Aging out of Pediatrics: Preparing Adolescents for Health Care Transition Using Illustration-based Anticipatory Guidance

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Abstract

Objective

Health care transition (HCT) for adolescents without special health care needs in the primary care setting has received inadequate attention, as represented by national surveys, when compared to adolescents with special health care needs. Barriers to transition such as lack of knowledge and preparation have been known to hinder HCT despite the knowledge gap and weak evidence related to non-special needs adolescent transition. Application of anticipatory guidance education related to care transition may improve transition readiness scores of adolescents without special health care needs.

Methods

Utilizing Meleis' transition theory with the Plan-Do-Study-Act framework, a quasi-experimental study was conducted comparing transition readiness scores between baseline and intervention groups of adolescents 14 years or older attending their well checks at a small pediatric primary care site. The intervention consisted of two videos developed from *Got Transition*[TM]'s (n.d.) Six Core Elements for specific adolescent age ranges.

Results

Statistical analysis reveals that the subgroup and overall transition readiness scores for both age groups, 14-15 and 16-18 years of age, when comparing the baseline groups to the intervention groups, have mixed significance ($p = .419$, $p = .074$, respectively). However, when asking the respondents about their understanding of the transition process and their role in that process, 75% and 62.5%, respectively, at minimum agreed the intervention was helpful.

Conclusion

The findings were mixed, indicating the educational videos did have a short-term impact on adolescent transition readiness scores for the 16-18 years old group only. Future focus on long-term follow up throughout the adolescent period may yield better data.

Aging out of Pediatrics: Preparing Adolescents for Health Care Transition Using

Illustration-based Anticipatory Guidance

In the realm of primary care, children's healthcare needs are usually delineated from adult healthcare needs. This is most readily seen at the community level via the establishment of pediatric-focused primary care offices versus a traditional family practice, and in how health care for pediatric patients is approached differently than the health care of adult patients. However, regardless of type of office a pediatric patient is attending for primary care services, a transition to an adult health care office or adult style of health care must occur. More importantly, this transition is not necessarily a simple or straightforward process and applies to all adolescents despite a history of focus on adolescents with special health care needs (SHCN).

Problem Statement

Pediatric primary care, despite having a strong focus on anticipatory guidance and planning as it relates to development, has not given health care transition (HCT) and transition readiness the same considerations as other areas of childhood development and health care. HCT is a process designed to move an adolescent from a pediatric care model to an adult model, which may or may not include the adolescent switching to a new provider (White et al., 2018). Transition readiness can be defined as the process of decision- and action-making of adolescents, parents, and providers to build the capacity of all involved to attend to all aspects of transition (van Staa et al., 2011). The concept of transition readiness has been applied and well-studied in specialty populations among adolescents with SHCN. However, research has indicated that these individuals are self-managing aspects of their medical conditions while adolescents without SHCN, in comparison, have less experience and management skills in regards to their health care

(Eaton et al., 2017). Research suggests that transition readiness could be applied to adolescents without SHCN (Eaton et al., 2017).

On a national scale, transition planning is poorly attended to despite the development and availability of standards and structured HCT planning and implementation guidelines (American Academy of Pediatrics et al., 2011; *Got Transition*^{TM}, n.d.). Transition planning is a national performance measure included in the National Survey of Children's Health (NSCH). Findings from the 2016 NSCH survey suggested that 17% of youth with SHCN and 14% of youth without SHCN met the overall transition measure (Lebrun-Harris et al., 2018). Review of the data on those measures on the same 2016 dataset suggests with caution, that for Arizona, 23% of youth with SHCN and 11% of youth without SHCN met the overall transition measure in full (Child and Adolescent Health Measurement Initiative, 2016). For the 2017-2018 NSCH years combined, youth without SHCN met the overall transition measure at a average of 14% nationally and 8% for Arizona, again interpreted with caution (Child and Adolescent Health Measurement Initiative, 2018). Similarly, in the Syverson et al. (2016) study 64% of adolescent participants had not discussed transition to an adult provider and 67% had not discussed insurance needs.

Trending health care utilization rates from childhood through young adulthood, data from 2010 to 2016 indicates that health care coverage and access tend to worsen with age (Spencer et al., 2018). Further compounding the problem of HCT for adolescents, numerous barriers to successful HCT exist. The following are some of the more common barriers that providers and patients can face in HCT: abrupt or unplanned transitions, negative beliefs about or lack of confidence in adult health care providers, hesitancy to leave pediatric provider due to long-standing relationship, poor provider-to-provider communication, limited knowledge or self-

management skills, lack of education and training for providers, lack of accessible and qualified

providers, inability of services to flex according to patient needs, and uninformed patient needs

(Campbell et al., 2016; Gray et al., 2018; White et al., 2018).

Purpose & Rationale

Given that healthcare is increasingly focused on the quality of care being delivered, and

with how reimbursement is becoming tied to quality measures, primary care practitioners should

consider adolescent transition to adult care an issue with the potential to impact future health

outcomes. And based on the reports of low transition readiness among both children with and

children without SHCN, HCT is an area of pediatric health care that needs to be addressed with

targeted interventions. The purpose of this study is to attempt to address the inattention to

adolescent HCT through implementation of an illustration-based anticipatory guidance

intervention in the primary care setting.

Background & Significance

Adolescents Nearing Adulthood

The adolescent period of life is a complex time where children are beginning to assume

the role and responsibility of managing their own care and making decisions that can potentially

last a lifetime. Structured transition interventions suggest a potential positive effect on

population health, consumer experience, service utilization, and barrier reduction (Gabriel et al.,

2017). While much of the research in recent years has looked at health care transition and health

outcomes among children with special health care needs, foundational consensus (National

Library of Medicine Medicine, 2002) and development of the underlying structure of HCT

(American Academy of Pediatrics et al., 2011) outline the need for HCT planning for all

adolescents, not just youth with SHCN.

Structured Transition Planning or Anticipated Guidance for Adolescents

Anticipatory guidance is a mainstay of pediatric primary care patient education as it creates a space for dialog and discussion of health topics during the primary care visit (Hagan et al., 2017). Transition to adult health care planning falls under that category as it engages the adolescent during a crucial time of development in which the adolescent is assuming more responsibility over their life, including their health management. The standard recommendation for this period is to allow them the space to assert their autonomy while providing guidance from a health care perspective (*Got Transition*^{TM}, n.d.; Hagan et al., 2017)

When anticipatory guidance for HCT is provided to youth with SHCN, transition readiness scores tended to be higher than those who did not receive anticipatory guidance (Syverson et al., 2016). Furthermore, from a broad perspective aimed at outcomes, structured transition interventions among various adolescent patient population groups tended to result in positive outcomes within the areas of population health, consumer experience, and service utilization (Gabriel et al., 2017). Even within the hospital setting, patients with previous familiarity to HCT preparation tended to have increased motivation and sense of competence in their transition skills (Dwyer-Matzky et al., 2018).

The comparison to receiving anticipatory guidance for HCT is identified as no formal discussion or education provision for adolescents transitioning from a pediatric model to an adult model of care. The majority of adolescents and young adults, both with SHCN and without SHCN, who do not receive adequate preparation and support for transitioning to adult care are at risk for worse health outcomes when compared to patients who do receive preparation and support (Gabriel et al., 2017).

Transition Readiness Among Adolescent and Young Adult Patients and Families

Transition readiness, as a term, and its specific use to describe a set of outcome measures, lacks homogeneity across the various measurement tools that exist (Straus, 2019). Currently, measures focus on the transition process and exclude health outcomes, which is realized in the questions on the NSCH survey pertaining to adolescent HCT (Sharma et al., 2014). In terms of associated factors, increases in the following areas suggest potential increases in transition readiness: knowledge, self-efficacy, belief in self-care, self-regulation, expectations, health management skills (Espeleta et al., 2019; Hart et al., 2017; Sawicki et al., 2014b; Stewart et al., 2017). However, other studies suggest that age is a factor associated with increased transition readiness scores (Jensen et al., 2017; Lapp & Chase, 2018; Rosen et al., 2016; Sawicki et al., 2014a).

Unfortunately, evidence is mixed in regards to linking transition interventions and transition readiness with quality of life and health-related outcomes (Campbell et al., 2016; Chu et al., 2015; Gabriel et al., 2017). Furthermore, while it is evident from the literature review that the original intention of adolescent HCT applied to all adolescents, scholarly focus has largely been placed on specific sub-populations within the larger population of adolescents, which further compounds the problem of studying transition readiness outcomes. While there are limited studies involving HCT for the general adolescent population, support for further HCT research does exist (Eaton et al., 2017; White et al., 2018). Attention to transition readiness is warranted as part of the larger pursuit to establish quality care outcomes for HCT (Eaton et al., 2017).

Internal Evidence

At a small pediatric health clinic in the southwestern United States with a maturing patient population, informal reports from staff indicate that some adolescents continue to make

use of the health office from a health care standpoint despite being adults based on their age. While no formal investigation was conducted into the reasons of why these patients maintained care at the clinic, informal discussions with staff indicate the following reasons for failing to transition: strong patient-provider and family-provider relationships, difficulty finding providers willing to accept children with SHCN, and convenience during school holidays for college age students. These reasons coincide with the previously discussed barriers to HCT. A preliminary survey of the patient database revealed several patients age 19 or older with established care at the clinic (Appendix A). However, a more thorough search of the primary care site's database conducted from January 1, 2019 to December 18, 2019 revealed 35 unique visits by patients aged 19 to 22 years old.

This investigation has led to the clinically relevant PICOT question, "In adolescent primary care patients without SHCN nearing adulthood (P), how does an anticipatory guidance adjunct (I), compared to no guidance adjunct (C), affect their readiness to transition to adult primary care (O)?"

Search Strategy

A literature review was conducted on databases specific to the field of health care to obtain the most recent evidence relevant to the topic of this paper. The three databases searched were the Cumulative Index of Nursing and Allied Health Literature (CINAHL), PubMed, and the Cochrane Library. The searches within each database was conducted in a uniform manner based on the stated PICO question. Key terms for the population of interest included: *pediatric*, teen*, adolescen*, paediatric*,* and *young adult.* The intervention search was conducted using the following key terms: *care transition, care transition planning, transition plan, transition from pediatric to adult health, health-care transition, healthcare transition, health care transition,*

transition of care, anticipatory guidance, transition intervention, transition to adult care, and

transition education. The term *transition to adult care* constituted a Medical Subject Heading

(MeSH) term within the PubMed and the Cochrane Library databases. Outcomes were searched

using the following key terms: *transition readiness, transitional readiness, readiness assessment,*

self-care, patient adherence, and *patient satisfaction.* A publication date filter of March 2015 and

newer was enacted across all three databases. Furthermore, filters were placed on both the

CINAHL and PubMed searches and included the following: English language, human subjects,

and adolescent age group (13-18 years).

The initial CINAHL search yielded 114,909 results. After applying the above stated

filters, the search yielded 101 results. The initial PubMed search yielded 36,672 results.

Application of the same filters yielded 187 results. The initial search of the Cochrane Library

yielded 32 results. Applying the publication date filter yielded 25 results. This resulted in a grand

total of 320 studies, which after screening for duplicates and relevance was reduced to 253

results. Further abstract scanning reduced the number to 204 results.

Inclusion criteria included studies and interventions directed at examining or modifying

transition readiness as it relates to HCT for adolescents in the primary care setting. Exclusion

criteria was numerous and included the following: adult only, acute care settings, scoping

reviews, purely qualitative studies, purely parent or proxy input, and measurement tool

validation studies. Ten potential articles were then identified for further appraisal and placed in

an evaluation table (Appendix B).

Critical Appraisal of the Evidence

Appraisal of the evidence table (Appendix B) revealed that the studies involving

adolescent HCT obtained from the literature search were some of the most recent studies to date;

however, numerous factors limit their overall strength. The first major issue with the studies is the overall weak level of evidence, represented by the majority as level IV evidence. This is further represented by the majority of the studies being cross-sectional or retrospective in design. In general, the studies did not explicitly state the frameworks used to guide the studies, but overall they appeared to adhere to either Zimmerman's (2000) empowerment theory or Meleis' (2010) theory of transitions. Furthermore, while the samples were sufficiently consistent across most studies in terms of age range, size, and setting within the United States of America, the sampling method employed was convenience sampling due to the majority of the studies being connected with a specialty clinic and due to the cross-sectional design. However, a large amount of heterogeneity resulted from the samples not being consistent due to the various levels of chronic conditions included by some studies compared to other studies that focused on a singular chronic disease or subspecialty.

