Post-Traumatic Stress Disorder and Post-Traumatic Growth following Kidney Transplantation

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Key Points
- Although kidney transplantation can increase risk for post-traumatic stress disorder, many recipients experience psychologic growth in response to the same stressors.
- Underlying characteristics such as resilience affect how recipients respond to kidney failure and transplantation.
- Investigators are just starting to understand the role of psychologic stress during kidney failure and transplantation.

Abstract

Background Kidney transplantation (KT) is a life-saving therapy for kidney failure. However, KT recipients can suffer from debilitating depression, post-traumatic stress disorder (PTSD), and suicide. In contrast to PTSD, post-traumatic growth (PTG) is a positive psychologic change in response to a challenging situation. PTG has been studied in other chronic diseases, but less is known about its role in the setting of KT. We sought to elucidate the prevalence, predictors, and the effect of PTSD and PTG on post-KT outcomes. We also considered the roles of benefit finding and resilience.

Methods In a literature review, we identified publications that examined PTSD, PTG, benefit finding, and/or resilience in KT recipients. We excluded case reports and first-person narratives. Publications meeting the specified criteria after full text review underwent data abstraction and descriptive analysis.

Results Of the 1013 unique citations identified, 39 publications met our criteria. PTSD was the most common construct evaluated (16 publications). Resilience was studied in 11 publications, PTG in nine, and benefit finding in five. Up to 21% of adult and 42% of pediatric KT recipients may experience PTSD, which is associated with lower quality of life (QOL), impaired sleep, and other psychiatric comorbidity. PTG was associated with improved QOL, kidney function, and reduced risk of organ rejection. Although benefit finding tended to increase post KT, resilience remained stable post KT. Like PTG, resilience was associated with lower psychologic distress and increased treatment adherence and confidence in the health care team.

Conclusions PTG, resilience, and benefit finding appear to reduce the risk of PTSD, promote well-being, and reduce risk of graft failure in KT recipients. Future research to understand these relationships better will allow clinicians and researchers to develop interventions to promote PTG, resilience, and benefit finding, and potentially improve post-transplant outcomes such as adherence and reducing risk of organ rejection.

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Introduction
Kidney transplantation (KT) is a life-altering event typically after years of living with kidney disease. With advances in medical care, 78% of KT recipients will now survive for ten or more years (1). Quality of life (QOL) and functional performance both improve after KT, with recipients of living donor KT (LDKT) experiencing greater benefit compared with recipients of deceased donor KT (DDKT) due in part to their reduced exposure to dialysis (2). However, kidney disease, dialysis, years spent on the KT waitlist, KT surgery, and post-KT recovery can be highly stressful. KT recipients face the constant risk of graft failure, return to dialysis, and death (3). Recipients’ responses to these stressors range from impressive psychologic growth to debilitating major depressive disorder (MDD), post-traumatic stress disorder (PTSD), and suicide (4–6). Transplantation has been alternately described as a “scheduled trauma” (7) and “gift of life” (3).

Due to the complicated reality in which KT recipients live (8), much effort has been devoted to exploring the role and effect of depression and coping after KT. Only recently have investigators considered the role of PTSD and its counterexample, post-traumatic growth (PTG), in transplant recipients.

Although PTSD is a negative reaction (e.g., intrusive/negative thoughts, avoidance, negative mood, and increased arousal) to an actual or perceived severe threat, injury, or violence (9), PTG is defined as a positive psychologic change in response to an extremely challenging life situation (10). PTG parallels other concepts such as benefit finding, stress-related growth, and meaning making (11); certain coping approaches such as positive reframing and positive reappraisal are often described in similar terms. Resilience is often thought to affect the likelihood an individual will undergo PTG or benefit finding (12). See Table 1 for an overview of PTSD, PTG, benefit finding, and resilience.

In this literature review, we sought to elucidate the prevalence of PTSD and PTG after KT, predictors of PTSD and PTG post KT, and the effect of both on post-KT outcomes. We also considered the role of benefit finding and resilience after KT.

Materials and Methods
We conducted a review of the literature based upon guidelines established by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (13), followed by a descriptive analysis of the publications found to meet our review criteria.

Search Strategy
The medical librarian (J.L.) searched PubMed, Embase via Elsevier, PsycInfo via EBSCO, and Scopus from their dates of inception to the final search date of September 16, 2021. The librarian used subject headings and keywords for kidney transplantation and PTSD/PTG concepts and an English language filter. See Supplemental Methods for the full list of the search terms.

