men in the early and middle liminal stages of transition. Moreover, comparisons across stages of transition uncovered variation in how trans men perceived and experienced changes in their bodies and social identity. These findings indicate that stages of change, defined by length of time using testosterone, could be used to characterize both psychosocial stress and bodily experience during transition.

Qualitative interview data provided insights into the experience of transitioning from female to male. Stress associated with managing the transition in social identity was particularly salient. For example, one stressor that was described by men in the early stages of transition related to puberty-like changes associated with testosterone administration. Early in transition, trans men may be reduced to silence as their voices change and drop into male range. They may not yet have obtained surgeries that remove female secondary sex characteristics (such as double mastectomy/chest surgery), and certain male secondary sex characteristics (such as facial hair) may not yet be apparent, preventing them from "passing" and living lives as socially recognized fully mature men. For trans men early in transition, when gender identity and physical presentation may not conform to normative gender expectations, transitioning-specific stress manifested most acutely in public settings where acquaintances or strangers were more likely to use an

incorrect (female) name or pronoun or in gender-specific spaces such as public restrooms.

Changes of the body that result in a shift in socially recognized gender also involve negotiating a shift in social identity. For example, since the shifts in physical appearance that occur during transition are usually publicly observed, the timing of transition is often accompanied by a "coming out" process. According to participants, one of the things that made coming out difficult was how it placed demands of compliance on others – it inherently necessitated asking for others to *show* their respect through a modification in their own behavior – specifically through changing the language that they used. All of these changes require trans men to grapple with bodies that are often read as liminal, that is to say, falling "between" the binary categories of female and male. Approximately half of the sample of trans men interviewed for this study embraced a unique identity of "trans man" while others preferred to be recognized as "just men," in short, inserting themselves into the binary sex system rather than opting for a unique placement in it. When viewed as a process made up of liminal stages, transition can thus lend insight into how these changes in the body correlate with changes in identity.

While validated measures of general perceived stress indicated an overall decrease of stress for trans men as they moved though the stages of transition, only *transition-specific* related stress measures sufficiently captured stress experience that manifested physiologically in ways that can affect health. In particular, stress related to managing a transitioning social identity, stress related to the use of gender-specific public restrooms, and stress associated with being out as transgender were independently associated with increased stress hormone levels, particularly among trans men in stage 2

(a liminal stage) of transition. Stress regarding being out as transgender also predicted a diminished decline in nocturnal amBP, which can negatively affect health. Additionally, stress associated with "passing" was linked to increased systemic inflammation, which is a risk factor for cardiovascular disease (DuBois 2012). These types of stress were described and experienced differently among men in different stages of the transition process and each involved the challenge of occupying a liminal social position. In addition to the experience of stress associated with gender transition, it is important to note that the men in the study also described their overall increase in happiness as the result of transition process. They emphasized the fact that the changes enabled them to reconcile their internal gender identity with their physical presentation and conveyed an understanding of transition as a profoundly liberating experience.

Throughout this study of transition among trans men, my aim has been to enable a more nuanced understanding of the ways in which cultural norms are lived, internalized, and manifested in the physical body. In particular, my aim has been to make useful methodological and theoretical contributions for future examinations of the convergence of lived experience and physiological stress response related to occupying a transitional, liminal, and stigmatized social position. Through the development of multiple scales that measure transition-specific experience and the use of a combined methodology that uses both qualitative experiential data and quantitative biological measures, this study provides a way forward for research aiming to develop specific and meaningful ways to measure the interaction between lived experience, identity, and health.

This study also uncovered a meaningful link between the way that trans men perceive and experience the changes of their bodies and the way in which they described

their identity that is, whether they prefer to identify as “trans men” or “just as men.” These findings indicate that, for some trans men in this study, the binary sex category system has been modified to include a third gender sex identity. This study therefore provides evidence of the malleability of the sex/gender system as individuals seek to find a way to navigate within a society that stigmatizes bodies perceived to be gender liminal. In these ways, this project contributes a more nuanced understanding of the experiential and health impact a binary sex/gender system can have on individuals who push its boundaries.

APPENDICES

APPENDIX A

RECRUITMENT FLYER

FtM/Trans-male Study Participants wanted!

UNDERSTANDING THE EXPERIENCES AND CHALLENGES OF TRANSITION

You can be part of this vital study!

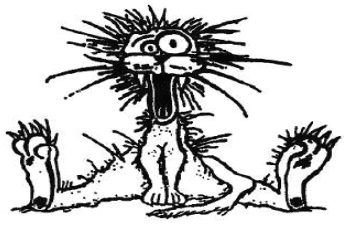
If you:

- Were assigned a female sex designation at birth but do NOT identify as female now,
- are using testosterone hormonal replacement therapy (HRT),
- are older than 18 years of age,
- and are NOT currently taking medications for high blood pressure, thyroid, or immune disorders.

Participants will be compensated $50 for their time.

This research study on transition related stress, health, and well-being is being conducted by a trans man and PhD candidate in the Anthropology Department at UMass Amherst.

If you are interested in participating or learning more about this study please send an email to: transstudy@gmail.com



"STRESS"

THE CONFUSION CREATED WHEN ONE'S MIND OVERRIDES THE BODY'S BASIC DESIRE TO CHOKE THE LIVING DAYLIGHTS OUT OF SOMEBODY WHO DESPERATELY NEEDS IT !

APPENDIX B

LETTER OF CONSENT

RESEARCH INFORMED CONSENT FORM
Biocultural Perspectives on Gender, Transitions, Stress, and Immune Response.

PURPOSE OF RESEARCH:

You are invited to participate in a study aimed at: 1) learning more about the subjective experience of living as a transgendered person and transitioning from female to male, 2) learning what experiences you find to be the most stressful and 3) measuring how stress is experienced: physiologically through measuring blood pressure changes, cortisol levels, and immune function and psychologically through a perceived stress scale questionnaire and self esteem questionnaire.

I ask you not to participate if no one has ever questioned your gender identity, including yourself. I invite you to participate if you identify as transgender, transsexual, trans, bigender, FTM, genderqueer, or gender variant. I invite you to participate if your current gender identification is different from the one your parents or guardians gave you. I invite you to participate if you are treated as male, as long as you have had the experience of not being treated as male at some point in your life.

PROCEDURES:

If you decide to participate, I will ask you to (1) answer a series of questions about your life history related to your gender or sex identity, transition process, medical and health history, and what experiences you find or expect to find stressful about your transition (2) participate in measures of your height, weight, waist circumference, and body composition using a bio-impedance monitor (3) provide 5 drops of blood obtained from a single finger prick on the for the purpose of measuring immune function (4) wear a non-invasive ambulatory blood pressure (BP) monitor for one 24 hour period; BP will be measured every 30 minutes during this period, (5) provide 5ml of saliva 5x a day at set times for 3 consecutive days (in collection tubes provided) for the purpose of measuring cortisol and testosterone levels, (6) maintain a stress/activity diary for the four days of saliva collection and 24 hour BP monitoring.

You may participate in any portion of the above that you feel comfortable with. You may withdraw from participating in any portion of the study at any time for any reason without explanation.

