How work and family transitions are associated with stress-related immunity dysfunction among young adult women

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Background

Research on the link between stress and immunity dysfunction largely began in clinically-based studies in the 1980s. During this time, numerous studies produced positive associations between chronic and acute stressors and stress-related immunity impairments, including higher levels of epinephrine, norepinephrine, Epstein-Barr antibodies, and helper T lymphocytes among women in high-conflict marriages (Kiecolt-Glaser et al., 1987; 1993; 1996); higher systolic blood pressure among those reporting greater marital strain (Barnett et al., 2005); positive association between number of children at home and women’s (but not men’s) norepinephrine levels (Lundberg et al., 1999); and impaired response to influenza vaccine among those with lower marital satisfaction (Phillips et al., 2006). One drawback of this literature is that it is founded primarily on clinical samples with limited generalizability.

Population-based studies followed this early clinical work by exploring associations between common stressors and self-reported mental health pathology. Early work in this area was pioneered by McLanahan (1983), who found that single mothers scored higher on two stress scales relative to married mothers. Subsequent research reproduced these findings; for instance, William Avison (2007) found that single vs. married motherhood was related to higher CESD depression scores, a disadvantage largely explained by single mothers’ greater exposure to life stress. One shortcoming of the extant literature is that the broad majority of population-based studies on family- and work-related stress is that stress-related outcomes have typically been measured as self-report mental health pathology. The methods of earlier clinically-based studies—including the use of biomarkers—has largely been omitted from population-based studies. Further, the family- and work-related factors of interest (e.g., mothering in single- vs. two-parent families; being employed vs. unemployed) are often considered independently of other factors. In reality, the association between specific types of work and family transitions and immunity dysfunction may depend upon the presence or absence of other transitions. Thus, a person-centered approach may be warranted.

Advantage of a person-centered approach

Some extant research has investigated the links between specific family or work-related circumstances and health outcomes including risk behaviors, mental health, degenerative conditions, physical limitations, and infectious disease. With respect to women entering adulthood—the life course stage where many key demographic transitions unfold—early work investigated the links between combinations of work and family roles and health outcomes including physical impairments and stress (Waldron 1982; Woods 1985). More recent work adopts what may be termed a “variable-centered” approach, where a single construct of interest is examined for its association with a particular health outcome. This work shows that a range of health outcomes are seemingly influenced by a number of work and family circumstances, including dissatisfaction with work and family life arrangements (Ball 2004), childbearing and parity progression (Jarvis 1996), job strain and decision latitude (Markovitz 2004), work hours (Nomaguchi 2004), and joblessness (Weden 2006).

Very few studies, however, adopt what may be termed a “person-centered” approach. This approach acknowledges that the relationship between any one family or work-related circumstance and health may be conditional on the presence or absence of other circumstances related to work and family (MacMillan and Copher, 2005). In other words, combinations of work and family circumstances may be important to young adult women’s health in ways that are obscured when such circumstances are viewed separately.
The current study addresses these gaps by (1) incorporating the use of biomarkers to assess immunity dysfunction among young women transitioning from early to formal adulthood, and (2) examining inequalities in immunity dysfunction across typologies of adult transitions evidenced by combinations of relationship, employment, and parenting transitions.

Data and methods

Data for this project are drawn from the restricted-use version of the National Longitudinal Study of Adolescent to Adult Health (AddHealth). Add Health is an ongoing, nationally representative, school-based survey of adolescents in seventh through twelfth grade from 132 high schools and middle schools\(^{15}\). In 1994 Add Health administered a brief in-school questionnaire to students selected through a stratified random sample of all high schools in the United States (n = 90,118). A nationally representative subsample of these respondents participated in a more extensive in-home interview between 1994 and 1995 (n = 20,745). All students except for graduating high school seniors were then re-interviewed in a second wave of data collection in 1996 (n = 14,738). In 2001-02 a third wave of data was collected (n = 15,175) from all participants, including graduating seniors from Wave 1. A fourth wave of interviews was fielded in 2008 when most Add Health participants were in their late twenties or early thirties (n = 14,322). The fourth wave of data collection also included efforts to draw biological specimens from participants including saliva and blood samples used to derive biomarkers of various health outcomes (response rate ≈ 90%). I use data from the first, third, and fourth waves of the Add Health study. These data are ideal because they are nationally representative, include a number of measures related to early-life conditions (e.g., family poverty) as well as measures related to aspects of work, relationships, and childrearing during emerging and formal adulthood, and now contain a variety of innovative biomarkers. The final sample is based on the number of female respondents present at waves 1, 3, and 4 with complete information on all measures (N = 5,074).