Appraisal of the measurement tools, independent variables, and dependent variables used throughout the studies varied widely in terms of specifics; however, in more than half of the studies, key tools and variables could be tied to the constructs of HCT planning and transition readiness. The key variables that can be tied to the construct of transition readiness include the following: transition readiness, self-efficacy, self-management, personal health knowledge, patient activation, and competence. Given the limitations of the study designs implemented as a whole, analysis of the majority of the studies relied on linear and logistic regressions, along with t-tests and chi-square tests where appropriate, in addition to the normal descriptive statistics.

Overall, the analysis of the findings with a focus on the construct of transition readiness indicated that adolescents were better prepared for HCT when planning or education was provided. Also, when taking age into consideration, older adolescents were better prepared for

HCT compared to younger adolescents. In terms of bias, while most studies have no overt bias

present, given the design of most of the studies as well as the use of convenience sampling, the

potential for selection bias exists across most of the studies.

Synthesis of the Evidence

Deriving a synthesis table (Appendix C) from the aforementioned evaluation table

(Appendix B) reveals a general gap in the knowledge of adolescent HCT as it relates to the

general adolescent population. The synthesis indicates that while the majority of the studies

involved measuring an aspect of the transition readiness construct, there are inherent issues

drawing a straightforward comparison from across all of the studies. However, there are two

potential considerations that can be drawn regarding adolescent HCT. The first consideration is

that planning or education targeting the HCT process, regardless of how the education occurred,

seems to favor improved readiness. The second consideration is that demographics can have an

impact on transition readiness.

The conclusion that can be drawn from the synthesis of the evidence is that despite the

wide focus on various pieces of the larger transition readiness construct, there exists a gap in the

knowledge of adolescent HCT. This gap is especially noticeable as it relates to the general

population of adolescents as the focus has primarily been on adolescents with special health care

needs or chronic conditions. Furthermore, given the inherent weakness of the studies,

standardization of approach to HCT interventions is warranted. Addressing these two areas will

allow for a more standardized assessment of HCT for adolescents while minimizing the

influence of factors associated with chronic disease.

Implementation Framework

The implementation framework best suited for an intervention aimed at improving the health care transition process of adolescents is the PDSA model, also known as the Plan-Do-Check-Act model (Gorenflo & Moran, 2009). The PDSA model condenses the evidence-based problem-solving approach of quality improvement into four stages. The diagram presented in Appendix D represents the major stages and progression of the PDSA model.

Plan, the first stage, is characterized by the development of an action plan after identification and research of present issues and potential areas for improvement. Do, the second stage, is the implementation stage of the model during which general observations are performed and study relevant data is collected. The third stage, Study, compares the results to the intended aim of the Plan stage, identifies unintended effects, and determines overall feasibility. The fourth stage, Act, is the determination stage in which the intervention is either formalized as part of the new routine, subjected to another cycle of the PDSA or abandoned all together.

The PDSA model is well suited to address the quality improvement issue of adolescent health care transition due to its adaptability and cyclical nature. The Plan stage is generalizable to a primary care office and seeks to gain input from a variety of sources. The primary issue presents internally via the number of unique visits by young adults older than 18, and externally by the low rates of transition preparedness nationwide among adolescents, as well as by the lack of evidence evaluating transition readiness among the general population of adolescents. The plan of action surrounding this issue will be focused on providing education of HCT using an illustration-based anticipatory guidance adjunct at adolescent well-check appointments. Specifically, the anticipatory guidance education intervention will be based on various aspects of *Got Transition*^{TM} 's (n.d.) six core elements.

The stages of Do and Study allow for a thorough implementation and evaluation of a quality improvement initiative with a subsequent decision point of whether to formally integrate the initiative or take a different path. The exact specifics of the Do stage will be covered extensively in the Methods section. The resulting data would then be subject to a quantitative assessment. Utilizing this framework also allowed for changes to be made in either real-time during implementation, or after completion. At which point the Act portion of the PDSA model is enacted and the decision is made to either redo the study with changes or accept the results.

Theoretical Framework

The evidence indicates a gap in the knowledge of adolescent transition to an adult health model as it relates to adolescents, especially those without special health care needs. To address this area, Meleis' (2010) transition theory embodies the construct of transition as a complex, interconnected process on multiple levels. The framework can be broken into three distinct categories of concepts: the nature of transition, transition conditions, and patterns of response. The diagram in Appendix E portrays the major concepts and relationships of Meleis' transition theory.

The nature of transitions category is defined by the type, patterns, and properties of the transition. Of the four types of transitions described by Meleis, adolescent HCT falls under both the developmental and situational types of transition simultaneously throughout the HCT process. Meleis further breaks down the construct into essential properties: awareness, engagement, change and difference, time span, and critical points and events. While all of these properties are present and relate to each other within HCT, certain properties such as engagement, changes, and time span will tend to carry more weight. However, the significance of each of the properties will be highly dependent on the situation and involved individuals.

The next concept of Meleis' (2010) transition theory is that of conditions. While adolescents move through the HCT process, their transition will be affected by personal, community, or societal factors that may either aid or hinder the process. The next concept of Meleis' (2010) transition theory is patterns of response, which is comprised of process and outcome indicators. Process indicators include the ideas of perceived connectedness, interaction, confidence, and coping, while outcome indicators may include skill or behavior mastery along with integrative identities (Im, 2014). The final concept of Meleis' (2010) transition theory is nursing therapeutics. There are three measures that constitute Meleis' description of nursing therapeutics and can be applied to an intervention, they are as follows: assessment of readiness, preparation for transition, and role supplementation.

Given the major concepts of Meleis' (2010) transition theory and their interconnectedness, the framework this theory provides will benefit and guide an anticipatory guidance intervention aimed at preparing adolescents for HCT. The main connections drawn between Meleis' theory and an anticipatory guidance intervention targeting HCT are the ideas of awareness, engagement, and time as major factors addressing transition. Anticipatory guidance will benefit both the medical staff and the adolescent in that it can help address the adolescent where they are, allowing space for autonomy, as well as allowing for the medical staff to best adapt their time based on the needs of the adolescent.

Outcomes

Establishing feasibility and benefit with adolescent HCT is difficult given that outcomes measuring benefit and cost would require a lengthy study period. A more conservative approach is to measure the readiness of adolescents as they approach adulthood since the American Academy of Pediatrics supports structured HCT initiatives and indicates the need for assessing

progress (White et al., 2018). This encompasses the idea that higher readiness scores will be obtained from adolescents closer to adulthood given the use of anticipatory guidance. Measuring transition readiness will be accomplished through the use of the 20 question Transition Readiness Assessment Questionnaire (TRAQ) (Wood et al., 2014). The TRAQ has been established as valid and reliable (Wood et al., 2014). The intent of focusing on transition readiness among the general adolescent population, those without SHCN, is to better prepare adolescents for taking on their developing adult role through empowering them in their health care, which is congruent with Meleis' (2010) transition theory framework.

However, while transition readiness is relatively new, limited evidence from studies involving youth with special health care needs suggest there are potential benefits to addressing HCT in a structured manner (Gabriel et al., 2017). Although, it should be noted that a snapshot view of anticipatory guidance and transition readiness is not an indicator that adolescent HCT will occur. Future research will be needed to establish if transition readiness has implications beyond the pediatric period and whether or not the barriers inhibiting adolescents from making a timely transition can be mitigated.

Methods

Study Design

A quasi-experimental design was used to answer the following quality improvement question:

1. For adolescent primary care patients nearing adulthood, does use of an illustration-based anticipatory guidance intervention with a well-check visit in the primary care setting affect the transition readiness of an adolescent post-visit?

Population and Setting

The site of the study was a small private pediatric clinic located in the southwest United States. The medical staff was composed of 2 medical doctors, 2 nurse practitioners, and 1 registered nurse. Other staff include medical assistants, scribes, and requisite front office staff. The office serves a relatively balanced mix of private and public insured pediatric patients. The goal of the organization is to be a provider of comprehensive primary care as well as a medical home for all patients, including those with SHCN and those without SHCN. The focus of this study was on the adolescent population without SHCN.

Ethical Considerations

IRB approval was sought given the population of focus being adolescents. The adolescent participants were consented via a standardized consent. The consent process occurred prior to either taking the survey in the baseline phase or watching the anticipatory guidance video illustration in the intervention phase. Along with the digital survey link sent in the week following the intervention component, participants were reminded that their participation in the study was not mandatory and that their response to the survey questions could be submitted as incomplete. This approach ensured sufficient knowledge was provided to the participant regarding the study. Information gathered as part of the study did not include any identifiable information and thus ensured the protection of privacy of all the participants. Furthermore, consents were kept separate from survey responses to achieve anonymity of results.

Instruments

Transition readiness of adolescent patients was assessed through the use of the Transition Readiness Assessment Questionnaire (TRAQ) developed by Wood et al. (2014). The Transition Readiness Assessment Questionnaire is a 20-item scale that measures an adolescent's readiness to transition to adult care. The TRAQ is further divided into 5 subscales: managing medications,

appointment keeping, tracking health issues, talking with providers, and managing daily activities. While the TRAQ scales use a 5-point Likert-type format, with a range of possible scores between 20-100, the intention is for the provider to evaluate the skills of the individual and determine future areas of focus for transition preparation versus looking at just the overall score. Specifically, the 5-point scale assesses an adolescents self-reported skill level description ranging from "No, I do not know how" to "Yes, I always do this when I need to."

Overall, TRAQ is a reliable instrument with a Cronbach's alpha of 0.94 (Wood et al., 2014). TRAQ is also reliable for 4 of the 5 subscales of measurement with a Cronbach's alpha range of 0.9 to 0.77 (Wood et al., 2014). The subscale of managing daily activities had a Cronbach's alpha of 0.67, which is below the 0.7 score of acceptable reliability.

Data related to intervention comprehension, as well as demographic data, was collected by a primary investigator developed form. The focus of the data pertaining to intervention comprehension was on the following topics: the ability of the intervention to help adolescents understand the transition process, as well as describe the role of the adolescent in HCT. The sociodemographic data gathered included the following: age, gender, and grade level.

Project Timeline

Implementation of the quality improvement study began in the fall of 2020. The anticipated length of the study was 2 months, with 4 weeks devoted to baseline data collection and another 4 weeks devoted to intervention application and data measurement. Appendix F represents the original, proposed timeline of the quality improvement study. The timeline for the implementation phase was ultimately adjusted due to a lack of participant response and the following timeline detailed in this section constituted the final methodology utilized for this study.

The primary investigator identified adolescent patients with well-checks. For the baseline data collection period, adolescents and legal guardian were provided information on the study, consented if appropriate, and surveyed if agreeing to participation in the study. For the intervention phase, at the scheduled well-check appointment, the adolescent participant and legal guardian were provided information on the study, consented if appropriate, and given time to view the HCT anticipatory guidance video illustration. A link to a digital survey was sent to the participant via their provided email 1 week after the adolescent well-check. Following completion of the study period, the data collected was then digitized and uploaded to the Intellectus Statistics^{TM} statistics package for analysis.

Budget

Funding for this project was provided by the principle investigator. Equipment needed to produce the illustration-based anticipatory guidance constituted the bulk of the budget. Purchasing of materials required for physical versions of the consents and instruments were included in the overall costs. Where applicable, utilization of free video hosting and communication strategies were implemented for conduction of the project. Refer to Appendix G for the cost breakdown of the project budget.

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Results

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Outcomes

Data collected from the project was analyzed using Intellectus Statistics^{TM}. Summary statistics were calculated for each interval and ratio variable; frequencies and percentages were calculated for each nominal and ordinal variable split by age group. Missing data points utilized Intellectus Statistics^{TM} imputation algorithms to provide substitute values needed to avoid purging incomplete responses and to conduct analyses of the data. The imputation algorithms

used by Intellectus Statistics™ applied random sampling within the specified categories for

nominal and ordinal variables, whereas regression imputation used for scale variables utilized

categorical averages combined with predicted error (*Intellectus Statistics*, n.d.).

Frequencies and Percentages

For the 14-15 years of age group ($n = 21$), the baseline group responses ($n = 17$, 81%)

was larger than the intervention group responses ($n = 4$, 19%). In the 16-18 years of age group (n

$= 19$), the baseline group responses ($n = 15$, 79%) was larger than the intervention group

responses ($n = 4$, 21%). Frequencies and percentages are presented in Table H1 and Table H2.