TIMELINE OF PARTICIPATION: (day #'s refer are since t-injection not days of participation in the study)

DAY 2 (T day+1 peak) PAID $25	DAY 3 (peak)	DAY 5 (journal ONLY on day 4 acute stress)	DAY 6	DAY 7 (trough) -PAID $25
Interview (approx 1 hour)	Wear amBP for 24 hours			
Anthropometric measures		5 total salivary	5 total salivary	5 total salivary

(e.g. ht, wt, bio-impedance measure of body composition)		**samples: wake, wake plus 30 min, bedtime, and 2 mid day.**	**samples: wake, wake plus 30 min, bedtime, and 2 mid day.**	**samples: wake, wake plus 30 min, bedtime, and 2 mid day.**
Finger prick for blood sample AND single saliva collection.	**Record in diary when BP cuff inflates**	**Record in diary with salivary collections**	**Record in diary with salivary collections**	**Record in diary with salivary collections**
Hook up amBP wear for 24 hours while maintaining diary	**Remove amBP after 24 hours**			**Salivary samples and diary retrieved by researcher.**
Salivary tubes and diary provided	**amBP monitor and diary retrieved**			

RISKS AND DISCOMFORTS

There is minimal risk involved in any of the procedures described in the study. Anticipated immediate risks may include inconvenience to you in terms of your time, discomfort associated with obtaining blood samples, difficulty sleeping when wearing the blood pressure monitor, and possible psychological discomfort associated with answering interview questions related to the stress of transitioning. You may decline from answering any questions that make you uncomfortable, as well as withdraw from participating at any point.

BENEFITS

We cannot promise that you will receive direct benefit from this study, but the results will provide information about what is stressful about the transition process and what physiological and psychological responses trans men experience during transition as well as information about physiological responses associated with those stressors. If you would like copies of your individual results (your cortisol, testosterone, BP, or EBV antibody levels), these will be provided to you after lab analysis is completed. BP results will be provided immediately following data collection so that they may be brought to your physician.

COSTS & COMPENSATION

Each participant will be awarded a total of $50 compensation for participation in the study. Half will be paid following the initial interview, which will include anthropometric measurements, blood spot sample collection and fitting of the amBP monitor; the second half will be paid upon retrieval of salivary samples.

The University of Massachusetts does not have a program for compensating subjects for injury or complications related to human subjects research but the study personnel will assist you in getting treatment.

ALTERNATIVES TO PARTICIPATION: Participation is entirely voluntary.

SUBJECT ENROLLMENT/LENGTH OF STUDY

It is expected that 70 subjects will be enrolled in this study. This study is expected to last for approximately 1 year, but your participation is expected to last only 5 days, including the day of the interview.

CONFIDENTIALITY

Your name will not be associated with the questionnaire or any samples that are collected. All of the data collected will be stored in a locked file cabinet and/or in a password protected computer and access to this information is limited to the researchers on this study. If the results of this study are written in a scientific journal or presented at a scientific meeting your name will not be used. Once the data have been analyzed, all identifying information will be destroyed.

VOLUNTARY PARTICIPATION

You are under no obligation to participate in this project. You may withdraw your participation at any time without prejudice. Participation is entirely voluntary. You are free to refuse to participate or may withdraw consent and discontinue participation in the study at any time without prejudice.

REQUEST FOR ADDITIONAL INFORMATION

Before you sign this form, please ask questions on any aspect of the study that is at all unclear to you. You may ask more questions about the study at any time. If you have any additional questions, feel free to contact L. Zachary DuBois at the Department of Anthropology, Machmer Hall, UMass Amherst, Amherst, MA 01003 zdubois@anthro.umass.edu (413) 320-2555 or Dr. Lynnette Leidy Sievert at leidy@anthro.umass.edu (413) 545-1379.

If you would like to speak with someone not directly involved in the research study, you may contact the Human Research Protection Office at the University of Massachusetts via email at humansubjects@ora.umass.edu; telephone (413) 545-3428; or mail at the Human Research Protection Office, Research Administration Building, University of Massachusetts Amherst, 70 Butterfield Terrace, Amherst, MA 01003-9242.

STUDY REPRESENTATIVE STATEMENT:

I have explained the purpose of the research, the study procedures, the possible risks and discomforts, the possible benefits, and have answered any questions to the best of my ability. I have explained that neither Tapestry nor Fenway Health Clinic has any affiliation with this project, is not responsible for any aspect of this research, and is only providing a space for interviews to take place. I have provided you a copy of this document.

_____ _____

Study Representative Name (Print or Type) Date

***Participant records initials in notebook rather than collecting signatures for participant protection**

APPENDIX C

BACKGROUND QUESTIONNAIRE

Hi! Thank you for filling in these questionnaires before our meeting! You can either print them and write on them or fill them in electronically and email them back. **Bold** type indicates that you can just circle (or highlight if you are filling it out electronically) your answer. If none of the options provided describe your situation, feel free to use your own words! Finally, please feel free to skip any questions that you don't want to answer for any reason! Thanks again! I look forward to meeting you.

Demographic Information:

1. Where did you grow up? (if you moved a lot, just indicate that and maybe give some highlights!)

2. How long did you live there?

3. For the most part – would you say that the place (s) you grew up was:

Rural	**Suburban**	**Urban**	**College town**
1	**2**	**3**	**4**

4. Do you think of where you grew up as socially/politically:

More Conservative	or	**More Progressive**
0		**1**

5. Where were you living when you began your physical transition?

6. How long did you live there (in total)?

7. How long did you stay living there after beginning your physical transition?

8. For the most part – would you say that the place (s) you began to transition was:

Rural	**Suburban**	**Urban**	**College town**
1	**2**	**3**	**4**

9. Do you think of where you began to transition as socially/politically:

More Conservative	or	**More Progressive**
0		**1**

10. Where do you live now?

11. How long have you lived there?

12. For the most part – would you say that the place (s) you live now is:

Rural	**Suburban**	**Urban**	**College town**
1	**2**	**3**	**4**

13. Do you think where you currently live is socially/politically:

More Conservative	or	More Progressive
0		1

14. Are you currently:

full-time employed	Part-time employed	unemployed/laid-off
1	2	3

15. Are you currently:

full-time student	Part-time student	not a student
1	2	3

16. What is your occupation or field of study?

17. How long have you worked at your current job/been a student at your current school?

18. Did you transition publicly at this job or in this school setting? If yes, were they supportive overall?

19. How many years of education have you had total?

20. What degrees/certification do you have?

some H.S.	H.S. diploma	some college	BA/BS	MA	PhD	Other
1	2	3	4	5	6	7

21. What is your current relationship status:

single	dating	in a relationship	partnered/married
1	2	3	4

a) Do you live together?

NO	YES
0	1

b) How do (es) your current partner (s) identify in terms of their gender?

22. How long have you been in this relationship?

23. Were you in your current relationship prior to beginning your physical transition?

N	Y
0	
	1

24. If no, have you experienced any break-ups of romantic relationships due to your transition process or gender identity?

25. What is your current monthly income? **Single or dual income**

26. What are your current living conditions:
    a) **Rent** **Own**
    1 **0**
    b) **Apartment** **Condo** **House**

27. How many people do you live with?
28. How many bedrooms are in your home?
29. Are you satisfied with your living conditions? **YES** **NO**
30. How would you describe your race or ethnicity?