Key measures

Epstein-Barr Virus (EBV): Known for its causal role in mononucleosis, EBV assays are also useful markers for immune function in humans. EBV is found in nearly all adult humans and is generally kept in a latent state with optimal cell-mediated immune function. Certain processes—including chronic stress—suppress the immune system and allow EBV to reactivate and release viral antigens into circulation. In this scenario, the body’s humoral antibody response may be activated, releasing antibodies against EBV into the system, providing an indirect measure of cell-mediated immune function. An interpretation of this response is that higher levels of EBV-related antibodies indicate lower cell-mediated immune functioning. In other words, higher levels of antibodies indicate the body’s impaired ability to maintain EBV in a latent state.

Work, relationship, and childrearing transitions: The current study examines transitions occurring between the 2001 and 2008 Add Health interviews across three domains. Relationship statuses include whether the respondent was (1) single, (2) cohabiting, or (3) married in each wave. Employment status indicates whether the respondent was working full-time (≥ 35 hours/week) in each wave, and childrearing indicates whether the respondent was co-residing with a child dependent in each wave.

Methodological approach

I first use latent transition analysis (LTA) to identify the most common combinations of transitions across work, relationships, and childrearing young women experience between Waves 3 (early adulthood) and 4 (formal adulthood) of the AddHealth study. LTA is a statistical tool that has been applied only limitedly to the study of young adult women’s health. LTA generates the probability of membership in a specific combination of work and family role transitions based upon a vector of observable characteristics. While LTA provides only ideal types of possible combinations of work, relationship, and childrearing transitions, the ideal types are useful to identify the most common sets of transitions young women are likely to experience between early and formal adulthood.
Using this typology, I then apply standard regression to examine how various combinations of work, relationship, and childrearing transitions are associated with impaired immunity. The final set of models assesses several possible stress-related mediators, including poverty, difficulty paying bills and housing costs, and household food insecurity.

**Preliminary results**

*Latent transition analysis*

The best-fitting LTA model converged on a seven class solution, with only 213 respondents (4.2% of the sample) presenting <70% probability of membership in any one group. Models based on a sub-sample omitting these respondents achieved similar results than models assigned them to the “best-fitting” transition set; thus, for now they are omitted. Figure 1 summarizes the characteristics of each group—so named for the traits that best identify their set of transitions—in the form of conditional item probabilities.

Figure 1. Conditional item-response probabilities from seven-factor latent transition model, 2001-2008

*Inequalities in immune dysfunction across transition subtypes*

Figure 2 presents predicted values of the outcome (EBV antibody titers) across the seven work-family transition subtypes. Model 1 is based on an unadjusted model; Model 2 controls for age, race, parental education, and family background (single/step/other parent family vs. two-parent family); Model 3 adds completed education by the respondent in Wave 4; and Model 4 adds a vector of health and stress-related measures for Wave 4: body mass index, smoking status, food insecurity, having missed a recent utility or housing payment, and self-reports of work-family conflict. All analyses are weighted by the inverse of the sampling fraction.
Preliminary results indicate a pattern of better immune functioning among women in the Consistently Single & Childfree group, where the average EBV antibody titer value equaled 151.19, net of all controls. By contrast, the highest-risk groups—Single to Married women and Cohabiting to Married Mothers—had EBV antibody titer values of 171.83 and 168.71, respectively. In full regression models not shown, the Single to Married and Cohabiting to Married Mothers groups had significantly higher EBV values compared to the Consistently Single & Childfree group.

Figure 2. Predicted EBV antibody titer values from several OLS models

<table>
<thead>
<tr>
<th>Transition Type</th>
<th>M1: Null model</th>
<th>M2: Adjusted for age, race, parental education, and family background</th>
<th>M3: M2 + respondent’s Wave 4 highest education</th>
<th>M4: M3 + missed utility or housing bills, food insecurity, work-family conflict, Wave BMI and smoking</th>
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<tbody>
<tr>
<td>Consistently single mothers</td>
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<tr>
<td>Single to cohabiting</td>
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<tr>
<td>Consistently married mothers</td>
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<td>Early cohabiters</td>
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<td>Single to married</td>
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<tr>
<td>Consistently single &amp; childfree</td>
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<td>Cohabiting to married mothers</td>
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Next steps

Prior to the annual meeting, I will work towards refining the latent transition models, including refining how each of the transitions are measured (e.g., refining the employment measure to include transitions are occupational categories and including provisions for non-standard schedule work as well as elements of job-related strain). I will also refine the models predicting EBV antibody titer values and make additional adjustments for confounding factors. A final step will include estimating EBV values over each of the transitions separately to determine what additional information is gained from using the person-centered approach and latent transition analysis.