Summary Statistics

For the 14-15 years of age group, the baseline group had an average age of 14.29 ($SD =$

0.47, $SE_M = 0.11$, Min = 14.00, Max = 15.00, Skewness = 0.90, Kurtosis = -1.18, $Mdn = 14.00$,

Mode = 14.00); the intervention group had an average age of 14.75 ($SD = 0.50$, $SE_M = 0.25$, Min

= 14.00, Max = 15.00, Skewness = -1.15, Kurtosis = -0.67, $Mdn = 15.00$, Mode = 15.00). For the

16-18 years of age group, the baseline group had an average age of 17.13 ($SD = 0.74$, $SE_M =$

0.19, Min = 16.00, Max = 18.00, Skewness = -0.20, Kurtosis = -1.05, $Mdn = 17.00$, Mode =

17.00); and the intervention group had an average age of 16.75 ($SD = 0.96$, $SE_M = 0.48$, Min =

16.00, Max = 18.00, Skewness = 0.49, Kurtosis = -1.37, $Mdn = 16.50$, Mode = 16.00).

MANOVA for the 14-15 Years of Age Group

A multivariate analysis of variance (MANOVA) was conducted to assess if there were

significant differences in the linear combination of the TRAQ subgroup scores and overall

TRAQ score between the baseline and intervention groups. In order to conduct a MANOVA

analysis of collected data, the following assumptions were assessed: multivariate normality,

homogeneity of covariance matrices, multivariate outliers, and absence of multicollinearity.

To assess the assumption of multivariate normality, the squared Mahalanobis distances were calculated for the model residuals and plotted against the quantiles of Chi-squared distribution (DeCarlo, 1997; Field, 2018). Through the use of a scatterplot, multivariate normality can be assumed if the points form a relatively straight line; strong deviations potentially indicate nonreliability, hindering the assumption of multivariate normality. The scatterplot for normality is presented in Figure I1.

Due to the unique properties of the data, some of the covariance matrices could not be calculated. This resulted in the inability to conduct the Box's *M* test.

Regarding multivariate outliers, identification of influential points were evaluated by using the calculated Mahalanobis distances compared to a χ^2 distribution (Newton & Rudestam, 2012). An outlier was defined as any Mahalanobis distance that exceeds 22.46, the 0.999 quantile of a χ^2 distribution with 6 degrees of freedom (Kline, 2015). No outliers were identified in the model.

Evaluating the multicollinearity of the dependent variables through the use of a correlation matrix revealed that all variable combinations had correlations less than 0.9 in absolute value. This indicated that the results were unlikely to be significantly influenced by multicollinearity. The correlation matrix is presented in Table H3.

MANOVA for the 16-18 Years of Age Group

A multivariate analysis of variance (MANOVA) was conducted to assess if there were significant differences in the linear combination of the TRAQ subgroup scores and overall TRAQ score between the baseline and intervention groups. In order to conduct a MANOVA analysis of collected data, the following assumptions were assessed: multivariate normality, homogeneity of covariance matrices, multivariate outliers, and absence of multicollinearity.

To assess the assumption of multivariate normality, the squared Mahalanobis distances were calculated for the model residuals and plotted against the quantiles of Chi-squared distribution (DeCarlo, 1997; Field, 2018). Through the use of a scatterplot, multivariate normality can be assumed if the points form a relatively straight line; strong deviations potentially indicate nonreliability, hindering the assumption of multivariate normality. The scatterplot for normality is presented in Figure I2.

Due to the unique properties of the data, some of the covariance matrices could not be calculated. This resulted in the inability to conduct the Box's *M* test.

Regarding multivariate outliers, identification of influential points were evaluated by using the calculated Mahalanobis distances compared to a χ^2 distribution (Newton & Rudestam, 2012). An outlier was defined as any Mahalanobis distance that exceeds 22.46, the 0.999 quantile of a χ^2 distribution with 6 degrees of freedom (Kline, 2015). No outliers were identified in the model.

Evaluating the multicollinearity of the dependent variables through the use of a correlation matrix revealed that the combination of the Tracking Health Issues Score and Overall TRAQ Score variables had correlations greater than 0.9 in absolute value which suggests the possibility of singularities. Singularities occur when two variables are identical or nearly identical. When present correlations are greater than 0.9 or less than -0.9, the results may be moderately biased. The correlation matrix is presented in Table H4.

Statistical Results

The implementation of this study is essentially a small exploratory pilot study in application. Given the importance of addressing a shortcoming in health care transition planning among adolescents, the level of significance was reduced, otherwise future research may not be

explored. Significance was tested at the p <0.10 level due to the importance of needing to detect

small to moderate differences where small sample sizes are concerned, with p values of >0.05

but <0.10 are referred to as trend (Fugate Woods et al., 1997).

The overall result for the 14-15 years of age group was not significant, $F(6, 14) = 1.08$, p

$= .419$, $\eta^2 p = 0.32$, suggesting the linear combination of the TRAQ subgroup scores and overall

score was similar between both the baseline and intervention groups. The MANOVA results are

presented in Table H5.

The overall results for the 16-18 years of age group was significant, $F(6, 12) = 2.61$, $p =$

$.074$, $\eta^2 p = 0.57$, suggesting the linear combination of the TRAQ subgroup scores and overall

score was significantly different between both the baseline and intervention groups, indicating

the potential for a trend. The MANOVA results are presented in Table H6.

Post hoc analysis of variance (ANOVA) of each dependent variable was conducted to

further examine the effects of the baseline and intervention groups of the 16-18 years of age

group. Of the six dependent variables, which are the five subgroups and the overall score of the

TRAQ, the ANOVA conducted on the subgroup of Talking with Providers, when examined with

an alpha value of 0.10, indicated a significant difference, $F(1, 17) = 4.47$, $p = .049$, among

baseline and intervention groups. Refer to Table H7 for the ANOVA results and Table H8 for

means and standard deviation associated with the Talking with Providers subgroup. The post hoc

analyses of the other subgroups and the overall score were not significant.

Clinical Significance

Statistically, the null hypothesis cannot be rejected for the 14-15 years of age group, and

the null hypothesis can be rejected for the 16-18 years of age group. However, the significant

effect of the intervention on the 16-18 years of age group should be interpreted with caution as

the mean score for the Talking with Providers subgroup appeared to be negatively affected when comparing the baseline group to the intervention group in the post hoc analysis, which is contradictory to intervention expectations.

In addition, from a clinical standpoint, the majority of adolescents in both of the intervention groups agreed that the intervention videos helped the participants to understand the process of transition as well as described their role in the transition process; respectively 75% and 62.5%. The results are presented as part of the descriptive statistics in Table H9.

Impact and Sustainability

Encompassing the statistical and clinical outcomes, an educational video intervention aimed at improving transition readiness in the adolescent population of a pediatric primary care office may be useful for older adolescents. Also, given the supportive findings related to the perceived understanding by the adolescent of the transition process and their role in that process, use of an educational adjunct may be useful. Despite the data only showing the possibility of an increase in transition readiness with illustration-based anticipatory guidance, broaching the subject of transitioning to adult health care early and at regular intervals ascribes to the concept of anticipatory guidance. Continuing this intervention would help to address the needs of adolescents from a knowledge perspective, as well as promote discussion with providers, as they approach the age of adulthood. From a time utilization perspective, incorporating an educational anticipatory guidance video during a patient's idle time in the office, such as that experienced by adolescents sitting during the 15-minute waiting period following the human papillomavirus (HPV) vaccine, is a potentially opportune time considering the end utility is questionable. While not explored except for a brief week, which will be discussed in the following section, a link to

the videos could be sent out before or after adolescent visits via the site's secure health messaging platform as a way to avoid taking time away from the providers.

<center>**Discussion**</center>

Limitations and Barriers

While this project intended to measure the efficacy of using the site's secure health messaging platform as a pre-appointment communications education initiative, concerns arose over limited enrollment in the health information portal associated with the messaging platform and lack of response. Due to these issues, modifications were made after one week to recruit for the intervention phase while adolescents were in the office with plans to provide the survey digitally a week after the appointment. However, it should be noted that changing the implementation strategy for surveying adolescents in the intervention phase likely affected the responses when compared to surveying the baseline groups in the health office setting, which may explain the negative effect on the Talking with Providers subgroup in the post hoc analyses.

Despite HCT being conceived of as a process where the goal is to increase an adolescent's readiness as they approach the age of adulthood, the relevance of the TRAQ survey may not be realized until close to time of transition. While not measured, it was reported off-hand by some parents that the survey questions were not appropriate, in the sense of relevance, for younger adolescents. This limitation is a function of misunderstanding the purpose of the survey, and its relation to HCT and long-term planning, then of health care in the current moment.

Another major limitation was the low response rate in the intervention phase despite the alteration to the implementation method. While 18 participants consented and watched one of the video interventions, only 8 of those participants responded to the survey sent by email in the

weeks following their appointment. Surveying the participants in the office before they left would not have been ideal due to the aspects of health care transition that involve discussion between the adolescent and their parents regarding their healthcare. An example of this can be identified in the various levels of insurance coverage and whether it is private or covered by the government. In continuing with the example, families with private insurance are likely to keep the adolescent on their health insurance policy as allowed by law up to the age of 26. Whereas adolescents utilizing Medicaid-backed coverage will need to address their situation via a different avenue.

Furthermore, the low response rate of the intervention group likely affected the significant outcome noted with the 16-18 years old group. Specifically, the post hoc significance noted with that group indicated a negative effect from application of the intervention, where the Talking with Providers subgroup is concerned.

Another factor to take into consideration is that both the baseline and intervention phases of this study were conducted during the COVID-19 pandemic. The total effect the pandemic had on adolescent primary care well-check visit rates is uncertain. However, given that public messaging at the time from the CDC (2020) was to limit non-essential public travel and activities, opting instead for alternative means of accessing primary care doctors, it should be assumed the site at which the study was conducted did not reach their average adolescent well-check visit rates.

Literature Connections

Similar to other studies evaluating transition readiness among adolescents, the data collected indicated an increase in average transition readiness scores that correlated with increasing adolescent age ($r = 0.56, p < .001$). Specifically, Jensen et al. (2017) and Sawicki et

al. (2014a) note the correlation of higher average TRAQ scores with older adolescents. Refer to graph in Appendix J, which displays the average TRAQ scores according to age group, and the scatterplot in Appendix K, which displays the regression correlation between age and average TRAQ scores of the baseline group.

Future Research

Considering the incidental findings regarding the utility of video interventions in increasing self-reported process and role understanding, a long-term approach to the assessment period should be explored. Again, going back to the idea that individual adolescent health needs in the adult period are highly dependent on multiple factors, allowing the adolescent and family more time to discuss future plans may be beneficial and may increase transition readiness scores over a longer period of time than anticipated by this study. Since readiness is a process with the goal of the adolescent being prepared for the adult role transition, and readiness appears to grow with age, a time-series focusing on yearly intervals may be a more appropriate fit. Furthermore, utilization of time by providers to check-in with adolescents regarding their transition readiness at future visits may serve as timely reminders to continue to consider the different aspects of transition readiness as the adolescent approaches adulthood.

<div align="center">**Conclusion**</div>

Overall, this study produced mixed results relating to significant difference in short-term transition readiness scores using illustration-based anticipatory guidance education focusing on transition preparation. In the short-term, illustration-based anticipatory guidance may potentially impact HCT for adolescents 16-18 years of age despite the conflicting issues presented by the post hoc analyses. More importantly, this study adds to the body of knowledge surrounding HCT through the use of a novel approach to addressing an area of historically low preparation, as

indicated by national surveys, specifically for adolescents without SHCN. Clearly, more research

is needed regarding the educational needs for adolescents preparing for transition from pediatric

to adult health care providers, or at the very least to an adult health care model.

References

American Academy of Pediatrics, American Academy of Family Physicians, American College of Physicians, Transitions Clinical Report Authoring Group, Cooley, W. C., & Sagerman, P. J. (2011). Supporting the health care transition from adolescence to adulthood in the medical home. *Pediatrics*, *128*(1), 182–200. https://doi.org/10.1542/peds.2011-0969

Campbell, F., Biggs, K., Aldiss, S. K., O'Neill, P. M., Clowes, M., McDonagh, J., While, A., & Gibson, F. (2016). Transition of care for adolescents from paediatric services to adult health services. *Cochrane Database of Systematic Reviews*, *2016*(4), CD009794. https://doi.org/10.1002/14651858.CD009794.pub2

CDC. (2020). https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/doctor-visits-medicine.html

Child and Adolescent Health Measurement Initiative. (2016). *Title V National Performance Measures (NPMs) Across State Comparison Table, 2016 NSCH.* Data Resource Center for Child and Adolescent Health Supported by the U.S. Department of Health and Human Services, Health Resources and Services Administration (HRSA), Maternal and Child Health Bureau (MCHB); Data Resource Center for Child and Adolescent Health. https://www.childhealthdata.org

Child and Adolescent Health Measurement Initiative. (2018). *Title V National Performance Measures (NPMs) Across State Comparison Table, 2017-2018 NSCH (two years combined)*. Data Resource Center for Child and Adolescent Health Supported by the U.S. Department of Health and Human Services, Health Resources and Services Administration (HRSA), Maternal and Child Health Bureau (MCHB). https://www.childhealthdata.org

Chu, P. Y., Maslow, G. R., von Isenburg, M., & Chung, R. J. (2015). Systematic review of the

impact of transition interventions for adolescents with chronic illness on transfer from

pediatric to adult healthcare. *Journal of Pediatric Nursing*, *30*(5), e19-27.

https://doi.org/10.1016/j.pedn.2015.05.022

DeCarlo, L. T. (1997). On the meaning and use of kurtosis. *Psychological Methods*, *2*(3), 292–

307. https://doi.org/10.1037/1082-989X.2.3.292

Dwyer-Matzky, K., Blatt, A., Asselin, B. L., & Wood, D. L. (2018). Lack of preparedness for

pediatric to adult-oriented health care transition in hospitalized adolescents and young

adults. *Academic Pediatrics*, *18*(1), 102–110. https://doi.org/10.1016/j.acap.2017.07.008

Eaton, C. K., Davis, M. F., Gutierrez-Colina, A. M., LaMotte, J., Blount, R. L., & Suveg, C.