African American	**Non-Hispanic white**	**Asian**	**Latino**	**Jewish**
1	**2**	**3**	**4**	**5**

Describe other:
6

31. Do you consider yourself to be a spiritual or religious person? **NO** **YES**
0 **1**

32. If yes, how would you describe your spirituality or religion?

33. Do you prefer to be known by others as a trans man or just as a man?
1 **0**

34. Are you currently known by most other people in your life as a trans man or just as a man (bio/cis gendered man)? **1** **0**

35. How would you describe your sexual orientation?

straight	**bi**	**gay**	**queer**	**asexual**
1	**2**	**3**	**4**	**5**

36. Prior to your transition did you generally prefer male or female partners?

Male	**Female**	**Ftm (trans men)**	**Mtf (trans women)**
1	**2**	**3**	**4**

37. Currently, do you generally prefer male or female partners? **Male** **Female** **MtF** **FtM**
1 **2** **3** **4**
38. Is your current partner : **Male** **Female** **FtM** **MtF**
1 **2** **3** **4**

39. Do you have any children? **YES** **NO**
    a) How many____
    b) Ages____

40. Are you biologically related to your children? **NO** **YES**
    0 **1**

Medical, Dietary, and lifestyle information:

1. About how much did you weigh a year (12 months) ago? _____ lbs
2. About how much did you weigh before going on HRT (please note how long ago that was)?

3. How much did you weigh at birth? _____lbs_____ oz
4. If you don't know your exact birthweight, which is your closest guess as to your birthweight: **<5 lbs** **6 lbs** **7lbs** **8lbs** **9lbs** **>10 lbs** **Really don't know**

5. To the best of your knowledge, were you born early, on time, or later than your expected due date
   Early (by ____ weeks) **On Time** **Late (by ____ weeks)** **Really don't know**

6. Do you regularly take any form of caffeine? **YES** **NO** (e.g. coffee, tea, soda, pills, etc.)
   1 **0**
7. If yes, please indicate what form you take it in and how much you take each day.
8. Form: **Coffee** **Tea** **Soda** Quantity _____ (amount/day).
   1 **2** **3**
9. Do you smoke or take nicotine in any other form? **YES** **NO**
   1 **0**
   If no, did you ever smoke? **Y** **N** Did you quit as part of your transition? **Y** **N**
   1 **0** **1** **0**
   If yes, please indicate what form you take it in and how much you take each day.
   Form _____ Quantity _____ (amount/day).
10. Do you ever consume alcoholic beverages? **YES** **NO**
    1 **0**
11. If yes, what form: **wine, beer, liquor**; and how many do you consume per week?
    _____
    1 **2** **3**
12. How many drinks per week did you consume prior to beginning your transition?
13. Do you currently use any "recreational" drugs **Yes** **No**
    1 **0**
14. If yes, please indicate are they "uppers" (could include speed type drugs i.e. coke, amphetamines etc) or "downers" (could include pot, benzos etc).
    Uppers Downers
    1 **0**
15. How frequently do you use these: daily weekly monthly every few months

1 2 3 4

16. Do you use these drugs: more often since starting T less often since starting T

1 0

17. On average, how many hours of sleep do you get per night? _____ (hours)
18. I typically go to bed between the hours of _____ and _____
19. I typically get up between the hours of _____ and _____
20. About how many days per week do you wake feeling rested? 1 2 3 4 5 6 7
21. Are you currently diagnosed with asthma? **YES NO**
22. If yes, do you currently take any form of asthma medication? **YES NO**
23. If yes, what type(s)?
24. Do you have any allergies? **YES NO**
25. If yes, please list:
26. If yes, are you taking any medications to control these allergies? **YES NO**
27. If yes, please list

_____

28. Are you currently taking medication for depression or another mental illness? **YES NO**
29. If yes, please list the medication(s)

_____

30. Were you taking any meds for depression or anxiety prior to starting your transition? **YES NO** LIST MEDS FOR WHICH CONDITION

_____

31. Do you have any diagnosed illness? **YES NO**
32. Please describe:
33. Have you been diagnosed with any of the following:

hypo or hyper glycemia high cholesterol polycythemia (indicates a high number of red blood cells) high blood pressure

34. Did the condition precede HRT? **YES NO**
35. Do you ever take any medications, beyond those already described above? **YES NO**
36. If yes, please list the medications, how often you take them and for what reasons.

37. Do you have any other health conditions I should be aware of? **YES NO**
38. If yes, please list:

39. Are there any specific medical conditions that you are aware that run in your family? Please list:

40. Basically, would you say your health is (circle one): Excellent **Above Average Average Below Average Poor**

41. Are you on any type of diet? **YES NO**
42. If yes, please circle: **vegetarian low fat low sugar other _____**
43. On average, how many times a week do you eat red meat?

44. Do you currently perform any form of regular physical exercise? **YES NO**

45. If yes, please indicate what types of exercise you do how many times per week you do each.

46. One hears about "morning" and "evening" types of people. Which ONE of these types do you consider yourself to be?

Definitely a "morning" type _____
Rather more a "morning" than an "evening" type _____
Rather more an "evening" than a "morning" type _____
Definitely an "evening" type _____

47. Have you been sick at all or had any injuries in the last 2 weeks?

48. Do you have any additional comments about your health or lifestyle?

49. Please list any surgeries you have had as part of your transition process, the approximate date of the surgery, and the doctor/city/country.

50. Please look at your testosterone prescription and note the information below. I've provided an example. Please tell me what you ACTUALLY take even if differs from your script!

CIRCLE: **Injection** **Gel** **Cream** **Other**_____

Type	strength	dose cc's	dose mg's	frequency	location(s)	day/time(s)
Cypionate	200mg/ml	.4cc	80mg	weekly	thigh	Mon/8pm-ish

51. Please rate the level of stress you are currently experiencing regarding you gender and transition on a scale of 0-10 (0 is no stress, 10 is extreme stress). Please list the primary stressors that you are facing so that we can discuss them during the interview! Thank you!

APPENDIX D

BIO-IMPEDANCE AND ANTHROPOMETRIC MEASUREMENTS

Participant #		
Ht		
Weight		
Waist Circ.		
Triceps		
Bio-impedance	M	F
Body fat %		
Body fat kg		
Target Fat %		
BMI		
BMR		
Target Wt		
Lean kg		
Lean %		
H20 Lt		
H20 %		
Target H20 %		
# BP Rdgs		
Hours BP		
Time since T		
Avg SBP awake		
Avg DBP awake		
Avg HR awake		
Avg SBP asleep		
Avg DBP asleep		

APPENDIX E

DIARY FOR DAY 1 OF SALIVARY COLLECTION

Day BEFORE salivary samples collected = DAY_____ of HRT cycle

ID Number: _____ Date: _____

Please answer the following at the end of the day:

How typical was this day for you? (1 is totally typical, 5 is totally not typical)

1 2 3 4 5

Please note any acute/extreme/unusual stress experiences you had today and how list how you felt.

1ST DAY – WAKEUP COLLECTION = do when you wake (do not get out of bed)! THEN SET ALARM FOR 30 minutes later!

DATE:_____ TIME:_____ AM / PM

Got into bed last night at _____ AM / PM
Tried to fall asleep at _____ AM / PM
Actually fell asleep at _____ AM / PM
Finally awoke at _____ AM / PM

AWAKENED BY: (Please check only one item)
Alarm clock/radio _____
Someone whom I asked to wake me _____
Noises _____
Just woke up _____
Person or pet sharing bed _____
After falling asleep, I woke up this many times: **0 1 2 3 4 5 +**

At the time of your wake up sample…
Where were you?
Were you alone? Yes_____ No_____
Did you want to be alone? Yes ____ No _____
If you weren't alone, who were you with?

1st DAY = 30 minutes after waking collect sample.