Inclusion criteria included: (1) In study of PTSD, PTG, benefit finding, and/or resilience in (2) KT recipients of all ages, and (3) available as full text in the English language. Exclusion criteria included: (1) case reports (n=2), (2) first-person narratives, and (3) dissertations.

Literature Review
All abstracts and titles were initially examined by two independent reviewers (R.N., E.B., T.R., J.S., M.L., and A.H.). The full texts of publications that met our criteria were then evaluated by two independent reviewers (R.N., E.B., T.R., J.S., M.L., and A.H.). During both steps, conflicts were resolved by a third reviewer or the majority of reviewers until consensus was reached.

All publications meeting the defined criteria after full text review underwent data abstraction. Data abstracted from the full text included publication type, journal, study location, primary construct(s), and psychologic measures utilized.

To identify any additional relevant citations, we compared the references cited by included reviews to the list of citations generated by the literature search. Additional references were reviewed and included in the data abstraction step if they met our review criteria.

Results
Search Results
The search yielded a total of 1892 citations. Figure 1 depicts the flow of article selection. After the removal of 879 duplicates, 1013 unique citations remained. The initial title/abstract review reduced the total number to 303 citations, and the full text review resulted in 38 publications for analysis. After reviewing citations of included reviews and examining the full text of three additional publications (bringing final number of unique citations evaluated to 1016), we included one additional publication. In total, we abstracted data from 39 publications.

Publication Characteristics
The 39 publications meeting inclusion criteria were published in 28 different peer-reviewed journals in 18 different countries and occurred in a variety of settings (e.g., clinic, hospital, community). The majority collected cross-sectional data from KT recipients; three were interventional studies, and three collected longitudinal data prior to and after KT. Due to the limited number of randomized controlled trials (RCTs; n=2), our data analyses were primarily descriptive in nature because the publications were not amendable to analysis by traditional meta-analytical techniques or other standardized quality assessment tools. Of the four constructs studied, PTSD was the most common (16 publications). Resilience was studied in 11 publications, PTG in nine, and benefit finding in five. Some publications studied more than one construct. Ten of the publications included children or adolescents. Nine publications also included heart, lung, and/or liver transplant recipients. Data abstraction and descriptive analyses focused on data pertinent to KT recipients. Table 2 summarizes publication characteristics.

Post-Traumatic Stress Disorder
We identified 16 publications that studied PTSD after KT (4,5,7,14–26). Six included pediatric populations (7,18–20,
Table 1. Overview of PTSD, PTG, benefit finding, and resilience

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
<th>Representative Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-traumatic stress disorder</td>
<td>An actual or perceived severe threat, injury, or violence to self, close family, or close friend leading to (1) intrusive symptoms (e.g., nightmares, flashbacks) (2) avoidance of stimuli associated with the event (3) negative alterations in mood/cognition, and (4) marked alterations in arousal (e.g., severe startle reflex), with symptoms lasting ≥1 month (9)</td>
<td>PTSD Checklist for DSM-5 (PCL-5)—updated to reflect DSM-5 criteria (55) PTSD Checklist—Civilian Version (PCL-C) (56) Davidson Trauma Scale (57) Impact of Events Scale—Revised—notably does not directly screen for alterations in mood (58)</td>
</tr>
<tr>
<td>Post-traumatic growth</td>
<td>A positive psychologic change (in self-perception, relationship, and/or life philosophy) in response to an extremely challenging life situation (10)</td>
<td>Post-Traumatic Growth Inventory (53)—measures five factors: relating to others, new possibilities, personal strength, spiritual change, and appreciation of life; developed to measure positive change in response to traumatic events and track this growth over time</td>
</tr>
<tr>
<td>Resilience</td>
<td>The ability to adapt well to stress, trauma, tragedy, or threats; to bounce back from difficult experiences and to overcome adversity (59)</td>
<td>Conner–Davidson Resiliency Scale (60)—abbreviated versions also available Resilience Scale (61)</td>
</tr>
<tr>
<td>Benefit finding</td>
<td>The identification of positive psychologic changes after a negative life event (11)</td>
<td>Dutch Illness Cognition Questionnaire, disease benefits subscale (54) Ryff’s Psychologic Well-Being Assessment, Personal Growth subscale (62)</td>
</tr>
</tbody>
</table>

25,26). There were four literature reviews (5,7,23,25) and two retrospective chart reviews (17,18). Six studies collected cross-sectional data from KT recipients (4,16,19,20,22,26), two studies collected longitudinal data from KT candidates and recipients of living related donor organs (14,24), one study collected longitudinal data from KT recipients (15), and one described an RCT of expressive writing (21). Outside of reviews, the studies included 5545 KT recipients, 4509 of whom were described by retrospective chart reviews. A range of instruments and structured interview techniques were used to screen for PTSD symptoms and/or establish a PTSD diagnosis (Supplemental Table S1, Table 3).