(2017). Different demands, same goal: Promoting transition readiness in adolescents and

young adults with and without medical conditions. *The Journal of Adolescent Health :

Official Publication of the Society for Adolescent Medicine*, *60*(6), 727–733.

https://doi.org/10.1016/j.jadohealth.2017.01.002

Espeleta, H. C., Bakula, D. M., Delozier, A. M., Perez, M. N., Sharkey, C. M., & Mullins, L. L.

(2019). Transition readiness: The linkage between adverse childhood experiences (ACEs)

and health-related quality of life. *Translational Behavioral Medicine*, *9*(3), 533–540.

https://doi.org/10.1093/tbm/iby130

Field, A. P. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). Sage Publications

Inc.

Fugate Woods, N., Lentz, M., Sullivan Mitchell, E., Heitkemper, M., & Shaver, J. (1997). PMS

after 40: Persistence of a stress-related symptom pattern. *Research in Nursing & Health*,

20(4), 329–340. https://doi.org/10.1002/(SICI)1098-240X(199708)20:4<329::AID-

NUR6>3.0.CO;2-I

Gabriel, P., Mcmanus, M., Rogers, K., & White, P. (2017). Outcome evidence for structured

pediatric to adult health care transition interventions: A systematic review. *The Journal of*

Pediatrics, *188*, 263-269.e15. https://doi.org/10.1016/j.jpeds.2017.05.066

Gorenflo, G., & Moran, J. W. (2009). *The ABCs of PDCA*.

http://www.phf.org/resourcestools/Documents/ABCs_of_PDCA.pdf

Got Transition^{TM}. (n.d.). Retrieved June 16, 2019, from https://www.gottransition.org/index.cfm

Gray, W. N., Schaefer, M. R., Resmini-Rawlinson, A., & Wagoner, S. T. (2018). Barriers to

transition from pediatric to adult care: A systematic review. *Journal of Pediatric*

Psychology, *43*(5), 488–502. https://doi.org/10.1093/jpepsy/jsx142

Gumidyala, A. P., Greenley, R. N., Plevinsky, J. M., Poulopoulos, N., Cabrera, J., Lerner, D.,

Noe, J. D., Walkiewicz, D., Werlin, S., & Kahn, S. A. (2018). Moving on: Transition

readiness in adolescents and young adults with IBD. *Inflammatory Bowel Diseases*, *24*(3),

482–489. https://doi.org/10.1093/ibd/izx051

Hagan, J. F., Shaw, J. S., & Duncan, P. M. (2017). *Bright futures: Guidelines for health*

supervision of infants, children, and adolescents (4th ed.). American Academy of

Pediatrics.

Hart, L. C., Pollock, M., Brown, A., Shah, N., Chung, R. J., Sloane, R., & Maslow, G. R. (2019).

Where did they go? Tracking young adult follow-up during the transition from pediatric to

adult-oriented care. *Clinical Pediatrics*, *58*(11–12), 1277–1283.

https://doi.org/10.1177/0009922819852980

Hart, L. C., Pollock, M., Hill, S., & Maslow, G. (2017). Association of transition readiness to

intentional self-regulation and hopeful future expectations in youth with illness. *Academic*

Pediatrics, *17*(4), 450–455. https://doi.org/10.1016/j.acap.2016.12.004

Im, E.-O. (2014). Theory of transitions. In M. J. Smith & P. Liehr (Eds.), *Middle Range Theory for Nursing* (3rd ed., pp. 253–276). Springer Publishing Company, LLC.

Intellectus Statistics. (n.d.). Retrieved April 9, 2021, from

https://www.intellectusstatistics.com/faqs/

Jensen, P. T., Karnes, J., Jones, K., Lehman, A., Rennebohm, R., Higgins, G. C., Spencer, C. H., & Ardoin, S. P. (2015). Quantitative evaluation of a pediatric rheumatology transition program. *Pediatric Rheumatology Online Journal*, *13*, 17. https://doi.org/10.1186/s12969-015-0013-0

Jensen, P. T., Paul, G. V, LaCount, S., Peng, J., Spencer, C. H., Higgins, G. C., Boyle, B., Kamboj, M., Smallwood, C., & Ardoin, S. P. (2017). Assessment of transition readiness in adolescents and young adults with chronic health conditions. *Pediatric Rheumatology Online Journal*, *15*(1), 70. https://doi.org/10.1186/s12969-017-0197-6

Johnson, M. A. J., Javalkar, K., van Tilburg, M., Haberman, C., Rak, E., & Ferris, M. E. (2015). The relationship of transition readiness, self-efficacy, and adherence to preferred health learning method by youths with chronic conditions. *Journal of Pediatric Nursing*, *30*(5), e83-90. https://doi.org/10.1016/j.pedn.2015.05.014

Kline, R. B. (2015). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.

Lapp, V., & Chase, S. K. (2018). How do youth with cystic fibrosis perceive their readiness to transition to adult healthcare compared to their caregivers' views? *Journal of Pediatric Nursing*, *43*, 104–110. https://doi.org/10.1016/j.pedn.2018.09.012

Lebrun-Harris, L. A., McManus, M. A., Ilango, S. M., Cyr, M., McLellan, S. B., Mann, M. Y., & White, P. H. (2018). Transition planning among US youth with and without special health

care needs. *Pediatrics*, *142*(4), e20180194. https://doi.org/10.1542/peds.2018-0194

Lemke, M., Kappel, R., McCarter, R., D'Angelo, L., & Tuchman, L. K. (2018). Perceptions of

health care transition care coordination in patients with chronic illness. *Pediatrics*, *141*(5).

https://doi.org/10.1542/peds.2017-3168

Mackie, A. S., Rempel, G. R., Kovacs, A. H., Kaufman, M., Rankin, K. N., Jelen, A., Yaskina,

M., Sananes, R., Oechslin, E., Dragieva, D., Mustafa, S., Williams, E., Schuh, M.,

Manlhiot, C., Anthony, S. J., Magill-Evans, J., Nicholas, D., & McCrindle, B. W. (2018).

Transition intervention for adolescents with congenital heart disease. *Journal of the*

American College of Cardiology, *71*(16), 1768–1777.

https://doi.org/10.1016/j.jacc.2018.02.043

Meleis, A. (2010). *Transitions theory: Middle range and situation specific theories in nursing*

research and practice. New York: Springer Publishing Company.

Meleis, A. I., Sawyer, L. M., Im, E.-O., Hilfinger Messias, D. K., & Schumacher, K. (2000).

Experiencing transitions: An emerging middle-range theory. *Advances in Nursing Science*,

23(1), 12–28. https://doi.org/10.1097/00012272-200009000-00006

National Library of Medicine Medicine. (2002). A consensus statement on health care transitions

for young adults with special health care needs. *Pediatrics*, *110*(6), 1304–1306.

Newton, R. R., & Rudestam, K. E. (2012). *Your statistical consultant* (2nd ed.). SAGE

Publications.

Rosen, D., Annunziato, R., Colombel, J. F., Dubinsky, M., & Benkov, K. (2016). Transition of

inflammatory bowel disease care: Assessment of transition readiness factors and disease

outcomes in a young adult population. *Inflammatory Bowel Diseases*, *22*(3), 702–708.

https://doi.org/10.1097/MIB.0000000000000633

Sawicki, G. S., Kelemen, S., & Weitzman, E. R. (2014a). Ready, Set, Stop: Mismatch Between

Self-Care Beliefs, Transition Readiness Skills, and Transition Planning Among

Adolescents, Young Adults, and Parents. *Clinical Pediatrics*, *53*(11), 1062–1068.

https://doi.org/10.1177/0009922814541169

Sawicki, G. S., Kelemen, S., & Weitzman, E. R. (2014b). Ready, set, stop: Mismatch between

self-care beliefs, transition readiness skills, and transition planning among adolescents,

young adults, and parents. *Clinical Pediatrics*, *53*(11), 1062–1068.

https://doi.org/10.1177/0009922814541169

Schmidt, S., Herrmann-Garitz, C., Bomba, F., & Thyen, U. (2015). A multicenter prospective

quasi-experimental study on the impact of a transition-oriented generic patient education

program on health service participation and quality of life in adolescents and young adults.

Patient Education and Counseling, *99*(3), 421–428.

https://doi.org/10.1016/j.pec.2015.10.024

Sharma, N., O'hare, K., Antonelli, R. C., & Sawicki, G. S. (2014). Transition care: Future

directions in education, health policy, and outcomes research. *Academic Pediatrics*, *14*(2),

120–127. https://doi.org/10.1016/j.acap.2013.11.007

Spencer, D. L., McManus, M., Call, K. T., Turner, J., Harwood, C., White, P., & Alarcon, G.

(2018). Health care coverage and access among children, adolescents, and young adults,

2010-2016: Implications for future health reforms. *The Journal of Adolescent Health:

Official Publication of the Society for Adolescent Medicine*, *62*(6), 667–673.

https://doi.org/10.1016/j.jadohealth.2017.12.012

Stewart, K. T., Chahal, N., Kovacs, A. H., Manlhiot, C., Jelen, A., Collins, T., & McCrindle, B.

W. (2017). Readiness for transition to adult health care for young adolescents with

congenital heart disease. *Pediatric Cardiology*, *38*(4), 778–786.

https://doi.org/10.1007/s00246-017-1580-2

Straus, E. J. (2019). Challenges in measuring healthcare transition readiness: Taking stock and

looking forward. *Journal of Pediatric Nursing*, *46*, 109–117.

https://doi.org/10.1016/j.pedn.2019.03.016

Syverson, E. P., McCarter, R., He, J., D'Angelo, L., Tuchman, L. K., D'Angelo, L., & Tuchman,

L. K. (2016). Adolescents' perceptions of transition importance, readiness, and likelihood of

future success: The role of anticipatory guidance. *Clinical Pediatrics*, *55*(11), 1020–1025.

https://doi.org/10.1177/0009922816666882

Uzark, K., Smith, C., Donohue, J., Yu, S., Afton, K., Norris, M., & Cotts, T. (2015). Assessment

of transition readiness in adolescents and young adults with heart disease. *The Journal of*

Pediatrics, *167*(6), 1233–1238. https://doi.org/10.1016/j.jpeds.2015.07.043

van Staa, A., van Der Stege, H. A., Jedeloo, S., Moll, H. A., & Hilberink, S. R. (2011).

Readiness to transfer to adult care of adolescents with chronic conditions: Exploration of

associated factors. *Journal of Adolescent Health*, *48*(3), 295–302.

https://doi.org/10.1016/j.jadohealth.2010.07.009

White, P. H., Cooley, W. C., Transition Clinical Report Authoring Group, American Academy of

Pediatrics, American Academy of Family Physicians, & American College of Physicians.