Where were you?
What were you doing?
Are you alone? Yes_____ No_____
Did you want to be alone? Yes ____ No _____
If you aren't alone, who were you with?

Indicate how you feel about your activity or situation:
0=Not at all 1=A little 2=Somewhat 3=Very much

Do you want to do what you are doing? 0 1 2 3
Do you enjoy what you are doing? 0 1 2 3
Is this activity interesting? 0 1 2 3
How well are you concentrating? 0 1 2 3
Do you have the abilities to deal with the situation? 0 1 2 3
Is the activity important to you? 0 1 2 3
Do you feel challenged? 0 1 2 3
Do you feel in control of the situation? 0 1 2 3
Are you succeeding at what you are doing? 0 1 2 3
Do you feel good about yourself? 0 1 2 3
Do you wish you could change something? 0 1 2 3

How much are you feeling…?
0=Not at all, 1=A little, 2=Somewhat, 3=Very much

Happy 0 1 2 3 **Alert** 0 1 2 3 **Tired** 0 1 2 3 **Caring** 0 1 2 3
Friendly 0 1 2 3 **Worried** 0 1 2 3 **Cooperative** 0 1 2 3
Relaxed 0 1 2 3 **Nervous** 0 1 2 3 **Irritable** 0 1 2 3 **Lonely** 0 1 2 3
Stressed 0 1 2 3 **Sleepy** 0 1 2 3 **Determined** 0 1 2 3
Active 0 1 2 3 **Sad** 0 1 2 3 **Frustrated** 0 1 2 3 **Cheerful** 0 1 2 3
Hardworking 0 1 2 3 **Productive** 0 1 2 3

Describe the most stressful situation or event you encountered in the past hour.

How stressful was this event?
0=Not at all, 1=A little, 2= Somewhat, 3= Very
0 1 2 3

How typical or familiar was this situation or event?
0 1 2 3

Was the situation or event still ongoing when you started this diary entry ?
Ongoing Completed

Please circle if you have done/had/experienced any of the following in the past hour…
Eating Caffeine Smoking Alcohol Exercise Sleep/Nap
Pain/Discomfort Medication/drug use brushing/flossing
Dairy Consumption
Describe:

YOUR SPACE: Comments/ Pictures/ Doodles/ Random Thoughts

1st DAY = 1ST BEEPED SAMPLE

Date_____ Time you were beeped_____am/pm Time you responded_____am/pm
Just before beginning this diary entry…

Where were you?
What were you doing?
Are you alone? Yes_____ No_____
Did you want to be alone? Yes ____ No _____
If you aren't alone, who were you with?

Indicate how you feel about your activity or situation:
0=Not at all 1=A little 2=Somewhat 3=Very much

Do you want to do what you are doing? 0 1 2 3
Do you enjoy what you are doing? 0 1 2 3
Is this activity interesting? 0 1 2 3
How well are you concentrating? 0 1 2 3
Do you have the abilities to deal with the situation? 0 1 2 3

Is the activity important to you? 0 1 2 3
Do you feel challenged? 0 1 2 3
Do you feel in control of the situation? 0 1 2 3
Are you succeeding at what you are doing? 0 1 2 3
Do you feel good about yourself? 0 1 2 3
Do you wish you could change something? 0 1 2 3

How much are you feeling…?
0=Not at all, 1=A little, 2=Somewhat, 3=Very much

Happy 0 1 2 3 **Alert** 0 1 2 3 **Tired** 0 1 2 3 **Caring** 0 1 2 3
Friendly 0 1 2 3 **Worried** 0 1 2 3 **Cooperative** 0 1 2 3
Relaxed 0 1 2 3 **Nervous** 0 1 2 3 **Irritable** 0 1 2 3 **Lonely** 0 1 2 3
Stressed 0 1 2 3 **Sleepy** 0 1 2 3 **Determined** 0 1 2 3
Active 0 1 2 3 **Sad** 0 1 2 3 **Frustrated** 0 1 2 3 **Cheerful** 0 1 2 3
Hardworking 0 1 2 3 **Productive** 0 1 2 3

Describe the most stressful situation or event you encountered in the past hour.

How stressful was this event?
0=Not at all, 1=A little, 2= Somewhat, 3= Very
0 1 2 3

How typical or familiar was this situation or event?
0 1 2 3

Was the situation or event still ongoing when you started this diary entry ?
Ongoing Completed

Please circle if you have done/had/experienced any of the following in the past hour…
Eating Caffeine Smoking Alcohol Exercise Sleep/Nap
Pain/Discomfort Medication/drug use brushing/flossing
Dairy Consumption
Describe:

YOUR SPACE: Comments/ Pictures/ Doodles/ Random Thoughts

1st DAY = 2ND BEEPED SAMPLE

Date_____ Time you were beeped_____am/pm Time you responded_____am/pm
Just before beginning this diary entry…

Where were you?
What were you doing?
Are you alone? Yes_____ No_____
Did you want to be alone? Yes ____ No _____
If you aren't alone, who were you with?

Indicate how you feel about your activity or situation:
0=Not at all 1=A little 2=Somewhat 3=Very much

Do you want to do what you are doing? 0 1 2 3
Do you enjoy what you are doing? 0 1 2 3
Is this activity interesting? 0 1 2 3
How well are you concentrating? 0 1 2 3
Do you have the abilities to deal with the situation? 0 1 2 3
Is the activity important to you? 0 1 2 3
Do you feel challenged? 0 1 2 3
Do you feel in control of the situation? 0 1 2 3
Are you succeeding at what you are doing? 0 1 2 3
Do you feel good about yourself? 0 1 2 3
Do you wish you could change something? 0 1 2 3

How much are you feeling…?
0=Not at all, 1=A little, 2=Somewhat, 3=Very much

Happy 0 1 2 3 **Alert** 0 1 2 3 **Tired** 0 1 2 3 **Caring** 0 1 2 3
Friendly 0 1 2 3 **Worried** 0 1 2 3 **Cooperative** 0 1 2 3
Relaxed 0 1 2 3 **Nervous** 0 1 2 3 **Irritable** 0 1 2 3 **Lonely** 0 1 2 3
Stressed 0 1 2 3 **Sleepy** 0 1 2 3 **Determined** 0 1 2 3
Active 0 1 2 3 **Sad** 0 1 2 3 **Frustrated** 0 1 2 3 **Cheerful** 0 1 2 3
Hardworking 0 1 2 3 **Productive** 0 1 2 3

Describe the most stressful situation or event you encountered in the past hour.

How stressful was this event?
0=Not at all, 1=A little, 2= Somewhat, 3= Very
0 1 2 3

How typical or familiar was this situation or event?
0 1 2 3

Was the situation or event still ongoing when you started this diary entry ?
Ongoing Completed

Please circle if you have done/had/experienced any of the following in the past hour…
Eating Caffeine Smoking Alcohol Exercise Sleep/Nap
Pain/Discomfort Medication/drug use brushing/flossing
Dairy Consumption
Describe:

YOUR SPACE: Comments/ Pictures/ Doodles/ Random Thoughts

1st DAY = BEDTIME SAMPLE TIME_____

RIGHT BEFORE TAKING THIS SAMPLE:
Where were you?
What were you doing?
Are you alone? Yes_____ No_____
Did you want to be alone? Yes ____ No _____
If you aren't alone, who were you with?