Prevalence of PTSD after KT varied widely, depending on the diagnostic tool or screening method used and the time since KT. In adults, prevalence ranged from 0.4% in recipients of LRKT 3 months post KT (14) to 21% in recipients of primarily DDKTs 3–6 months post KT (4). Among adults, KT recipients reported more frequent (P<0.002) and intense (P<0.001) PTSD symptoms than dialysis patients (16). Prior exposure to trauma (r=0.39, P≤0.01) (4), higher educational attainment (r=0.27, P≤0.05) (4), and reports of suffering/distress resulting from dialysis (β=0.32, P≤0.03) (15) were the only identified risk factors for PTSD symptoms post KT. Across other solid-organ transplant groups, potential risk factors including younger age, being a woman, lower educational status, pretransplant psychiatric disorder, retransplantation, postoperative complications, acute rejection, longer intensive care unit stay, poor social support, post-transplant depression, and low resilience have been suggested (5). PTSD was associated with impaired sleep (P<0.001) (16) and lower QOL in adult KT recipients (PTSD severity accounted for 15% of QOL variance; P=0.001) (4). If a KT candidate was diagnosed with PTSD prior to evaluation and transplantation, there was no evidence that this PTSD diagnosis increased the risk for death, graft loss, or medication nonadherence post KT (17).

In the pediatric population, 16%–42% experienced PTSD (18–20). Studies of PTSD in pediatric KT patients were limited by small sample sizes and cross-sectional study designs that prevented robust identification of risk factors. Depression was commonly comorbid with PTSD in pediatric patients, although the causal nature of this relationship was unclear (7,20). More severe PTSD symptoms in pediatric KT recipients were also identified as a key factor in lower QOL scores, as in adult studies (4,18). Across all pediatric solid-organ transplant groups, more severe PTSD symptoms were associated with acute (versus chronic) illness onset (odds ratio [OR]=3.36; P=0.02) and more severe medical complications (hospital admission days, number of intensive care unit days, return to dialysis, retransplantation; OR=6.08; P=0.03) (19); higher trauma scores were associated with greater number of medications (r=0.27; P=0.04) and more hospitalized days (r=0.28; P=0.04) (18).

Post-Traumatic Growth

We identified nine publications with a primary construct of PTG after KT in adults. There were no pediatric studies. All were published in 2013 or later (27–35). Six studies collected cross-sectional data from KT recipients (27–29,31,33,34), two collected longitudinal data from KT recipients (30,35), and one was a RCT of a positive psychology intervention (32). These studies described 762 KT recipients. The PTG Inventory (PTGI) was the most common instrument used to identify PTG (Table 3).

Review of the nine publications demonstrated several associations between PTG and KT-related factors and outcomes. Higher (better) PTG scores were associated with higher health-related QOL (r=0.18; P=0.02) (28), and two PTG subscales were associated with improved kidney
Benefit Finding

We identified five publications describing the process of benefit finding and related concepts after KT (11,36–39); one focused on the pediatric population (39). Four studies collected cross-sectional data from KT recipients (36–39); one study collected longitudinal data from KT recipients (11). The studies described 475 KT recipients. The studies used a wide variety of approaches, including semi-structured interviews, coping subscales, and other self-report measures to assess benefit finding and related concepts (Table 3).