(2018). Supporting the health care transition from adolescence to adulthood in the medical

home. *Pediatrics*, *142*(5), e20182587. https://doi.org/10.1542/peds.2018-2587

Wood, D. L., Sawicki, G. S., Miller, M. D., Smotherman, C., Lukens-Bull, K., Livingood, W. C.,

Ferris, M., & Kraemer, D. F. (2014). The transition readiness assessment questionnaire

(TRAQ): Its factor structure, reliability, and validity. *Academic Pediatrics*, *14*(4), 415–422.

https://doi.org/10.1016/j.acap.2014.03.008

Zhong, Y., Gilleskie, D. B., van Tilburg, M. A. L., Hooper, S. R., Rak, E., Javalkar, K.,

   Nazareth, M., Pitts, B., Ndugga, M., Jain, N., Hart, L., Bhansali, S., Richards, J., Detwiler,

   R. K., True, K., de Pomposo, A. S. F., & Ferris, M. E. (2018). Longitudinal self-

   management and/or transition readiness per the TRxANSITION index among patients with

   chronic conditions in pediatric or adult care settings. *The Journal of Pediatrics*, *203*, 361-

   370.e1. https://doi.org/10.1016/j.jpeds.2018.06.052

Zimmerman, M. A. (2000). Empowerment theory: Psychological, organizational, and

   community levels of analysis. In *Handbook of community psychology.* (pp. 43–63). Kluwer

   Academic Publishers. https://doi.org/10.1007/978-1-4615-4193-6_2

Appendix A

Adolescent Patient Population by Age at a Small Southwest Pediatric Health Clinic as of

September 2019

Age	Number of Patients
12	420
13	333
14	340
15	294
16	257
17	200
18	174
19	131
20	83
21	67

Appendix B

Evaluation of Quantitative Studies

Table 1

Evaluation Table of Quantitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Gumidyala et al. (2018) Moving On: Transition Readiness in Adolescents and Young Adults with IBD Country: USA Funding: American Psychological Association and Bucksbaum Institute Bias: May have an inclusive sampling bias given recruitment during clinic	Inferring Zimmermann's empowerment concept containing 3 components: intrapersonal, interactional, and behavioral	Design: CS study Purpose: To describe TR in adolescents with IBD and to identify associated factors.	n= 106 70.7% (n=75) completed questionnaire Demographics: - 86.7% Caucasian - 53.3% male - 74.7% crohn's disease - 22.7% ulcerative colitis - 57.3% no disease activity at enrollment Sample: IBD patients 16-22 years of age Site: 3 outpatient pediatric IBD clinics	IV – - Age - Gender - Disease Duration - Disease Severity DV – - Self-efficacy - AYA-RTQ-overall - AYA-RTQ-adolescent responsibility - PR-RTQ-overall - PR-RTQ-adolescent responsibility	Physician global assessment rating Study developed patient-provider transition-related communication questionnaire RTQ Inflammatory Bowel Disease Self-Efficacy Scale (IBD-SES)	Analysis via IBM SPSS Statistics v.20 - descriptive statistics - bivariate correlations - multiple regression analyses with forward entry - probability of F used for regression - Effect size	- ↑ AYA age and ↑ AYA self-efficacy and ↑ AYA patient-provider communication were each associated with ↑ AYA-RTQ with effect sizes ranging from small to medium - transition communication and age were significant and had a large effect on AYA RTQ-overall scores [Multiple R = 0.58; $F_{(4, 63)}$ = 16.48, $P < 0.001$]	LOE: IV Strengths: - incudes both AYA and PR of TR - explored patient-provider communication in relation to TR Weaknesses: - focus on IBD; not generalizable across general population - recruitment from patients adhering to clinic visits - relied on self-report - poor response rate

Key: **ANCOVA-** analysis of covariance; **AG-** anticipatory guidance; **CC-** chronic conditions; **CF-** cystic fibrosis; **DM-** type 1 diabetes; **DV-** dependent variable; **HCT-** health care transition; **HRSA-** Health Resources and Services Administration; **HHS-** Health and Human Services ; **IBD-** inflammatory bowel disease; **IV-** independent variable; **LOE-** level of evidence; **n-** number of participants; **NC-** North Carolina; **NSCSHCN-** National Survey of Children with Special Health Care Needs; **QoL-** quality of life; **RCT-** randomized controlled trial; **RMVCA-** repeated measurement covariance analysis; **SSI-** Supplementary Security Income; **TC-c-** health-care competence; **TCS-** transition competence scale; **USA-** United States of America; **YWSHCN-** youth with special health care needs

Table 1

Evaluation Table of Quantitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
visits. Self-report method may be impacted by social desire biases.			associated with Midwestern children's hospitals Inclusion: - IBD diagnosis for minimum of 1 year - age 16-22 years old - parent/legal guardian participation Exclusion: - significant communication or cognitive impairment - non-English speaking parent - any other chronic medical condition requiring medication use				- transition age, communication, gender, and self-efficacy had an overall significant effect on AYA RTQ-responsibility scores [Multiple $R = 0.59$; $F_{(4, 63)} = 11.58$, $P < 0.001$]	- Application to practice: - Despite limited ability generalize, does indicate associations between good communication and TR, as well as supports the notion that older adolescents tend to have greater TR. Limitations: - limited diversity of sample - required parent participation shifted recruitment towards younger age sample

Key: **ANCOVA-** analysis of covariance; **AG-** anticipatory guidance; **CC-** chronic conditions; **CF-** cystic fibrosis; **DM-** type 1 diabetes; **DV-** dependent variable; **HCT-** health care transition; **HRSA-** Health Resources and Services Administration; **HHS-** Health and Human Services ; **IBD-** inflammatory bowel disease; **IV-** independent variable; **LOE-** level of evidence; **n-** number of participants; **NC-** North Carolina; **NSCSHCN-** National Survey of Children with Special Health Care Needs; **QoL-** quality of life; **RCT-** randomized controlled trial; **RMVCA-** repeated measurement covariance analysis; **SSI-** Supplementary Security Income; **TC-c-** health-care competence; **TCS-** transition competence scale; **USA-** United States of America; **YWSHCN-** youth with special health care needs

Table 1

Evaluation Table of Quantitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Hart et al. (2019) Where Did They Go? Tracking Young Adult Follow-up During the Transition from Pediatric to Adult-Oriented Care Country: USA Funding: National Research Service Award Grant Bias: Conflicts of Interests: Dr Shah is a speaker for Novartis and Alexion	Inferring Meleis' Theory of Transitions	Design: Retrospective Purpose: To retrospectively evaluate health record data of young adult clinic attendance during the transition period.	n=1623 Attrition Rates: - 40% lost from pediatric care - 16% lost from adult care Demographics: - mean age at end of study: 21 years old - mean number of visits during the study: 20 - 53% female - 50% white - 45% black Sample: - minimum age of 18 at end of study period - Chronic disease history: diabetes, sickle cell, lupus, IBD, HIV, CF	IV – - diagnosis DV – - odds of successful transfer - dropping out of care - gap in care - transitional care self-assessment score	Medical Home Health Care Transition Index - Transitional Care Self-Assessment (6 Core Elements) Gap in care – transitional care quality	Analysis via STATA v.14 Random-effects logistic regression	↑ number of successful transitions associated with ↓ gap times between last pediatric visit and first adult visit, and ↑ clinic transition scores ↑ clinic transition scores associated with ↑ odds of successful transfer and ↓ loss to follow-up	LOE: IV Strengths: - rare examination of transition and visit gap measurement Weaknesses: - single site study - may not generalize to other settings - transition score was self-reported measure - design did not account for pediatric patient that left for college only to return for adult care later - high attrition rates

Key: **ANCOVA-** analysis of covariance; **AG-** anticipatory guidance; **CC-** chronic conditions; **CF-** cystic fibrosis; **DM-** type 1 diabetes; **DV-** dependent variable; **HCT-** health care transition; **HRSA-** Health Resources and Services Administration; **HHS-** Health and Human Services ; **IBD-** inflammatory bowel disease; **IV-** independent variable; **LOE-** level of evidence; **n-** number of participants; **NC-** North Carolina; **NSCSHCN-** National Survey of Children with Special Health Care Needs; **QoL-** quality of life; **RCT-** randomized controlled trial; **RMVCA-** repeated measurement covariance analysis; **SSI-** Supplementary Security Income; **TC-c-** health-care competence; **TCS-** transition competence scale; **USA-** United States of America; **YWSHCN-** youth with special health care needs

Table 1

Evaluation Table of Quantitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
			Site: single, large southeastern health center: 6 clinics					Application to practice: - attention given to the area of transitional care at the practice level may increase successful transitions Limitations: - not all patients transferred - unable to track if loss to follow-up was due to seeking care elsewhere - longitudinal snapshot -
Jensen et al. (2015) Quantitative Evaluation of a Pediatric Rheumatology	Inferring Meleis' Theory of Transitions	Design: CS study Purpose: To assess and quantify transition	n=210 Demographics: - 79% female - median age: 18 years	IV – - transition program plan development with social worker	Continuation of services with adult provider at 6-8 months after initial visit	Analysis via STAS/STAT v9.2 Descriptive statistics	IG - 51% saw an adult rheumatologist at least once - 42% saw an adult	LOE: IV Strengths: - length of study Weaknesses:

Key: **ANCOVA-** analysis of covariance; **AG-** anticipatory guidance; **CC-** chronic conditions; **CF-** cystic fibrosis; **DM-** type 1 diabetes; **DV-** dependent variable; **HCT-** health care transition; **HRSA-** Health Resources and Services Administration; **HHS-** Health and Human Services ; **IBD-** inflammatory bowel disease; **IV-** independent variable; **LOE-** level of evidence; **n-** number of participants; **NC-** North Carolina; **NSCSHCN-** National Survey of Children with Special Health Care Needs; **QoL-** quality of life; **RCT-** randomized controlled trial; **RMVCA-** repeated measurement covariance analysis; **SSI-** Supplementary Security Income; **TC-c-** health-care competence; **TCS-** transition competence scale; **USA-** United States of America; **YWSHCN-** youth with special health care needs

Table 1

Evaluation Table of Quantitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Transition Program Country: USA Funding: Not indicated Bias: Potential design and sampling bias		outcomes of adolescents as they transition to adult providers through the use of social worker-centered transition program.	- age range: 15-26 years Sample: n=210 - minimum age of 16 years old Control: n=26 - eligible and consented but did not meet with social worker Site: pediatric rheumatology clinic at a single, tertiary care, freestanding pediatric hospital	DV – - transition success		Two-sided chi-square	rheumatologist more than once - 10% did not return to provider after initial visit - 15% never saw an adult rheumatologist Significant difference between transition group and CG in terms of successful and not successful transitions (p = 0.002)	- lack of information and demographics on CG - single center - small study - low response rate - unequal intervention and CGs - intervention not adequately described Application to Practice: - Not generalizable due to specific patient population, lack of intervention description, and poor methodology
Johnson et al. (2015)	None specified	Cross-sectional quantitative study	n= 160 response rate: 20.48%	IV – Preferred learning method: -Handout	STARx Questionnaire	SPSS v21	Information obtained from internet and care	LOE: IV

Key: **ANCOVA-** analysis of covariance; **AG-** anticipatory guidance; **CC-** chronic conditions; **CF-** cystic fibrosis; **DM-** type 1 diabetes; **DV-** dependent variable; **HCT-** health care transition; **HRSA-** Health Resources and Services Administration; **HHS-** Health and Human Services ; **IBD-** inflammatory bowel disease; **IV-** independent variable; **LOE-** level of evidence; **n-** number of participants; **NC-** North Carolina; **NSCSHCN-** National Survey of Children with Special Health Care Needs; **QoL-** quality of life; **RCT-** randomized controlled trial; **RMVCA-** repeated measurement covariance analysis; **SSI-** Supplementary Security Income; **TC-c-** health-care competence; **TCS-** transition competence scale; **USA-** United States of America; **YWSHCN-** youth with special health care needs

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The relationship of transition readiness, self-efficacy, and adherence to preferred health learning method by youths with CC.

Funding: Not stated

Country: USA

Bias: Potential – unable to assess non-responders vs responders | | Purpose: To compare preferred learning methods of youth with CC and the associations between those methods and the following: transition readiness, self-efficacy, and medication adherence. | Convenience sampling

Age range: 6-16 Male:84 Female:76 Predominantly Caucasian: 77.5%

Participants attendees of Victory Junction Camp, NC 2014 with CC via an online survey.

Inclusion Criteria: Victory Junction Camp attendee

Exclusion Criteria: None | -Internet -Health care providers -Family/parents -Other youth -Other

DV – -STARx -Self-efficacy -Non-adherence | Modified diabetes management self-efficacy questionnaire

Morisky Medication Adherence Scale | Chi square tests for categorical variables

t-tests for continuous variables

Linear regressions with age as control

Separate regressions for each DV | providers associated with greater transition readiness.