Indicate how you feel about your activity or situation:
0=Not at all 1=A little 2=Somewhat 3=Very much

Do you want to do what you are doing? 0 1 2 3
Do you enjoy what you are doing? 0 1 2 3
Is this activity interesting? 0 1 2 3
How well are you concentrating? 0 1 2 3
Do you have the abilities to deal with the situation? 0 1 2 3
Is the activity important to you? 0 1 2 3
Do you feel challenged? 0 1 2 3

Do you feel in control of the situation? 0 1 2 3
Are you succeeding at what you are doing? 0 1 2 3
Do you feel good about yourself? 0 1 2 3
Do you wish you could change something? 0 1 2 3

How much are you feeling…?
0=Not at all, 1=A little, 2=Somewhat, 3=Very much

Happy 0 1 2 3 **Alert** 0 1 2 3 **Tired** 0 1 2 3 **Caring** 0 1 2 3
Friendly 0 1 2 3 **Worried** 0 1 2 3 **Cooperative** 0 1 2 3
Relaxed 0 1 2 3 **Nervous** 0 1 2 3 **Irritable** 0 1 2 3 **Lonely** 0 1 2 3
Stressed 0 1 2 3 **Sleepy** 0 1 2 3 **Determined** 0 1 2 3
Active 0 1 2 3 **Sad** 0 1 2 3 **Frustrated** 0 1 2 3 **Cheerful** 0 1 2 3
Hardworking 0 1 2 3 **Productive** 0 1 2 3

Describe the most stressful situation or event you encountered in the past hour.

How stressful was this event?
0=Not at all, 1=A little, 2= Somewhat, 3= Very
0 1 2 3

How typical or familiar was this situation or event?
0 1 2 3

Was the situation or event still ongoing when you started this diary entry ?
Ongoing Completed

Please circle if you have done/had/experienced any of the following in the past hour…
Eating Caffeine Smoking Alcohol Exercise Sleep/Nap
Pain/Discomfort Medication/drug use brushing/flossing
Dairy Consumption
Describe:

YOUR SPACE: Comments/ Pictures/ Doodles/ Random Thoughts

APPENDIX F

INSTRUCTIONS FOR SALIVARY SAMPLING

INSTRUCTIONS FOR TAKING SALIVA SAMPLES!

PLEASE TAKE A TOTAL OF 5 SALIVA SAMPLES EACH DAY OVER THREE DAYS AT THE FOLLOWING TIMES USING THE INSTRUCTIONS BELOW:

- Upon awakening! This is easiest if you set the vial by the bed so that you can collect BEFORE getting out of bed, having anything to eat or drink, or brushing your teeth. Then set your alarm (phone, watch, clock) for 30 minutes later!
- 30 minutes after waking up
- when you hear the watch alarm beep (2x during the day so please carry 2 vials and labels with you)
- at bedtime but BEFORE any teeth-brushing or flossing

Step 1: Pool saliva in your mouth. If you have eaten or had anything to drink in the past 30 min – swish your mouth with water and then wait 5 min before collecting if you can. If your mouth is dry, chew the end of the straw briefly. This should make your mouth water. DO NOT swallow the saliva that is gathered in your mouth.

Step 2: Unscrew the cap from the plastic vial and slip the end of the straw into the mouth of the plastic vial.

Step 3: Spit the saliva into the straw. After placing the straw into the mouth of the vial, release the saliva from your mouth into the straw. Let the saliva collect at the bottom of the vial. Make sure you are holding the vial firmly as it can slip. Try to fill at least one-third of the vial with saliva. **Screw the cap on the vial VERY tightly to prevent leakage.** If your saliva is foamy – tap the bottom of the vial and let the sample settle

Step 4: Label the vial. Write the info on the label before sticking it to the vial. Make sure to use the right number. Use the label corresponding to the sample you are taking. Note the exact TIME and DATE on the appropriate label and attach the label to the vial. Put the vial in the small bag with your ID number on it.

Step 5: If at home – make notes in the diary provided. If you can't have the diary with you – use the small notebook and note where you are, what

your doing, what time it is, what you've eaten/drank, and a note on how you feel or any stressors. Use the notes to jog your memory and fill in the diary.

Step 6: Refrigerate as soon as possible.
Thank you!! Call with any questions 413-320-2555

APPENDIX G

BLOOD PRESSURE DIARY

Participant ID _____ Date _____ T cycle day _____

TIME	BP	LOCATION H = home W = work O = other	POSITION S =sitting U =upright/stand R = recline/lying	MOOD 0=none	1=mild 2=mod 3=very	ACTIVITIES: -are you outside or inside/ac? -approx temp? -are you engaged in any increased activity? -have you had any alcohol, coffee, tea or soda? - have you smoked or taken any medications?
				positive e.g. happy	Negative e.g. sad, angry	

APPENDIX H

FINAL INTERVIEW QUESTIONNAIRE

Participant

Date of interview1: Location
Start time_____ End time_____

Date of interview2: Location
Start time_____ End time_____

AGE/DOB

- **Years on T:**
- **Injection IM SUBQ**
- **Gel Cream**
- **Weekly Biweekly Daily**
  Dose:
- **Change in dose/side effects?**

- **Inj Day: Time:**
- **Physical Stage:**
- **Social Stage:**
- **Passing with strangers % =**
- **Surgeries =**
-

Where did you hear about the study?

Inclusion Criteria:
Over 18yo _____
On T_____
ID as not female/ftm/tg_____
Female birth designation___
Exclusion criteria
No meds (bp,imm,thy)____
No immune/thyroid/cardio disorder_____

- **Consent form _____**
- **Sick past 2 weeks? N Y _____**

Peak T day#____ measures
Date___

- **Blood Spot___**
- **Peak saliva___**
- **24-Hr BP___**
- **BP Diaries collected____**
- **Compensation_____**

Data collection (any day) checklist

- **Background ____**
- **Stress/esteem sheet___**
- **Full interview___ /____**
- **Height___**
- **Weight___**
- **Waist circum.___**
- **Triceps skinfold___**
- **Bio-impedance_____**
- **Exit interview_____**
- **Sent BP/PDF_____**

Trough T measures
Days# Date_____

- **Saliva 3 days__**
- **Saliva diaries collected____**
- **Compensation____**

Whirlwind tour of your Gender Identity/Gender Process and current "status":

1. **How long ago did you A) first start questioning your gender identity and B) began thinking about transitioning? (any story about what prompted this?)**

   A) ____exact age (what prompted this?)