The one longitudinal study demonstrated increased benefit finding post DDKT and post LDKT ($P \leq 0.01$). Across all time points, higher optimism scores were associated with higher benefit finding ($r^2 = 0.47; P < 0.01$), whereas a larger number of physical symptoms ($r^2 = -0.15; P = 0.02$) and more comorbid conditions ($r^2 = -0.28; P < 0.01$) were associated with lower benefit finding. During within-person analyses, higher distress pre KT was associated with higher benefit finding post KT ($\beta = 0.13; P \leq 0.01$), and higher post-KT distress at earlier time point(s) was associated with lower benefit finding at subsequent time point(s) ($\beta = -0.1$;
Table 2. Summary of publication characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>All Publications</th>
<th>Post-Traumatic</th>
<th>Post-Traumatic</th>
<th>Benefit</th>
<th>Resilience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(pediatric)</td>
<td>Stress Disorder</td>
<td>Growth</td>
<td>Finding</td>
<td></td>
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<tr>
<td>Total number</td>
<td>39 (10)</td>
<td>16 (6)</td>
<td>9</td>
<td>5 (1)</td>
<td>11 (4)</td>
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<tr>
<td>Journals—total unique</td>
<td>28</td>
<td>11</td>
<td>9</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Pediatric Transplant</td>
<td>6</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>British Journal of Health Psychology</td>
<td>2</td>
<td>1</td>
<td></td>
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<tr>
<td>General Hospital Psychiatry</td>
<td>2</td>
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<td>Psychosomatics</td>
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<td></td>
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<tr>
<td>Qualitative Health Research</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traumatology</td>
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<td></td>
<td></td>
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<tr>
<td>Other</td>
<td>21</td>
<td>7</td>
<td>8</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Study country—total unique</td>
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<td>7</td>
<td>6</td>
<td>4</td>
<td>8</td>
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<td>United States</td>
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<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>N/A (review)</td>
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<td>Poland</td>
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<td>Japan</td>
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<td>Netherlands</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>11</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Study type</td>
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<td></td>
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<tr>
<td>Cross-sectional (post KT)</td>
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<td>6</td>
<td>6</td>
<td>4</td>
<td>7</td>
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<tr>
<td>Cross-sectional (pre and post KT)</td>
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<tr>
<td>Longitudinal (post KT)</td>
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<td></td>
<td></td>
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<tr>
<td>Longitudinal (pre and post KT)</td>
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<tr>
<td>Interventional study</td>
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<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Retrospective chart review</td>
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<td>2</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Literature review</td>
<td>4</td>
<td>4</td>
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<td></td>
</tr>
</tbody>
</table>

KT, kidney transplant.

*Note that two publications involve more than one construct; some columns may add up to more than the total for All Publications.

Table 3. Range of instruments and techniques used to screen for PTSD symptoms and/or establish a PTSD diagnosis

<table>
<thead>
<tr>
<th>Source of Data</th>
<th>Post-Traumatic Stress Disorder</th>
<th>Post-Traumatic Growth</th>
<th>Benefit Finding</th>
<th>Resilience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chart review</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi-structured interview (SCID or similar)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Qualitative evaluation of semi-structured interview</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Psychometric instrument

- Impact of Event Scale—Revised
- Davidson Trauma Scale
- PTSD Checklist—Civilian Version
- UCLA PTSD Index for the DSM
- Childhood PTSD Reaction Index
- Child Trauma Screening Questionnaire
- Post Traumatic Growth Inventory
- Stress-related Growth Scale
- Dutch Illness Cognition Questionnaire, Disease Benefits Subscale
- Ryff's Psychologic Well-Being Assessment, Personal Growth Factor
- Ways of Coping, Positive Reappraisal Subscale
- Resiliency Assessment Scale for Children and Adolescents
- Resilience Scale
- Connor–Davidson Resiliency Scale
- Resilience Coping Scale Questionnaire
and did not appear to vary significantly associated with resilience. Higher resiliency scores were associated with a small ($r=0.26$, $P<0.05$) but statistically significant positive correlation with medication adherence (44). Resilience was associated with parenting styles characterized by attentiveness, sensitivity, and emotional involvement ($r=0.34$, $P<0.01$) and support of child autonomy ($r=0.27$, $P<0.01$), and strong, trusting relationships with the health care team (45,46). Resilience themes of “expressing confidence in the health care team” and “feeling a sense of connection” at the time of KT promoted stable transitions in KT care after transition from pediatric to adult providers (46).

### Discussion

Solid-organ transplant recipients undergo a physical transformation and a so-called psychic transplantation as they emotionally and cognitively integrate a new organ into their body and self-identity (30). Historically, the potentially traumatic nature of organ failure and transplantation was examined within a psychodynamic framework to characterize the effect of organ failure and living with another’s organ(s). The transplanted organ as a “foreign body” was reported to elicit a variety of intrapsychic conflicts. Men receiving organs from donors who were women were described to question their sexuality, and some recipients feared (or hoped) they would assume the personality characteristics of the donor (49).