Transition Readiness: Internet: p=.021 -no use: 37.36±14 -use: 42.69±11.59 Health care providers: p=.004 -no use: 35.57±14 -use: 41.57±12.49

Self-efficacy: Internet: p=.007 -no use: 52.96±25.15 -use: 63.14±20.07 Health care providers: p=.001 | Strengths: -novel approach to gathering preference data and potential associations

Weakness: -convenience sample -cross-sectional design -online survey restricts responses to those with convenient access to computer and internet, as well as higher socioeconomic means -establishes preference of source, not use -poor response rate |

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							-no use: 49.35±25.32 -use: 61.59±21.69 Doctors as a source of health info significant predictor of health care transition readiness (β = 0.310; p = .002)	Application to practice: Limited ability to make associations. May indicate that health care providers and the internet are important sources of information for the successful transition from pediatrics to adult medicine, but are not the only sources. Providers should ascertain patient preferences and attempt to be as flexible as possible while ensuring appropriate guidance regarding patient's

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Evaluation Table of Quantitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
								preferred method.
Lemke et al. (2018)

Perceptions of Health Care Transition Care Coordination in Patients with Chronic Illness

Country: USA

Funding: Maternal and Child Health Research Program, Maternal and Child Health Bureau, Health Resources and Services Administration, Department of Health and Human Services | Inferring Meleis' Theory of Transitions | Design: RCT

Purpose: To evaluate the effectiveness of HCT care coordination through measurement of patient-level perception and perceived quality of care | n=209

Setting: Urban academic AM practice in tertiary referral HS for pediatrics

Demographics: 208 African Americans

Mean age: 19 ± 1.7 Age range: 16-22

Stratified by complexity and age for IG and CG balance | IV – AAP-AAFP-ACP 6 core elements in addition to enhanced usual care
- readiness assessment
- planning and preparation
- monthly action plan updates
- transition checklist
- medical summary

Control – Enhanced usual care

DV –
- PACIC scores
- CPCQ scores | (PACIC) – Patient Assessment of Chronic Illness Care

(CPCQ) – Client Perceptions or Coordination Questionnaire | - X^2
- t-test
- linear regression
- logistic regression | - ↑ PACIC score at 12 months for IG vs CG (p = .01)
- IG had ↑ scores for patient activation (p = .01), problem solving (p = .02), and coordination/ follow-up (p < .01)

- ↑ odds of IG having talked to provider about future care (p < .01) | LOE: III

Strengths:
- cohort of a variety of conditions along with a comparison group
- structured intervention plan implemented over an adequate period of time

Weaknesses:
- demographic homogeneity
- not all of the participants transferred care during study period
- intervention may have varied depending on |

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Bias: Potential for selection bias due to CVS								patient engagement and availability

Application to practice:
- intervention generalizable across a variety of conditions and complexity levels. Also generalizable to those with chronic conditions and those of low SES |
| Mackie et al. (2018)

Transition Intervention for Adolescents With Congenital Heart Disease

Country: Canada | Inferring Zimmermann's empowerment concept containing 3 components: intrapersonal, interactional, and behavioral | Design: Cluster RCT

Purpose: To evaluate the impact of nurse-led transition interventions on lapses in care with secondary aims of evaluating | n=173

Site: 2 tertiary care pediatric cardiology clinics

Demographics: Age: range 16-17 years | IV – 2 nurse-led face-to-face sessions without parents

Control – usual care

DV –
- time to first adult appointment | - TRAQ
- Williams' self-management | - Mann-Whitney U test
- Cox regression
- t-test | Intervention participants 1.8 times more likely to have appointment within 1 month (95% confidence interval: 1.1 to 2.9; Cox regression, p ¼ 0.018). | LOE: III

Strengths:
- well designed comparison and follow-up of patient transfers to adult providers

Weaknesses: |

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Funding: the Heart and Stroke Foundation of Canada, Canadian Institutes of Health Research Bias: Potential selection bias		participants' disease knowledge, self-management and self-advocacy skills, and cardiac procedures post-enrollment.	Sample: 2 parallel groups of adolescents	- disease knowledge scores - self-management scores - self-advocacy scores - incidence of cardiac re-intervention - transition readiness			↑ participation and knowledge of IG compared to CG ↑ TRAQ self-management index scores at 1, 6, 12, and 18 months for the IG 28% of the IG and 33% of the CG failed to return	- high failure to return rates - potential differences of intervention provided to IG - long-term impact of self-management skills remains unknown Application to practice: - TRAQ shows some potential as a measure of TR across the transition period - limited generalizability outside of cardiology
Schmidt et al. (2015) A multicenter prospective quasi-	Zimmermann's empowerment concept containing 3 components: intrapersonal,	Quasi-experimental controlled trial Partial randomization	n=325 Demographics: Adolescents 15 years or older	IV – 2 day group training transition workshop (x8 60-90 min modules)	1. Health-related TCS 2. General Self-Efficacy Scale (GSE)	RMVCA with age as covariate ANCOVA	Transition workshop significantly affected transition competence,	LOE: III Strengths: -well defined education intervention

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experimental study on the impact of a transition-oriented generic patient education program on health service participation and quality of life in adolescents and young adults. Funding: Federal Ministry of Education and Research Country: Germany Bias: Potential recruitment bias due to limited clinic locations	interactional, and behavioral	Purpose: To evaluate the effectiveness of generic patient education program for adolescents with a chronic condition during their transition to adult care and to quantify changes in health service participation and patient-reported outcomes.	with diagnosis of DM, CF, or IBD Age range: 13-22 175 males; 150 females DM: 186 IBD: 99 CF: 40 No previous patient education: 132 One previous patient education: 57 More than one previous patient education: 121 Inclusion criteria: -Diagnosed with DM, CF, or IBD -15 years or older	Topics: "transfer to adult medicine, orientation in the health system, future planning and occupation/career, separation from parents, communication about illness with peers and partners, stress management and activation of resources" Control – Treatment-as-usual DV – Primary: health-related transition competence, self-efficacy, patient activation, and	3. Patient Activation Measure 13 (PAM13-D) 4. Self-report version of the Child Health Care Questionnaire on Satisfaction, Utilization, and Needs (CHS-SUN self) 5. QoL: EUROHIS QOL-8, DISABKIDS Chronic Generic Measure	Post-hoc analyses Used statistical Package for the Social Sciences SPSS v22	self-efficacy, and satisfaction Change in scores from pre- and post-intervention to 6 month follow-up: TCS: F=38.69, p<.001, η2=.125 TC-c: F=29.03, p<.001, η2=.099 Self-efficacy: F=2.98, p=.05, η2=.011	-included control group Weakness: -CF group underpowered -generic QoL instruments may be too broad for certain conditions -6-month follow-up too short to determine long-term effect on health outcomes and cost savings -inability to randomize participants at inpatient centers involved due to organizational restrictions Application to Practice:

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			Exclusion criteria: -Younger than 15 years -Learning disability -Insufficient German language skills to preclude participation in a discussion	satisfaction with health care. Secondary: QoL				educational transition program may improve transitional care for adolescents with CC
Syverson et al. (2016) Adolescents' perceptions of transition importance, readiness, and likelihood of future success: The role of AG. Funding: HRSA of the US Department of HHS	None specified.	Design: Cross-sectional RCT Purpose: Assesses how AG affects patient perception of the HCT process.	n=209 Snowball sampling Stratified by: Age: 2 groups (16-18 years and 19-22 years) Care Coordination: 3 groups (low, moderate, high) Age range: 16-22 years	IV – AG: 1. transition 2. insurance 3. needs 4. encouragement of responsibility DV – Perception 1. Transition Importance 2. Transition Readiness 3. Transition Successful	Survey: NSCSHCN transition assessment questions – yes or no Perception questions on a 10-point Likert-type scale Proxy allowed for participants unable to answer for themselves	Care Coordination Assignment Tool v1.0 – determine level of care coordination needs Linear regression for relationships between IV and DV Multiple variable analyses to	Transition AG in any 3 categories (transition, insurance, needs) resulted in significantly higher means ratings of perceived readiness and confidence of success. Transition – Readiness: Mean: 6.8	LOE: IV Strengths: -samples from various levels of care coordination needs Weakness: -largely homozygous for race and socioeconomic status

Key: **ANCOVA**- analysis of covariance; **AG**- anticipatory guidance; **CC**- chronic conditions; **CF**- cystic fibrosis; **DM**- type 1 diabetes; **DV**- dependent variable; **HCT**- health care transition; **HRSA**- Health Resources and Services Administration; **HHS**- Health and Human Services ; **IBD**- inflammatory bowel disease; **IV**- independent variable; **LOE**- level of evidence; **n**- number of participants; **NC**- North Carolina; **NSCSHCN**- National Survey of Children with Special Health Care Needs; **QoL**- quality of life; **RCT**- randomized controlled trial; **RMVCA**- repeated measurement covariance analysis; **SSI**- Supplementary Security Income; **TC-c**- health-care competence; **TCS**- transition competence scale; **USA**- United States of America; **YWSHCN**- youth with special health care needs

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Country: USA Bias: None recognized			53% Female 208 participants African American District of Columbia-based Medicaid health plan for SSI-eligible YWSHCN Site: Hospital based urban academic adolescent health clinic Inclusion criteria: recruited as part of a larger longitudinal study, inclusion criteria not discussed			account for age and level of care coordination	95% CI: 5.9-7.6 P: .023 Transition – Success: Mean: 7.2 95% CI: 6.5-7.9 P: .028 Insurance – Readiness: Mean: 7.0 95% CI: 6.1-7.9 P: .006 Insurance – Success: Mean: 7.5 95% CI: 6.7-8.2 P: .003 Needs – Readiness: Mean: 6.6 95% CI: 5.9-7.3 P: .018 Needs – Success: Mean: 7.2	-response rates not discussed -cross-sectional design -use of proxy for subset of participants Application to Practice: Limited associations. Low rates of AG. However, those who did report AG seemed to positively affect their perceptions of transition readiness and confidence of success. Limitations: Homogeneousness of ethnic background and socioeconomic

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			Exclusion criteria: Not discussed				95% CI: 6.7-7.8 P: <.001	status of cohort limits generalizability.
Uzark et al. (2015) Assessment of Transition Readiness in Adolescents and Young Adults with Heart Disease Country: USA Funding: University of Michigan Cardiovascular Center Bias: May have an inclusive sampling bias given CVS.	Inferring Zimmermann's empowerment concept containing 3 components: intrapersonal, interactional, and behavioral	CS study Purpose: Evaluate transition readiness, information seeking and QoL in patients 13-25 years of age with CHD or heart transplant as well as evaluate delivering a TRA via e-tablet.	n=164 CVS Demographics: - median age 18.1 years - age range: 13-25.5 years - race: 90.2% white - male sex: 59.8% Site: University of Michigan Congenital Heart Center	IV – 1. Age 2. Gender 3. Diagnosis DV – 1. Transition readiness 2. Knowledge deficits 3. Self-efficacy 4. Self-management behavior 5. Psychosocial QoL	Modified TRA – CHD specific - developed from the STARx and TRxANSITION Scale Pediatric Quality of Life Inventory (PedsQL)	SAS v.9 - descriptive statistics - 2-sample t test - X^2 test (Fisher exact test) -bivariate relations of Pearson or Spearman correlation coefficients - sig level of 0.05, 2-sided tests	Among CHD patients: - ↑ knowledge associated with ↑ self-efficacy - Transition knowledge deficits and ↓ self-efficacy associated with ↓ psychosocial QoL - ↑ age associated with ↓ knowledge deficits and ↑ self-efficacy and self-management	LOE: IV Strengths: - >90% response rate - trialed use of e-tablet system for data collection Weaknesses: - parent education level and socioeconomic data not assessed - transition process not standardized Application to practice: Limited associations further limited by sample. TRA may provide insight into care

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								deficits, especially as it relates to adolescents with CHG. QoL may be affected by better patient knowledge and self-efficacy as well. Limitations: - single-center study - lack of geographic and racial diversity - study population limits generalizability
Zhong et al. (2018) Longitudinal Self-Management and/or Transition Readiness per the	Inferring Meleis' Theory of Transitions	Design: Longitudinal observational Purpose: Evaluate the roles of key individual, family, and	n= 566 CVS Demographics: - 54.1% female - 43.6% Caucasian	IV – - age - gender - race - guardians at home - driving time to site	*TRxANSITION Index*	Analysis via STATA 13.0 - descriptive statistics - compared 2 empirical models coefficients - regression	- ↑ *TRxANSITION Index* scores with ↑ age, but at diminishing rate - ↑ intellectual limitations ↓ *TRxANSITION Index* scores	LOE: IV Strengths: - length of study Weaknesses: - data collection interviewers not