   B) _____exact age

   C) ID as male at what age____

2. **Would you say that you were initially most dissatisfied with your social identity being seen as female or were you more dissatisfied with your body?**

3. **What prompted your decision to change your body?**

4. **Did you pass/how were you read by strangers prior to your physical transition?**

5. **Would you say that you experienced any negative treatment due to your gender prior to beginning your physical transition?**

6. **How did you identify prior to physically transitioning? (A. gender and B.sexual orientation)**

   A)
   B)

7. **How do you identify now? How long have you identified this way?**

8. **Are you confident that you're read this way? Always Mostly Hardly Ever Never**

9. **Did you "socially transition" prior to taking T? Did other people begin referring to you as "he" prior to your beginning to physically transition? Did you request this or did it "just happen" (it was initiated by other's)?**
    a) **Romantic Partners– yes no request/correct just happened WHEN:**

    b) **Friends- yes no request/correct just happened WHEN:**

    c) **Family- yes no request/correct just happened WHEN:**

    d) **Strangers- yes no request/correct just happened WHEN:**

****How did you tell them? A. In person B. letter C. email D. someone else told them**

10. **Have you received a GID diagnosis? If yes, when? Do you feel the diagnosis accurately describes your feelings/experience?**

11. **Did you pursue therapy as a way to work out issues related to your gender identity or primarily in order to access the means to physically transition? Was it helpful?**

12. **Have you legally changed your name? yes no in process When:**

13. **Have you legally changed your gender marker? Yes no in process When: Has it been challenging or stressful for you?**

14. **What surgeries have you had as part of transitioning, if any and WHEN? Did you have any surgeries prior to starting T?**

15. **Where did you learn about the medical options to physically transition?**

16. **Where did you first learn about trans people/trans men and what was your initial reaction?**

17. **Did you ever bind? If yes, for how long? YES NO CURRENTLY**
18. **Did you bind after you were living/passing full-time as male? YES NO**

19. **Would you say that the way that you appear on the outside currently matches the way that you feel on the inside in terms of your gender? Are you currently satisfied with your body as it is?? NOT AT ALL SOMEWHAT A LOT What dissatisfies you?**

20. **Do you feel now that the decision to transition was the right decision for you?**

21. **Can you list any new problems or challenges in your life that have come about in relation to your transition so that we can make sure to discuss them during the interview?**

22. **Can you list some of the challenges or difficulties are you *currently* facing in relation to your gender presentation and transition?**

(check demographics sheet and anthropometrics for completion or finish them now.)

<u>Stress experience during transition</u>

23. **Are you currently experiencing a lot of stress that you would say is related to your transition? Yes No If yes, scale 0-10_____**
    a) **Is your current stress level about your gender/transition more or less than it was: 6 months ago more less same N/A**

    b) **1 year ago more less same N/A**

c) 2 years ago or more more less same N/A

****What was the main challenge you faced at each point? ****

24. Can you rate the difficulty/stress level of your experience with the following?

a. Psychotherapist extremely moderately not at all positive
Past Current N/A

b. Endocrinologist extremely moderately not at all positive
Past Current N/A

c. OB/Gyn Doc/GP extremely moderately not at all positive
Past Current N/A

d. OB/Gyn Wait/GP extremely moderately not at all positive
Past Current N/A

e. Surgeons extremely moderately not at all positive
Past Current N/A

f. Gender Marker extremely moderately not at all positive
Past Current N/A

g. Name Change extremely moderately not at all positive
Past Current N/A

h. Work/school HR extremely moderately not at all positive
Past Current N/A

i. Mammogram?

25. Which of the above *currently* causes you the most stress/distress if any? Why?

26. When was your last pelvic exam? Do you intend to continue check-ups if you have not had surgery?

27. What, if anything, could make these exams easier for you?

28. Are you currently under a doctor's care for your HRT? How frequently does he/she check your blood work/dose/side-effects?

29. Is your immediate family/job/partner currently actively supportive of you and your need to transition? Was coming out difficult (if applicable?)

Family:

Job:

Partner:

30. Which restroom do you currently use? M F

a. Can you rate how stressful you currently find public restrooms 0-10 (0 = no stress)? What, if anything causes you the most discomfort? WHY?

31. Do you currently self-inject or does someone help you? Do you find injections difficult or stressful 0-10.

32. At this point in your life, are you experiencing any of the following:

A) depression severe moderate mild none
Every day a few days a week few times per month never How long_____
Describe symptoms:
B) insomnia severe moderate mild none
Every night few times per week few times per month never How Long_____
Describe symptoms:
C) anxiety severe moderate mild none
Every day few times per week few times per month never How Long_____
Describe symptoms: (attacks or chronic)
D) change of appetite severe moderate mild none
How Long_____
Describe:
E) Other _____ frequency/severity _____ How Long_____

Describe symptoms:

33. **Which if any of the above symptoms were you experiencing prior to beginning to transition? Were the alleviated or worsened by beginning the transition process formally? Were on psych meds before? Now?**

34. **Is there anything you'd like to add or tell me about? Are there experiences related to transition that you feel have been particularly difficult for you?**

Gender "Fitting:" Appearance, Treatment, and Behavior

Appearance and Behavior:

35. **Would you please rate the following in terms of importance/relevance for your transition?**

A) Top surgery not important somewhat important very important
Bind/not bind Done intend to do do not intend to do_____
B) Hysterectomy not important somewhat important very important
Done intend to do do not intend to do_____
C) Vocal change not important somewhat important very important
Dropped enough hope it gets deeper never cared too much
D) Bottom surgery not important somewhat important very important
Done intend to do do not intend to do_____
E) Facial Hair not important somewhat important very important
Have some/OK want more don't care/want any
F) Body hair not important important very important most important
Have some/OK want more don't care/want any
G) Fat redist. not important somewhat important very important
Have some/OK want more don't care/want any
H) >muscle not important somewhat important very important
Have some/OK want more don't care/want any

36. **How do you feel about your body now? Are you satisfied with the changes/pace of T and masculinization? Are you satisfied with surgical outcomes?**

37. **Do the parts or your body that dissatisfy you cause you stress or insecurity currently? Which parts bother you? Not at all somewhat very**

38. Do you expect/plan to be able to change them?

39. Does either binding or packing cause you difficulty or stress of any sort? If yes, what is your biggest reason for doing it?

40. This next question concerns what are generally considered to be stereotypical gendered behaviors/roles. Do any of these characteristics matter to you or are they relevant in your life for you to be the kind of man you want to be?

a) Have masculine mannerisms/movement? not at all somewhat very NFIT SFIT FIT
b) Have a certain *type* of job/provider not at all somewhat very NFIT SFIT FIT
c) Wear men's clothing not at all somewhat very NFIT SFIT FIT
d) Have a men's haircut not at all somewhat very NFIT SFIT FIT
e) Play any particular "role" in sex not at all somewhat very NFIT SFIT FIT
f) Look any particular age not at all somewhat very NFIT SFIT FIT
g) Be able to cry/or not cry not at all somewhat very NFIT SFIT FIT
h) Show/not show emotions/enthusiasm not at all somewhat very NFIT SFIT FIT
i) Be blunt/straightforward/in charge not at all somewhat very NFIT SFIT FIT
j) Come across as confident not at all somewhat very NFIT SFIT FIT
k) date/get in relationships with women? not at all somewhat very NFIT SFIT FIT
l) Play/watch/keep up with sports not at all somewhat very NFIT SFIT FIT

41. Do any of the areas above currently cause you stress or anxiety? Which areas?

42. Do you consciously "work on" or modify your behavior deliberately in order to be more "masculine" or male in any way? Which characteristics?

43. Has what you worked on changed over the course of your transition?

44. Can you list some of the ways that *you* think you are typical/the same as biologically-born males?

<u>Social Treatment:</u>

45. Are you treated as you want to be out in the world for the most part in terms of your gender? never seldom most of the time always
It matters/bothers me….not at all somewhat a lot
****How were you treated when it wasn't how you wanted to be treated?**

46. Are you treated as you want to be treated in terms of your age?
never seldom most of the time always
not at all somewhat a lot

47. Who in your life knows that you are trans that you want/feel comfortable knowing?
a) Romantic partners/lovers b) Immediate family
c) close friends d) school mates
e) work mates f) Distant family
g) acquaintances h) Strangers
What makes them ok:

OUT WITH: Friends Acquaintances coworkers/schoolmates

48. Are there people or situations you are in where being known as trans makes you feel uncomfortable? (Who do you wish didn't know?) Why?