More recently, investigators have studied organ failure and transplantation as potentially inciting traumatic events leading to PTSD symptoms and/or PTG (5). Compared with transplantation of other solid organs, KT is unique in that recipients have the alternative therapeutic option of maintenance dialysis therapy. Although QOL typically improves after KT, compared with maintenance dialysis (2,42), this is not universally true, and patients can question their decision to exchange the routine and social support provided by dialysis for the side effects of immunosuppressive regimens, risk of rejection, and postoperative complications (3,8). As with patients with other chronic medical conditions, KT recipients describe significant “treatment burden” when caring for their transplanted kidney; treatment burden can cause fatigue, mental exhaustion, and impinge on prior social roles (8).

In the current review, we systematically reviewed the literature to identify 39 publications exploring the prevalence, role, and effect of PTSD, PTG, and related constructs in KT recipients. Our review revealed three key points.

First, KT increases risk for PTSD symptoms, although recipients can experience psychologic growth in response to the same stressors. KT recipients reported more frequent and intense PTSD symptoms than dialysis patients did (16). The reported PTSD prevalence ranged from 0.4% to 42% of KT recipients. Prevalence was affected by severity and duration of kidney disease (LRKT recipients had lower prevalence compared with DDKT recipients), evaluation method (self-report measures resulted in higher prevalence than clinician evaluation), and age of recipient (children had higher prevalence than adults) (4,14,20). Because symptoms of PTSD present differently across developmental stages, diagnostic criteria for PTSD are different for children and adults.

### Table 4. Post-traumatic growth inventory score by kidney transplant recipient characteristics

<table>
<thead>
<tr>
<th>Kidney Transplant Recipient Characteristics</th>
<th>Post-Traumatic Growth Inventory Score, a Average (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All KT recipients</td>
<td>56.8 (429)</td>
</tr>
<tr>
<td>Prior organ rejection</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>50.21 (55)b</td>
</tr>
<tr>
<td>No</td>
<td>60.98 (109)b</td>
</tr>
<tr>
<td>Donor type</td>
<td></td>
</tr>
<tr>
<td>Living</td>
<td>74 (44)c</td>
</tr>
<tr>
<td>Deceased</td>
<td>59.07 (211)c</td>
</tr>
</tbody>
</table>

a PTG Inventory scores range from 0 to 105.
b $P=0.01$.
c $P=0.03$.

In contrast, when comparing KT recipients with dialysis patients using the Positive Reappraisal subscale of the Ways of Coping Questionnaire, there were no differences in subscale or total scores (38). In a cross-sectional study using Ryff’s Psychologic Well-Being for Personal Growth, personal growth scores were higher among KT recipients relative to donors ($t$ test =2.13; $P=0.03$) (36).

Two qualitative studies were conducted with KT recipients: one in a pediatric population and the other in adults who had suffered graft loss. For adults suffering graft loss, meaning making was one of the primary themes identified, with participants identifying a positive change in their interpersonal relationships or outlook on life resulting from organ failure and a renewed sense of purpose after organ failure (37). Pediatric patients described undergoing adjustment and personal growth despite the challenges and adversities of kidney failure (39).

### Resilience

We identified 11 publications describing resilience during and after KT (25,34,40–48); four focused on the pediatric population (25,44–46). Seven studies collected cross-sectional data from KT recipients (34,43–48), one collected cross-sectional data from both candidates and recipients (41,42), one was a review (25), and one was a self-described “quasi-experimental interventional pre-test-post-test research with control group” study (40). A total of 700 KT recipients were described in these studies. Four studies used semi-structured interviews, two used the Connor-Davidson Resilience Scale, two used the Resilience Scale, one used the Resilience Assessment Scale for Children and Adolescents, and one study used the Resilience Coping Scale Questionnaire (Table 3).

Among adults, higher resilience scores post KT were associated with higher PTGI scores (34). Qualitative studies revealed themes related to both resilience and PTG (48). Resilience training was found to improve self-efficacy ($P<0.001$), social adjustment ($P<0.03$), and empowerment ($P<0.001$) in KT recipients (40). Resilience was associated with lower psychologic distress (OR =0.945; $P<0.01$) (43) and did not appear to vary significantly between DDKT and LDKT recipients (42) or between KT recipients and candidate donors (41).