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TRxANSITION *Index* among Patients with Chronic Conditions in Pediatric or Adult Care Settings Country: USA Funding: Not stated. Bias: May have an inclusive sampling bias given CVS.		illness characteristics on longitudinal HCT readiness in pediatrics and self-management skills in the adult setting, conduct from 2006 to 2015.	- 42.2% African American - avg age at baseline: 17.3 - age range at baseline: 12-31 Site: University of North Carolina Hospitals	- intellectual limitation - insurance: pubic, self-pay - socioeconomic - disease-related characteristics DV – - *TRxANSITION Index* Score		- sensitivity analyses - effect size - significant difference	- ↑ years of diagnosis ↓ *TRxANSITION Index* scores	consistent with patients - different samples depending on collection of 1 score or multiple scores - re-interviews not on uniform intervals - varied but limited chronic disorder list - medical care and primary care data not captured Application to Practice: Can apply knowledge of ideal times to approach HCT readiness as adolescents approach adulthood to the care visit to achieve efficient

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								use of time and applicability. Will help tailor learning needs depending on demographic data. Limitations: - single-institution - change in data collection methods lost data as variables updated - limited data on parent education - limited data on socioeconomic variables

Key: **ANCOVA-** analysis of covariance; **AG-** anticipatory guidance; **CC-** chronic conditions; **CF-** cystic fibrosis; **DM-** type 1 diabetes; **DV-** dependent variable; **HCT-** health care transition; **HRSA-** Health Resources and Services Administration; **HHS-** Health and Human Services ; **IBD-** inflammatory bowel disease; **IV-** independent variable; **LOE-** level of evidence; **n-** number of participants; **NC-** North Carolina; **NSCSHCN-** National Survey of Children with Special Health Care Needs; **QoL-** quality of life; **RCT-** randomized controlled trial; **RMVCA-** repeated measurement covariance analysis; **SSI-** Supplementary Security Income; **TC-c-** health-care competence; **TCS-** transition competence scale; **USA-** United States of America; **YWSHCN-** youth with special health care needs

Appendix C

Synthesis of Evaluation Table

Synthesis of Evaluation Table

Categories		Study by Main Author									
Major Category	**Subcategory**	Gumidyala	Hart	Jensen	Johnson	Lemke	Mackie	Schmidt	Syverson	Uzark	Zhong
Study Info	Year	2018	2019	2015	2015	2018	2018	2015	2016	2015	2018
	Design	CS	R	CS	CS	RCT	RCT	QE	CS RCT	CS	LO
	LOE	IV	IV	IV	IV	III	III	III	IV	IV	IV
	Country	USA	USA	USA	USA	USA	Canada	Germany	USA	USA	USA
Sample	n	106	1623	210	160	209	173	325	209	164	566
	Mean Age (years)	Not provided	21.13 (at end of study)	18	12.2	19	17	16.8	19	18.1	17.3
	Range (years)	16-22	18 (min age at end of study)	15-26	6-16	16-22	16-17	13-22	16-22	13-25.5	12-31
	% Males	53	47	21	52.5	52.6	51	54	47	60	46
	Chronic Conditions or Specialty	IBD	DB, SC, Lupus, IBD, HIV, CF	Rheumatology	Various	Various	Cardiology	DB, CF, IBD	Various	CHD	Various
	Proxy				X				X		
Setting	Academic				X				X	X	
	Outpatient	X	X	X		X	X	X	X	X	X
	Inpatient							X			
	Online				X						
Measurement Construct	Transition Readiness	X			X		X		X	X	X
	Transitional Care Quality		X								
	Medication Adherence				X						
	Self-Efficacy	X			X			X			
	Self-Management					X	X	X			
	QoL							X		X	
	Patient Satisfaction							X			
	Disease Severity	X									
IV Constructs	Demographics	X								X	X
	Disease and Associated Characteristics	X	X							X	X
	Transition Planning or Education			X	X	X	X	X	X		
	Readiness Assessment					X					
	Socioeconomic Factors									X	
DV Constructs	Self-efficacy	X			X			X	X		

Key: **CF-** cystic fibrosis; **CHD-** congenital heart disease; **CS-** cross-sectional study; **DB-** diabetes; **GSE-** general self-efficacy scale; **HIV-** human immunodeficiency virus; **IBD-** irritable bowel disease; **LO-** longitudinal observational study; **QE-** quasi-experimental controlled trial; **QoL-** quality of life; **R-** retrospective; **RCT-** randomized controlled trial; **SC-** sickle cell

| Major Category	Subcategory	Gumidyala	Hart	Jensen	Johnson	Lemke	Mackie	Schmidt	Syverson	Uzark	Zhong
	Transition Readiness	X			X	X	X	X	X	X	
	Transfer Outcomes		X	X					X		
	Non-adherence				X						
	Incidence of re-intervention						X				
	Satisfaction			X					X		
	QoL								X	X	
	Transitional Care Quality		X								
Categories					**Study by Main Author**						

Key: **CF-** cystic fibrosis; **CHD-** congenital heart disease; **CS-** cross-sectional study; **DB-** diabetes; **GSE-** general self-efficacy scale; **HIV-** human immunodeficiency virus; **IBD-** irritable bowel disease; **LO-** longitudinal observational study; **QE-** quasi-experimental controlled trial; **QoL-** quality of life; **R-** retrospective; **RCT-** randomized controlled trial; **SC-** sickle cell

Appendix D
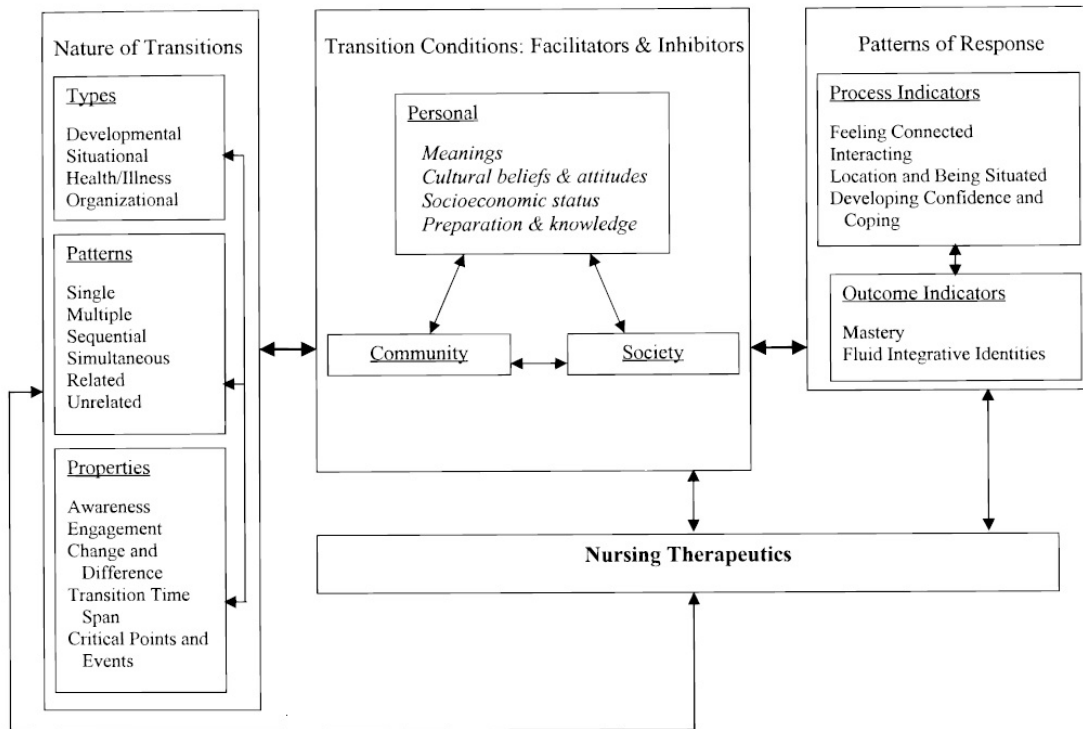
Plan-Do-Study-Act Model
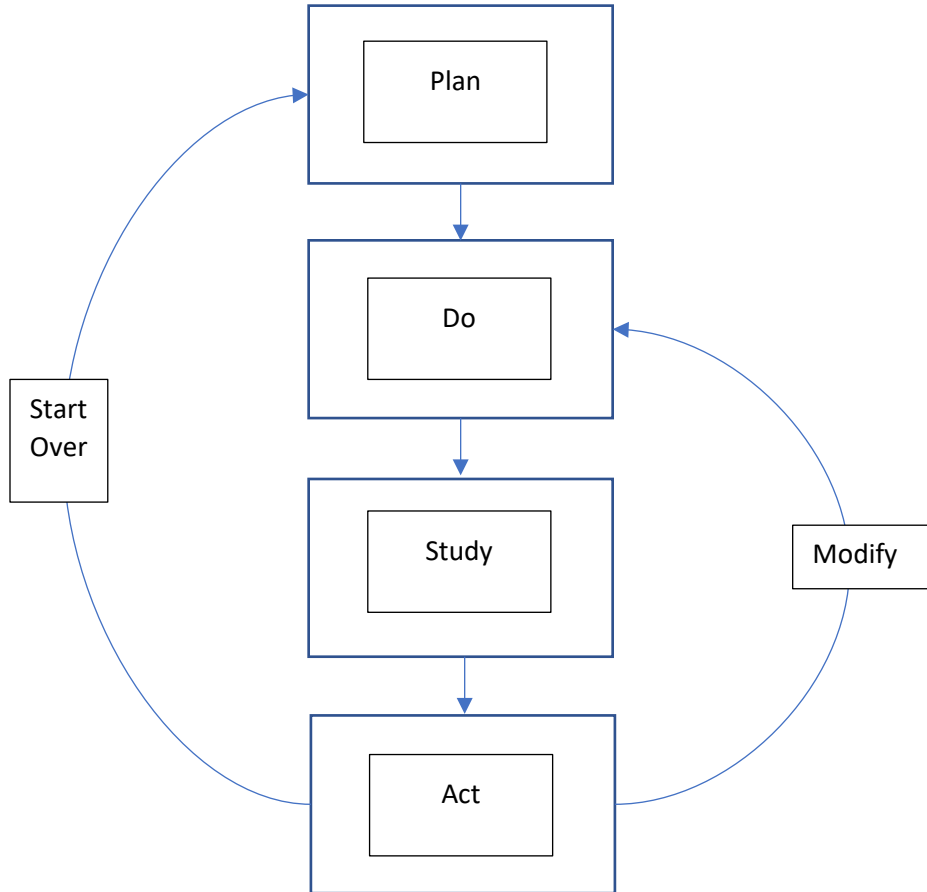
Appendix E

Meleis' Transition Theory

Figure 1

Model of Meleis' Transition Theory

Note. From "Experiencing transitions: An emerging middle-range theory," by A. Meleis, L. Sawyer, E. Im, D. Hilfinger Messias, and K. Schumacher, 2000, *Advances in Nursing Science, 23*(1), p. 12 (https://doi.org/10.1097/00012272-200009000-00006).

Appendix F

Project Timeline

A. Implementing an Educational Primer for Health Care Transition
   a. Identification of candidates via scheduled appointments
      i. Sample population: adolescents ages 14 - 20
   b. Baseline Phase
      i. The investigator will contact potential participants, and their legal guardians as needed, at their adolescent well-check appointment and provide information on the study and conduct the survey if adolescent and legal guardian agree to participation.
   c. Intervention Phase
      i. The investigator will contact potential participants, and their legal guardians as needed, at their adolescent well-check appointment and provide information on the study.
      ii. If participation is agreed on by the adolescent and their legal guardian, if needed, then health care transition explainer video will be shown.
      iii. Link to digital survey will be sent to participant provided email 1 week following the adolescent well-check..