49. Is being out a source of stress or anxiety for you?
Never Seldom Most of the time Always

50. If yes, is the stress due to
a) wanting to be out/feeling invisible or
b) because you would rather NOT be known as trans?

51. Are there people in your life who "she" you or call you by your old name? YES NO

52. A) If yes, who?

B) Does it bother you? A LOT MODERATELY A LITTLE NOT AT ALL

53. What do you do when you are called "she" or by your old name by people you just described?

54. Would you say that you successfully filled any typical female social roles before transition? Did you successfully "pass" as female before your physical transition? YES NO

****What roles? How did you pass?**

55. Do you feel that you successfully fill any typically male social roles now? y/n YES NO

****What roles?**

56. Has the transition in relation to these roles been stressful or a source of relief? Stress relief Can you describe why/how?

57. Are you comfortable being viewed as a heterosexual male?

58. Are you comfortable being viewed as a gay man? Y/N

59. Are you read as a gay male? Never seldom sometimes often

60. Do you feel that you occupy/are known as more than one gender identity in your public life? If yes, do you feel in control during these situations?

61. If yes, do you prefer occupying more than one identity or would you prefer to have "everyone" know you as only one gender ID (male or transmale)?

Relationships, Resources, and Support

62. Do you feel that loneliness or a lack of companionship is currently something you experience in your life? Is it related to being trans?

63. Can you tell me how often you feel lonely or that you lack companionship?
Hardly ever some of the time often (daily weekly monthly)

64. Do you find that you often feel isolated or "left out" socially? Is it related to being trans?

65. Can you tell me how often you feel isolated or that you are left out?
Hardly ever some of the time often (daily weekly monthly)

66. Did you feel as though you were part of any community *before you transitioned*?

67. What sorts of changes have you experienced in your relation to that community or with your friends as you began to transition? Were those changes difficult for you in any way?

68. Did you ever ID as lesbian or Hetero female? How do you relate to the women friends in that community now? Do they accept/judge you?

69. How do you feel about your relations with men now? Do you find men easier or more difficult to relate to/befriend than women?

70. Do you have non-trans male friends?

71. Do you feel as though you are part of any community *now*?

72. Please list which relationships or resources do you find are the most helpful to you and supportive in dealing with your transition or transition related issues.

73. Please list which relationships have been the most challenging or difficult for you in relation to transition.

74. Do you have any friends who you interact with regularly that are trans? How often do you see them?

75. Are you currently attending a support group, going to therapy, or accessing any other forms of support for the purpose of dealing with transition related issues?

76. Have you tried to date at all during your transition or have you primarily been in a stable monogamous romantic relationship?

77. Have your romantic relations or sexuality changed since you have transitioned? In what way?

78. What would you say has been the most challenging part of transitioning in terms of your relationships?

<u>Stress related to age, social treatment/status, racism, and class</u>

79. Do you feel that you are currently treated socially better or worse than you were prior to your transition?

80. Do you feel that you now access greater or fewer privileges or resources since you've begun your transition?

81. How would you describe your response to any of the changes that you've experienced regarding your access to resources or social treatment? Does it cause you stress? Does it provide you relief of any kind?

82. Does the way that you are treated in terms of your age cause you any problems or stress? Never infrequently frequently always

83. Remind me what you do for a living and please tell me if which you would say is most true about your income each month:
I make - less than I need to/lack what I need/am seeking more work,
b) exactly what I need/no wiggle room,
c) just enough/I feel comfortable,
d) plenty/enough to be generous/invest etc
84. How would you describe your current class position?

85. What level of education did your parents complete in school?
Dad=SOME H.S/GED H.S SOME COLLEGE BA/BS MA/MS PHD/MD/JD Mom= SOME H.S/GED H.S SOME COLLEGE BA/BS MA/MS PHD/MD/JD

86. What were there jobs when you were growing up/now?

87. Have you had any sort of familial financial support in your adult life? How does their financial support make you feel?

88. Does your family help you financially with transition related costs? Which?

89. If no, would they like to be able to if they can't afford it?

90. Do you have debt as a consequence of transitioning?

91. Is your debt burden currently a source of stress for you? YES NO

92. Have you been ever been the victim of violence, job discrimination, or harassment as a consequence of your gender identity or presentation?

93. Would you say that you experience stress as a consequence of racism?

94. If yes, has your experience with or thoughts on racism changed as a result of your transition? In what way?

95. What is the most rewarding result of transitioning? Have you found that you have felt disappointed with anything in particular in relation to your transition?

APPENDIX I

ORIGINAL QUESTIONNAIRE

Participant # **AGE/DOB:** **STAGE:**
Date: **Time:**
Location:
Section 1: Demographic and Bio-behavioral Questions:
Anthropometrics
1) A) Ht/Wt B) BMI:
2) A) Waist circumference B) Hip circumference C) waist/hip ratio
3) Triceps skinfold: A) B) C) D) AVG____
4) mid Bicep circumference A) B) C) D) AVG_____
5) Years of education:
6) Current occupation: 6a) monthly income:
6b) rent/own? 6c) # rooms in home 6d) live alone/with?
7) Self-described race/ethnicity:
8) Religion if any:
9) Current marital/relationship status:
9a) Male or female partner:
10) How would you describe your sexual orientation?
11) Number of children if any:
12) Ages of children:
13) Do you smoke? y/n 13A) Number of cigarettes per day:
14) Do you drink alcohol? y/n 14A) Number of drinks per day?
Beer/wine or liquor?
15) Do you exercise? y/n 15A) Number of times per week?
Type?
16) Are you on any type of diet? y/n 16A) vegetarian/low fat/low sugar/other
17) On average, how many times a week do you eat red meat?
18) Do you have any diagnosed illness? y/n 18A) describe:
19) Have you been diagnosed with: hypo or hyperglycemia/high cholesterol/polycythemia
19A) Are you currently on HRT? y/n
19b) If yes, what route of administration do you use?
19c) dose
19d) type
19e) frequency
19f) Did the condition precede HRT? y/n
20) Have you had any surgeries related to transitioning? y/n

21) If yes, what type and when?

22) Are you on any regular medications? y/n 22A) list:
23) Are there any specific medical conditions that you are aware that run in your family?

24) How would you rate your overall health: Excellent Very Good Good Fair Poor

25) Have you been sick at all or had any injuries in the last 2 weeks?

Section 2: Gender Fit = consonance (behavior) and congruity (markers/sex chars) with perceived gender categories

1) How would you currently describe yourself in terms of your gender identity?

1a) Would you say that the way that you appear outside currently matches the way that you feel inside?
never seldom most of the time always

2) Does it matter to you and do the people in your life identify you the same way that you do (names, pronouns)? (
a) work
never seldom most of the time always
not at all somewhat a lot

b) school
Not important Important Very Important Most important
never seldom most of the time always

c) immediate family
Not important Important Very Important Most important
never seldom most of the time always

d) distant family
Not important Important Very Important Most important
never seldom most of the time always

e) close friends
Not important Important Very Important Most important
never seldom most of the time always

f) acquaintances
Not important Important Very Important Most important
never seldom most of the time always

g) romantic interests/partners/lovers
Not important Important Very Important Most important
never seldom most of the time always

h) strangers
Not important Important Very Important Most important
never seldom most of the time always

i) other_____

Not important	Important	Very Important	Most important
never	seldom	most of the time	always

3) In general, is it important to you and do you get treated the way that you want to be treated out in the world/with strangers

a) in terms of your gender?