Pediatric studies also demonstrated improved outcomes associated with resilience. Higher resiliency scores were associated with a small ($r=0.26$, $P<0.05$) but statistically significant positive correlation with medication adherence (44). Resilience was associated with parenting styles characterized by attentiveness, sensitivity, and emotional involvement ($r=0.34$, $P<0.01$) and support of child autonomy ($r=0.27$, $P<0.01$), and strong, trusting relationships with the health care team (45,46). Resilience themes of “expressing confidence in the health care team” and “feeling a sense of connection” at the time of KT promoted stable transitions in KT care after transition from pediatric to adult providers (46).
children younger than six years old (9), thus limiting comparability across pediatric studies to adult patients (7). Although prior trauma exposure (with no known PTSD diagnosis) increased risk for PTSD post KT (4), a previous PTSD diagnosis did not affect death, graft loss, or medication nonadherence risk post KT (17), possibly highlighting the negative effect of undiagnosed mental illness. PTSD post KT was associated with increased prevalence of other psychiatric comorbidities and poorer QOL and sleep (4,7,16,20). It was uncertain whether these associations represented risk factors for PTSD or outcomes related to PTSD due to the limited number of longitudinal studies capturing both KT candidates and recipients (only available for adult LRKT recipients).

Second, and in contrast, PTG was associated with improved kidney function (30,31), health-related QOL (28), and physical activity (33). Recipients of living donor organs, and those with no prior history of organ rejection, had higher average PTGI scores (30,31,34) (Table 4). There are conflicting opinions as to the effect of time after trauma on level of benefit finding and/or PTG (11). The publications included in this review demonstrated increasingly higher benefit finding as time elapsed post KT (11), but there were insufficient data to characterize PTG trajectory after KT. The related construct of resilience tended to be a static quality, not affected by transplant status (41,42), consistent with the general understanding of resilience as a personality characteristic that may modulate the level of stress perceived during a traumatic event (12).

Third, underlying characteristics such as resilience affected how recipients responded to kidney failure and transplantation. Resilience was associated with increased adherence (44), feeling connected to the health care team (46), lower psychologic distress (43), and an improved ability to express emotions, retain control, look for opportunities/positive refocusing, appreciate different aspects of life, take responsibility for behaviors, and make choices in line with wishes (48). Resilience has been proposed to reduce the intensity of distress experienced during a traumatic event, thus making it less likely the individual experiences distress and undergoes PTG (12). Interestingly, resilience in KT recipients was associated with greater PTG (34), and often overlapped with PTG during thematic qualitative analysis (45). This may speak to the unique type or level of distress experienced by KT recipients or the extended duration of stressors from kidney failure and transplantation.

Although a thorough discussion of approaches to target PTSD and promote PTG, benefit finding, and resilience was beyond the scope of this review, two publications meeting inclusion criteria demonstrated benefit from interventions to promote resilience (40) and PTG (32). Other studies, which did not meet our inclusion criteria, supported the use of cognitive behavioral therapy–based approaches such as Quality of Life Therapy and psychologic counseling and Mindfulness Based Stress Reduction to improve psychologic distress and quality of life for KT candidates (50-52). Developing interventions to specifically target PTG, resilience, and benefit finding pre and post KT will be important next steps for clinicians and researchers.

A major strength of this review is our focus on the underappreciated but pivotal constructs of PTSD, PTG, resilience, and benefit finding after KT. Our review highlights the importance of these constructs in relation to graft outcomes and provides an impetus for future research in these areas. Future research directions will include expanding our understanding of these constructs, facilitating the development of interventions to strengthen resilience and promote PTG and benefit finding, and evaluating the effect of these interventions on adherence, graft function, and patient survival.

Our review has limitations. First, our search across four databases may have missed relevant literature indexed in other sources. Second, we included full-text studies. There may be relevant conference proceedings, trial registrations, and other gray literature that were not captured. Third, our analyses were primarily descriptive because the publications were not amendable to analysis by standardized quality assessment tools.

In summary, the pathway each recipient will take post KT remains challenging, if not impossible, to predict. Investigators are just starting to understand the role of psychologic stress during kidney failure and transplantation. PTSD, PTG, and related constructs are relatively new additions to the fields of psychiatry and psychology. The DSM first described PTSD in 1980 (9). PTG and related constructs were first discussed, primarily in the oncology literature, in the 1980s and 1990s (10,53,54). However, as demonstrated by this review, PTSD, PTG, and related constructs affect patient well-being and graft function. Multidisciplinary collaborations (23) among nephrologists, psychiatrists, and psychologists are needed to address empirical gaps in the literature and to develop and evaluate interventions to support PTG, benefit finding, and resiliency in KT candidates and recipients.

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