Appendix G

Itemized Budget

	Phase	Subcategory	Activities or Items	Cost (hr)	Cost ($)	Subtotal	Running Total	Notes
Direct Costs	Plan	Equipment / IT	Studio Microphone		$ 108.09			
			Animation Software		$ 231.00			
			Web hosting for animation video		$ 201.00			3 months purchased for trialing intervention hosting
			Web hosting for survey		$ -			Free hosting through ASU QuestionPro account
			File Box		$ 3.74			Lockable file box
			Pad lock		$ 9.67			For locking file box
			Clipboard		$ 6.48			
			Goggles		$ 14.04			
			File tabs		$ 2.03			
			Hanging File Folders		$ 4.03			
					$ -			for use when interacting with patients
					$ -	$ 580.08	$ 580.08	
		Intervention	Script and develop anticipatory guidance animation with voiceover	10	$ -	$ -	$ 580.08	
		Supplies	Study cover letters and consents for baseline phase(266 pages; 0.13/page)	2	$ 34.58			
			Study cover letters and consents for intervention phase(### pages; 0.12/page)		$ -			
			Permanent markers		$ 3.92			
			Envelopes		$ 3.00			
			Pens		$ 5.36	$ 46.86	$ 626.94	
	Do		Aggregate list of adolescent patient appointments and send out link to video via patient	8	$ -			
			Hand out surveys to participants (80 participants; 10 minutes per participant)	14	$ -			
	Study	Analysis	Intellectus Statistics - Cloud-based		$ -			ASU provided account access as part of tuition costs
Indirect Costs	Plan	Equipment / IT	Microsoft Office Suite		$ -			
		Intervention	Data Bandwidth / Internet		$ -			
		Supplies			$ -			
	Do		PI handing out surveys (80 participants; 10 minutes per participant)	14	$ -			
					$ -			
	Study	Analysis	Data Bandwidth / Internet		$ -			
				48			$ 1,787.09	

Appendix H

Results Tables

Table H1

Frequency Table for Nominal and Ordinal Variables Filtered by Age

Age Group	14-15 Years of Age	16-18 Years of Age
Group		
Baseline	17 (81%)	15 (79%)
Intervention	4 (19%)	4 (21%)
Gender		
Male	7 (33%)	8 (42%)
Female	12 (57%)	11 (58%)
Not Answered	2 (10%)	0 (0%)
School Grade Level		
8	4 (19%)	0 (0%)
9	13 (62%)	0 (0%)
10	4 (19%)	1 (5%)
11	0 (0%)	7 (37%)
12	0 (0%)	10 (53%)
College or Trade School	0 (0%)	1 (5%)
Age in Years Grouped		
14 -15 Years of Age	21 (100%)	0 (0%)
16 -18 Years of Age	0 (0%)	19 (100%)

Note. Due to rounding errors, column wise percentages may not equal 100%.

Table H2

Frequency Table for Nominal and Ordinal Variables Filtered by Age Group and Study Group

Age Group	14-15 Years of Age		16-18 Years of Age	
Variable	Baseline	Intervention	Baseline	Intervention
Group				
Baseline	17 (100%)	0 (0%)	15 (100%)	0 (0%)
Intervention	0 (0%)	4 (100%)	0 (0%)	4 (100%)
Gender				
Male	4 (24%)	3 (75%)	6 (40%)	2 (50%)
Female	11 (65%)	1 (25%)	9 (60%)	2 (50%)
Not Answered	2 (12%)	0 (0%)	0 (0%)	0 (0%)
School Grade Level				

8	4 (24%)	0 (0%)	0 (0%)	0 (0%)
9	10 (59%)	3 (75%)	0 (0%)	0 (0%)
10	3 (18%)	1 (25%)	1 (7%)	0 (0%)
11	0 (0%)	0 (0%)	4 (27%)	3 (75%)
12	0 (0%)	0 (0%)	9 (60%)	1 (25%)
College or Trade School	0 (0%)	0 (0%)	1 (7%)	0 (0%)
Age in Years Grouped				
14 -15 Years of Age	17 (100%)	4 (100%)	0 (0%)	0 (0%)
16 -18 Years of Age	0 (0%)	0 (0%)	15 (100%)	4 (100%)

Note. Due to rounding errors, column wise percentages may not equal 100%.

Table H3

Correlations between Dependent Variables of Adolescents 14-15 Years of Age

Variable	1	2	3	4	5	6
1. Managing Medications Mean Imputed	-					
2. Appointment Keeping Mean Imputed	0.47	-				
3. Tracking Health Issues Mean Imputed	0.40	0.51	-			
4. Talking with Providers Mean	0.06	0.19	0.25	-		
5. Managing Daily Activities Mean	0.38	0.42	0.28	0.24	-	
6. Overall TRAQ Score Mean Imputed	0.74	0.84	0.73	0.33	0.63	-

Table H4

Correlations between Dependent Variables of Adolescents 16-18 Years of Age

Variable	1	2	3	4	5	6
1. Managing Medications Mean Imputed	-					
2. Appointment Keeping Mean Imputed	0.53	-				
3. Tracking Health Issues Mean Imputed	0.77	0.68	-			
4. Talking with Providers Mean	0.31	-0.15	0.05	-		
5. Managing Daily Activities Mean	0.09	0.30	0.42	-0.12	-	
6. Overall TRAQ Score Mean Imputed	0.82	0.86	0.92	0.03	0.45	-

Table H5

MANOVA Results for Subgroups and Overall TRAQ Scores of Adolescents 14-15 Years of Age

Variable	Pillai	F	df	Residual df	p	η_p^2
14-15 Years of Age	0.32	1.08	6	14	.419	0.32

Table H6

MANOVA Results for Subgroups and Overall TRAQ Scores of Adolescents 16-18 Years of Age

Variable	Pillai	F	df	Residual df	p	η_p^2
16-18 Years of Age	0.57	2.61	6	12	.074	0.57

Table H7

Analysis of Variance Table for Talking with Providers Subgroup of Adolescents 16-18 Years of Age

Term	SS	df	F	p	η_p^2
Group	0.05	1	4.47	.049	0.21
Residuals	0.19	17			

Table H8

Mean, Standard Deviation, and Sample Size for Talking with Providers Subgroup of Adolescents 16-18 Years of Age

Combination	M	SD	n
A	5.00	0.00	15
B	4.88	0.25	4

Table H9

Frequency Table for Nominal and Ordinal Variables of Intervention Groups Combined

Variable	n	%
Gender		
Male	5	62.50
Female	3	37.50
Not Answered	0	0.00
School Grade Level		
8	0	0.00
9	3	37.50
10	1	12.50
11	3	37.50
12	1	12.50
College or Trade School	0	0.00
Did_the_video_help_you_understand_the_process_of_transition_to_adult_care		

Strong Disagree	0	0.00
Disagree	0	0.00
Neutral	2	25.00
Agree	5	62.50
Strongly Agree	1	12.50
Did the video describe your role in the transition process		
Strong Disagree	0	0.00
Disagree	0	0.00
Neutral	3	37.50
Agree	4	50.00
Strongly Agree	1	12.50

Note. Due to rounding errors, percentages may not equal 100%.

Appendix I

Results Figures

Figure I1

Chi-square Q-Q Plot for Squared Mahalanobis Distances of Model Residuals to Test Multivariate Normality for Adolescents 14-15 Years of Age
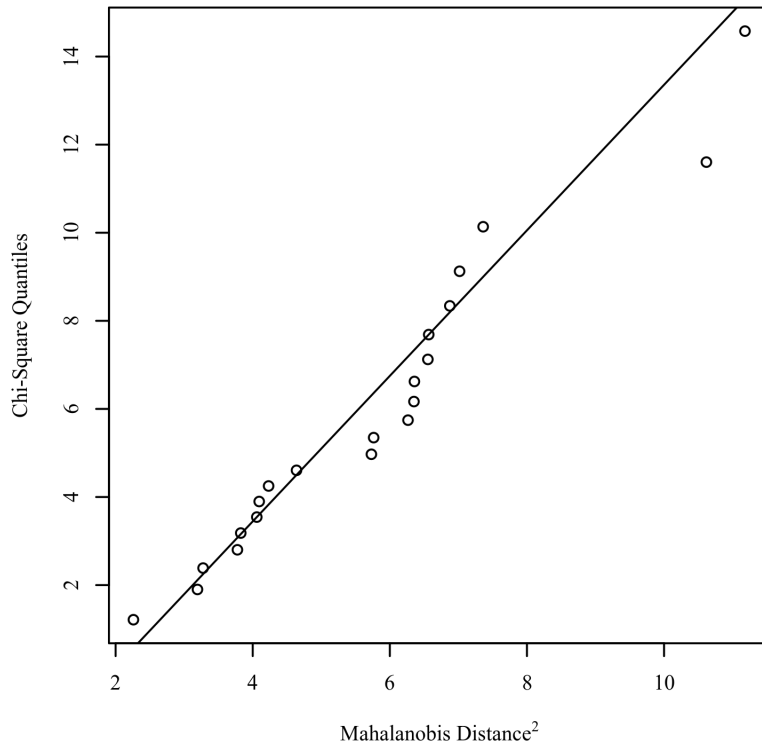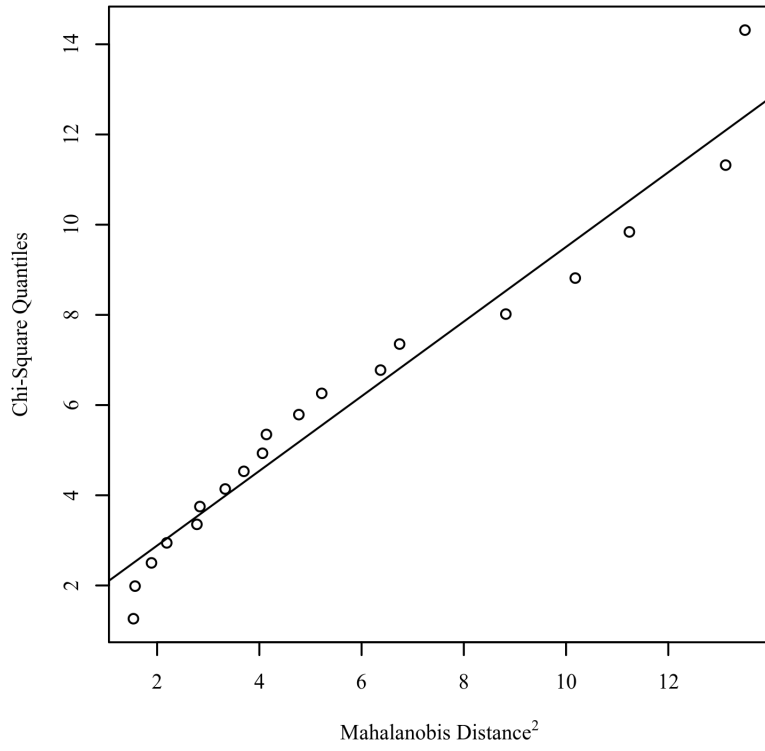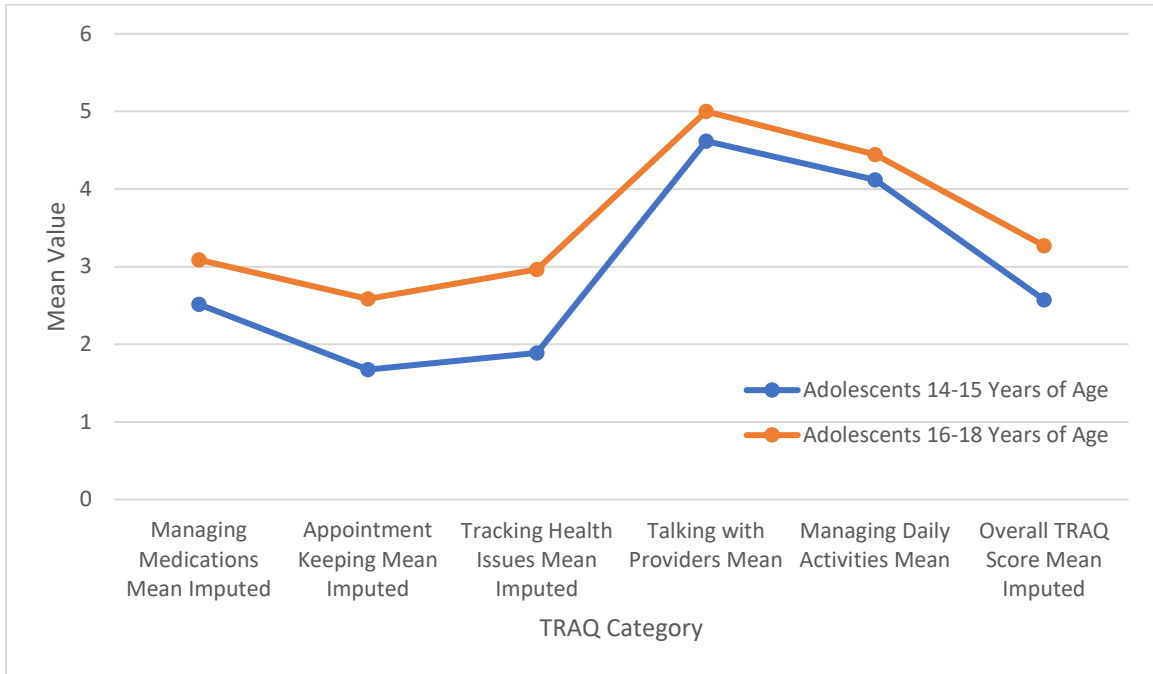

Figure I2

Chi-square Q-Q Plot for Squared Mahalanobis Distances of Model Residuals to Test Multivariate Normality for Adolescents 16-18 Years of Age

Appendix J

Mean Transition Scores by Age

Profile Plot of Mean Subgroups and Overall TRAQ Scores by Adolescent Age Group

Appendix K

Correlation of Age with Average TRAQ Scores

Scatterplot between Age in Years and Average Overall TRAQ Scores in the Baseline Group