Not important	Important	Very Important	Most important
never	seldom	most of the time	always

b) in terms of your age?

Not important	Important	Very Important	Most important
never	seldom	most of the time	always

4) Where or with whom is "passing" (as non-transmale/as bio-male) or being "stealth" important to you?

a) Strangers

Not important	Important	Very Important	Most important
never	seldom	most of the time	always

b) Work mates

Not important	Important	Very Important	Most important
never	seldom	most of the time	always

c) School mates

Not important	Important	Very Important	Most important
never	seldom	most of the time	always

d) Distant family

Not important	Important	Very Important	Most important
never	seldom	most of the time	always

e) Immediate family

Not important	Important	Very Important	Most important
never	seldom	most of the time	always

f) Acquaintances

Not important	Important	Very Important	Most important
never	seldom	most of the time	always

g) Close friends

Not important	Important	Very Important	Most important
never	seldom	most of the time	always

h) Partners/lovers
Not important Important Very Important Most important

5) a) Overall, since you've started HRT, has "passing" been a source of stress?
never seldom most of the time always N/A

b) Is this a source of stress or anxiety now?
never seldom most of the time always N/A

6) Where or with whom is *being out* as trans important to you? Are you out as trans with them?
a) Strangers
Not important Important Very Important Most important
never seldom most of the time always

b) Work mates
Not important Important Very Important Most important
never seldom most of the time always

c) School mates
Not important Important Very Important Most important
never seldom most of the time always

d) Distant family
Not important Important Very Important Most important
never seldom most of the time always

e) Immediate family
Not important Important Very Important Most important
never seldom most of the time always

f) Acquaintances
Not important Important Very Important Most important
never seldom most of the time always

g) Close friends
Not important Important Very Important Most important
never seldom most of the time always

h) Partners/lovers
Not important Important Very Important Most important
never seldom most of the time always

7) a)Was being out as trans a source of stress or anxiety in the past?
never seldom most of the time always

b) Is this a source of stress or anxiety now?
never seldom most of the time always

8) How do you think you are the same as or different from biologically-born males?
a) same:

b) different:

8a) How important to you is it that you minimize these differences?
Not important Important Very Important Most important

8b) How important to you is it that you retain these differences?
Not important Important Very Important Most important

9) To be the type of man/male/trans man that you want to be, is it important to you that you:
a) Move your body in any particular way?
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

b) Make a certain amount of money
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

c) Have a certain type of job
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

d) Wear men's clothing
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

e) Have a men's haircut
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

f) Play any particular "role" in terms of sex
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

g) Have bottom surgery
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

h) Have top surgery
Not important Important Very Important Most important

Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

i) Have bigger muscles
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

j) Look any particular age
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

k) Have children
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

l) Own something (home, car)
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

m) Be able to cry/or not cry
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

n) Show or not show your emotions/enthusiasm/affection
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

o) Be blunt/straightforward
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

p) Come across as confident
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

q) any other male roles/behaviors that you feel are important for you?
Not important Important Very Important Most important
Fit/Succeed Mostly Fit/succeed Don't really fit/succeed

10) Do you expect the changes that happen over the process of your transition to resolve the difficulties (of question 1)? y/n
a) Which issues in particular?

11) Do you feel that your expectations have changed over the course of the transition process? y/n
How?

12) Do you expect a lot more to change for you in the future in terms of your physical transition?

13) a)Do you feel that your physical self matches your emotional self? y/n

b) Do you feel that your physical self matches who you are socially? y/n

c) If discrepancies in a or b, do any of they bother you? y/n

14) For you, how would you rate the following in terms of their importance in your process of transition – how much do you feel you need or look(ed) forward to them? **(read whole list 1st)**

A) Top surgery not important important very important most important
Done intend to do do not intend to do
B) Hysterectomy not important important very important most important
Done intend to do do not intend to do
C) Vocal change not important important very important most important
Dropped enough hope it gets deeper never cared too much
D) Bottom surgery not important important very important most important
Done intend to do do not intend to do
E) Facial hair not important important very important most important
Have some/OK want more don't care/want any
F) Body hair not important important very important most important
Have some/OK want more don't care/want any
G) Fat redist. not important important very important most important
Have some/OK want more don't care/want any
H) >muscle not important important very important most important
Have some/OK want more don't care/want any

Section 4: Stressors, Challenges, and rewards

1) Do you feel that your behavior has changed over the course of your transition? y/n
a) If yes, How so?

b) Have you been consciously working on or changing any aspects of your behavior?

2) a)Do you feel that *behaviorally in day to day behaviors* you are read as a biologically-born male/nontrans-guy? y/n
b) Has this been a source of stress or anxiety in the past? y/n
c) Is this a source of stress or anxiety now? y/n

3a) Do you feel more or less in control of your life compared to before transitioning? m/l
b) Is this the same or different from your experience when you first started transitioning?

4)Have the interactions/experiences listed below been sources of stress/anxiety for you?

a) psychotherapist for diagnosis	extremely	moderately	a little	not at all	positive
b)endocrinologist	extremely	moderately	a little	not at all	positive
c) ob/gyn	extremely	moderately	a little	not at all	positive
d) surgeons	extremely	moderately	a little	not at all	positive
e) state agencies for name change	extremely	moderately	a little	not at all	positive
f) HR for job/school documents	extremely	moderately	a little	not at all	positive
g) injections	extremely	moderately	a little	not at all	positive

5) When was your last pelvic exam?
5a) Was this very difficult for you?
5b) Does it cause anxiety for you now if you need to go for this exam?

6) Would you say that you "feel your age"?
6a) Are you treated your age by people that don't know you? y/n
6b)If no, does this bother you or cause any problems?
6c) Has the age at which you began transitioning effected your experience in any way either negatively or positively?

Section 5: Resources, Relationships, Coping, and Resilience
1) Which relationships have been the most difficult in terms of your transition?

1a) Which relationships have been the most helpful in terms of your transition?

2) Do you have any friends or acquaintances that you interact with regularly that are trans?

3) When and where did you learn about the surgical/hormonal options that were available for you to transition?

4) What are the most effective ways you have developed or resources you've used to cope with the stress of transitioning?

5) Are your coping mechanisms now different than those you used to deal with stressors related to gender prior to transitioning?

6) If single and or looking to date - do you want to be in romantic relationship right now? What is the most difficult part of meeting someone for you?

7) If involved or dating - Are your romantic relationships/interactions more or less challenging now that you've transitioned?

8) At this point in your life, are you experiencing any of the following:

A) depression severe moderate none
B) insomnia severe moderate none
Every night few times per week never
C) anxiety many times a day many times per week many times per month never
D) change of appetite severe moderate mild none
Lost increased binge
E) Other _____ frequency/severity _____

9) Do you have debt as a consequence of transitioning?

9a) Is this debt preventing you from doing other things that you would have otherwise done in your life right now?
9b) Would you say that the debt is a source of stress for you?

10) Are these debts holding you back from doing other things that you want to do?

11) Do you see yourself as a "strong/resilient" person?
never seldom most of the time always

12) Did you see yourself this way prior to your decision to transition?

13) What quality about yourself are you the most displeased or frustrated with? What is your least favorite quality about yourself?

14) What quality about yourself do you value the most? What is your favorite thing about you?

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